



SANS

Social & Affective Neuroscience Society



Abstract Book

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Keynote Speaker Talk

Thursday, April 11 14:45-15:45



Kristen A. Lindquist, Ph.D.

University of North Carolina at Chapel Hill

Deconstructing Emotions

Questions about the nature of emotion are some of the most enduring in psychology and neuroscience. We have been studying emotion scientifically for over a century, but answers to questions about the nature of these important states have remained elusive. Traditionally, attempts to weigh in on the mechanisms of emotion have used a single level of analysis and focus almost exclusively on cognitive, neurophysiological, or cultural mechanisms. In this talk, I discuss work that spans all three. I will begin by showing experimental evidence that emotions are mental states characterized by cognitive features such as valence, arousal, and situated semantic meanings. Next, I'll demonstrate that these features are the product of interactions amongst distributed brain networks that predictively regulate visceromotor outputs by making best guesses about adaptive actions. Finally, I'll close by showing that such predictions are learned via experience within particularly cultural contexts. Together, this work forms the basis of a new constructionist model in which emotions are both deeply embodied and encultured states.

Presidential Keynote Speaker Talk

Friday, April 12 14:45-15:45



Sheena Josselyn, Ph.D.

University of Toronto

Making memories in mice

Understanding how the brain uses information is a fundamental goal of neuroscience. Several human disorders (ranging from autism spectrum disorder to PTSD to Alzheimer's disease) may stem from disrupted information processing. Therefore, this basic knowledge is not only critical for understanding normal brain function, but also vital for the development of new treatment strategies for these disorders. Memory may be defined as the retention over time of internal representations gained through experience, and the capacity to reconstruct these representations at later times. Long-lasting physical brain changes ('engrams') are thought to encode these internal representations. The concept of a physical memory trace likely originated in ancient Greece, although it wasn't until 1904 that Richard Semon first coined the term 'engram'. Despite its long history, finding a specific engram has been challenging, likely because an engram is encoded at multiple levels (epigenetic, synaptic, cell assembly). My lab is interested in understanding how specific neurons are recruited or allocated to an engram, and how neuronal membership in an engram may change over time or with new experience. Here I will describe data in our efforts to understand memories in mice.

SANS Conference Oral Presentations

Thursday, April 11 09:30-11:00

Symposium 1 – Intergroup Relations

Jennifer Kubota¹, Juncheng Lu², Jaime Castellon³, Celia Guillard⁴, Jillian Franks⁵

¹University of Delaware, ²Beijing Normal University, ³University of Pennsylvania, ⁴Cornell University, ⁵Brandeis University

Studying intergroup relations is critical to understanding the mechanisms that give rise to prejudice, discrimination, conflict, and social injustice, and social affective neuroscience provides an important tool for assessing these mechanisms. The SANS Equity, Diversity, Inclusion, and Justice committee is excited to present its first symposium highlighting work on intergroup relations by SANS community members. The symposium will start with the announcement of diversity award recipients, followed by a featured talk by Dr. Jennifer Kubota on how interracial contact shapes perceptions of social injustice during arrests of civilians. Finally, there will be a series of flash talks by SANS trainees covering a range of topics, examining how social, affective, and cognitive neural processes contribute to stereotype-induced stress, the influence of group membership on decisions to harm civilians in intergroup conflict, the contributions of stereotypes to social discounting decisions, and empathy biases related to political group membership.

S1.1 - Interracial contact shapes perceptions of social injustice during arrests of perceived Black and White civilians by White police officers

Jennifer T. Kubota¹, Tzipporah P. Dang¹, Denise M. Barth², Grace Handley¹, Jasmin Cloutier¹

¹University of Delaware, ²University of Chicago

People may be motivated to understand the dynamics of interracial arrests when they perceive the potential for injustice, which may be amplified for individuals with greater interracial contact. To address these questions, we conducted an fMRI study that examined (n = 69) White-identified U.S. participants' neural activity when viewing real-world videos with varying degrees of aggression of perceived White officers arresting a perceived Black or White civilian. Activity in brain regions supporting mentalizing was greater when viewing perceived Black (vs. White) civilians involved in more aggressive police encounters. This was amplified for individuals with greater interracial contact with Black relative White individuals. Additionally, participants rated officers as more aggressive and their use of force as less legitimate when the civilian was perceived to be Black. These results indicate that Black civilians are perceived to receive harsher treatment and that viewing aggressive arrests increases mentalizing as police use more excessive force on perceived Black civilians. These results also suggest that engagement of mentalizing processes may help perceivers determine whether they are observing social injustice, and individuals with more contact may be more sensitive to this likelihood.

S1.3 - Contributions of stereotypes and prospective imagination to decisions on behalf of others

Jaime Castellon¹, Ekaterina Goncharova¹, Adrianna Jenkins¹

¹University of Pennsylvania

BACKGROUND AND AIMS: Humans frequently make decisions that lead to unequal outcomes for different groups. Recent findings suggest that decision inequality aligns with how brains represent stereotypes along dimensions of warmth and competence. Prior research also indicates that imagination can influence future reward preferences, but this is unexplored in social contexts. Here, we used neuroimaging and representational similarity analysis to examine the roles of stereotypes and future imagination in people's distribution of delayed rewards to members of different social groups.

METHODS: Forty healthy adults completed an imagination task and a social delay discounting task during fMRI scanning. In the imagination task, participants viewed information about named targets (e.g., "Carlos Lopez") engaging in various activities in the future (e.g., "going on a morning run this weekend") and guessed the target's enjoyment. Target names were associated with 10 different ethnoracial-gender combinations. In the discounting task, participants made decisions about whether the same named targets should receive a small monetary reward sooner or a larger reward after a delay. We created representational dissimilarity matrices (RDMs) based on (i) warmth and competence ratings of targets (stereotype RDM) and (ii) the proportion of larger-later choices made in the delay discounting task (choice RDM). Using a whole-brain searchlight approach, we compared patterns of brain activation during target imagination to the stereotype RDM. Using follow-up region of interest analysis, we compared patterns of activation to the choice RDM. Linear regression was used to evaluate the contributions of stereotypes and imagination to future reward choices.

RESULTS: The searchlight analysis revealed a significant cluster in the medial prefrontal cortex (mPFC) in which neural representations during the imagination task corresponded to stereotypes about targets' warmth and competence. Further analyses found that participants' representations of targets in the mPFC during the imagination task corresponded to participants' choices about those targets' future rewards. A hierarchical regression comparing the contributions of stereotypes and future imagination to social reward choices indicated that future imagination alone was a better predictor of choice than

stereotypes alone; however, a model with both stereotypes and imagination was not more accurate than a model with stereotypes alone.

CONCLUSIONS: We found that activation patterns in the mPFC during the prospective imagination of named targets shared a structure with warmth and competence stereotypes. Moreover, the structure of delayed reward choices for the named targets corresponded to the structure of the stereotypes and activation patterns in mPFC. These findings suggest an interplay between stereotypes and imagination in shaping decisions that result in unequal outcomes for members of different social groups.

S1.4 - Understanding political outgroup harm through a computational and neuroscientific approach

Celia Guillard¹, Amy Krosch¹, Hongbo Yu²

¹Cornell University, ²University of California, Santa Barbara

BACKGROUND AND AIMS: As U.S. partisan violence increases, it becomes more critical than ever to understand the mechanisms of political outgroup harm. Here, we asked whether the tendency to harm political outgroup members stems in part from basic differences in the valuation of outgroup vs. ingroup members' pain.

METHODS: Across six preregistered behavioral studies we used a computational approach to investigate aversion to political ingroup vs. outgroup pain. Specifically, we used the Hypothetical Harm Aversion task in which participants (Deciders) made decisions between amounts of money for themselves and amounts of shocks for anonymous individuals who would play the role of the Receivers. They were instructed that the money was always for themselves (the Decider), while the shocks were always for the Receiver. We then modeled participants' choice behavior as a function of target party membership and reward value to examine whether the subjective value of outgroup pain was lower than ingroup pain.

RESULTS: As expected, participants showed reduced harm aversion when deciding for political outgroup vs. ingroup members whether individuals were represented abstractly with just political party labels (Studies 1, 3, & 4) or more concretely with face images and party labels (Studies 2, 5, & 6). In all studies, participants sacrificed fewer financial resources to avoid harming political outgroup members than ingroup members. Further, participants enacted the greatest physical harm against political outgroup members and were consistently fastest to harm them and slowest to help them.

CONCLUSIONS: These behavioral findings suggest that individuals place a lower value on outgroup pain and that harming outgroup members may be more reflexive than helping them. In an ongoing neuroimaging study of this paradigm, we are examining the neural underpinnings of political outgroup vs. ingroup harm. Specifically, we are investigating neural regions associated with early visual processing of faces (i.e., FFA) to examine the role of perceptual dehumanization and regions associated with social cognition (e.g., mPFC, dmPFC, ACC) to examine the role of mentalization and similar processes when engaging in political outgroup vs. ingroup harm. Importantly, this design allows us to disentangle whether individuals engage separable processes when harming political outgroup vs. ingroup members, or if harm towards both ingroup and outgroup members relies on the same cognitive processes, just to a different degree. By studying the psychological and social cognitive mechanisms involved in politically motivated intergroup harm, we hope to better understand how violence is increasingly perpetrated against political rivals.

ACKNOWLEDGEMENTS AND FUNDING: NSF: Graduate Research Fellowship Program & The Cornell MRI Facility

S1.5 - Across the Political Divide: Decreased EEG Neural Resonance for Political Outgroup Members

Jillian Franks¹, Jennifer Gutsell¹

¹Brandeis University

BACKGROUND AND AIMS: Political polarization and partisanship have increased in the United States over the last thirty years [1-2]. This study investigated empathy biases in the context of political group membership using electroencephalography (EEG) by indexing neural resonance. Neural resonance is characterized by a similar activation pattern occurring in the observer's sensorimotor system when watching another perform an action, such that the brain activation pattern of the observer looks similar to the pattern that would be seen if the observer was acting themselves. Mu-Suppression, a measure of neural resonance, reflects a decrease in EEG oscillations in the mu frequency (8-13Hz) over these sensorimotor areas [3]. Previous work demonstrated that people show less neural resonance indexed via mu-suppression for racial outgroup members and those in lower socioeconomic groups [4-6]. This research extends that work by examining neural resonance among political ingroup and outgroup members. One benefit of studying political groups is that it is a strong social group identity that can be manipulated by random assignment to group conditions, which cannot be done with other similar group identities like race. We predicted that participants would resonate more with political ingroup members than outgroup members.

METHODS: To test the hypothesis, a college sample (N = 43) of self-identifying Republicans (conservative) or Democrats (liberal) watched ostensible political ingroup and outgroup members perform a repetitive motor action and display emotions.

RESULTS: A two-way repeated measures ANOVA revealed a significant difference between ingroup and outgroup mu-suppression, with participants resonating significantly more with same-party political members than cross-party members performing a motor action, $F(42) = 13.49$, $p < .001$, $\eta^2 = .243$. Additionally, there was a moderate negative correlation between mu-suppression when viewing sad ingroup members and self-reported empathy felt toward those sad ingroup members, $r(38) = -.354$, $p = .029$. Lastly, there was a strong positive correlation between empathy ratings when viewing sad ingroup members and negative contact with political outgroup members, $r(38) = .786$, $p < .001$, and no correlation between outgroup positive contact and empathy for sad outgroup members.

CONCLUSION: The first finding supports our hypothesis and provides evidence for implicit brain-related empathy biases

concerning political groups. The second finding suggests that group differences in mu-suppression while viewing emotions can be associated with self-report measures of empathy. The third finding suggests that negative contact with political outgroup members may lead to more empathizing with ingroup members; however, positive contact with outgroup members is not associated with increased empathy toward political outgroup members.

ACKNOWLEDGEMENTS AND FUNDING: Social Interaction and Motivation Lab National Institute of General Medical Sciences (T32-GM084907-09)

S1.6 - Affective and motivational effects of social identity threats

Ava Ma De Sousa¹, Lee Qianqian Cui¹, Youngki Hong², B. Locke Welborn¹, Kyle Ratner¹

¹University of California, Santa Barbara, ²Columbia University

BACKGROUND AND AIMS: This study investigates the influence of exposure to negative stereotypes on neural incentive processing. Although behavioral research has highlighted the potential for stereotype exposure to induce stress, the neural mechanisms underlying these outcomes remain unclear. In initial research, forty Mexican American college students were exposed to negative stereotypes about their group, by watching stigmatizing news clips about Latinos, compared to a control condition in which they watched news clips addressing similar issues but focusing on the broader U.S. They then played a seemingly unrelated reward task, the Monetary Incentive Delay task, in which they anticipated both gains and losses. Machine learning analyses revealed differential patterns of activity in the nucleus accumbens of participants exposed to negative stereotypes compared to those in the control condition. This suggested a link between stigmatization and motivated behavior, which may have implications for health and well-being.

METHODS: To further elucidate these findings, our current study aims to replicate this initial study. Using the same procedure, we have broadened our sample to focus on community members to assess the generalizability of the initial observations seen in college students. Secondly, we incorporate a White non-Latinx control group to discern whether observed effects stem from social identity threat or other sources, such as a general response to seeing any group stereotyped. We will conduct both univariate and multivariate analyses on a priori ROIs of the right and left nucleus accumbens, as well as the ventromedial prefrontal cortex. In univariate analyses, GLMs will be defined for each participant with trials modeled with functions corresponding to the fixation phase prior to target presentation, the target phase, and the feedback phase. These GLM analyses will serve to examine whether there are different activation levels in reward processing regions depending on whether participants were exposed to negative stereotypes about Latinos, as well as depending on participant social identity, as well as potential interactions of these two factors. To examine whether our current community sample replicates findings from the college student sample, we will conduct a multivariate pattern classification analysis to examine whether patterns of activity in our predefined ROIs differ based on stereotype exposure and social identity of the participant during anticipation of gains and losses.

RESULTS: Data will be analyzed according to the methods above. We have currently collected 35 participants' data, and aim to have 60 of our target 80 participants in time for analysis at SANS.

CONCLUSIONS: This study contributes to our understanding of the effects of stigma on basic reward processing, with implications for mental health and well-being.

ACKNOWLEDGEMENTS AND FUNDING: This work is supported by the National Science Foundation.

Thursday, April 11 11:30-13:00

Symposium 2 - The neurocognitive dynamics fostering social connection and agreement in conversation

Laetitia Mwilambwe Tshilobo¹, Shannon Burns², Ashley Binnquist³, Sebastian Speer¹

¹Princeton University, ²Pomona College, ³University of California, Los Angeles

Conversation is our most powerful tool for building social connection, resolving disagreements, and navigating ideological differences. It allows us to share our thoughts and feelings, learn about different perspectives, and build empathy for others. When we engage in conversation, we open up the possibility of finding common ground, social connection, and agreement. This can help to break down barriers and divides and foster a more harmonious society. In this symposium, we present four studies exploring the neurobiological aspects of conversations that emphasize their impact on social connection, decision-making, and navigating interpersonal conflict. First, we will present an fMRI-hyperscanning study focusing on what makes conversations most effective in fostering a social connection and the neural mechanisms that support this connection. The second talk investigates what happens when the goal of the conversation changes, and we are conversing to make a joint decision rather than to build a connection. This study employs fMRI-hyperscanning to investigate the mental state dynamics that support agreement. The third study combines fMRI and fNIRS to explore how coordination of neural state transitions fosters more agreement in joint decision-making conversations. The fourth study further increases the conflict between conversation partners. It uses fNIRS-hyperscanning to examine neural states engaged when conversing with people who hold different ideological beliefs. This study contributes to the work on the neural mechanisms that support intergroup communication. Collectively, these studies presented in this symposium highlight the importance of studying real-time conversation to understand human social interaction better. In a panel-style discussion following the empirical research presentations, we will reflect on recent advances and future directions in the science of hyperscanning conversation.

S2.1 - Neural alignment during real-time conversation among friends and strangers

Laetitia Mwilambwe-Tshilobo^{1,2}, Lily Tsoi³, Sebastian Speer², Shannon Burns⁴, Emily Falk², Diana Tamir¹

¹Princeton University, ²University of Pennsylvania, ³Caldwell University, ⁴Pomona College

Conversations are central to human social connection. Although conversations with a close friend may differ from those with a stranger, both can foster closeness. When people feel close to one another or share experiences, the neural activity of their brains becomes more aligned. What occurs during a conversation that leads to a successful social interaction, and does neural alignment differ based on the social relationship context of the conversation partners? Here, we examine neural dynamics between dyads of friends and strangers during real-time conversation and explore how conversation relates to later feelings of social connection.

We analyzed fMRI hyperscanning data from dyads (N=30 self-identified friends; N=27 strangers) engaged in a real-time conversation. The conversation task consisted of two conditions: a natural, free-flowing, and a pre-scripted condition. During the free-flowing conversation, dyads were given specific prompts as conversation starters and took turns speaking to each other. For the scripted conversation, the partners in a dyad were given the script from a conversation of another dyad to read out loud (control condition). To examine how conversation aligns the brain across all dyads, we measured whole-brain intersubject correlation (ISC) between dyads in each condition.

Across all dyads, naturalistic conversation led to greater alignment in brain regions associated with social cognition (e.g., temporoparietal junction, inferior parietal lobule, bilateral dorsal medial prefrontal cortex) and language (inferior and middle frontal gyrus), compared to scripted conversation. Neural alignment in these regions was similar for friend and stranger dyads. Next, we examined how socially connected partners in each dyad felt towards each other after the conversation using self-reported responses rating the enjoyment of the conversation and similarity and closeness to their partner. Friends enjoyed their conversation more and felt similar and closer to their partner than strangers.

Here, we explore interpersonal neural alignment in friends and strangers during real-time conversation. Generally, conversation resulted in greater interpersonal brain alignment. Our results suggest that while friends and strangers shared a common alignment pattern during conversation, they differed in how socially connected they felt afterward. Future work will assess differences in the relationship between neural alignment and social connection outcomes between friends and strangers.

S2.2 - Finding Agreement: fMRI-hyperscanning reveals that dyads diverge in mental state space to align opinions

Sebastian P.H. Speer¹, Haran Sened¹, Laëtitia Mwilambwe-Tshilobo^{1,2}, Lily Tsoi³, Shannon M. Burns⁴, Emily B. Falk², Diana I. Tamir¹

¹Princeton University, ²University of Pennsylvania, ³Caldwell University, ⁴Pomona College

Many prize agreement as the ingredient that turns a conversation from a debate into a delightful duet and imagine that harmony paves the way for connection and conflict resolution. Yet, learning from other people's diverging opinions can also foster understanding and facilitate productive collaboration and progress, suggesting that the process matters. Dyads can arrive at agreement through either cooperation or competition, but in either case, agreement depends on the ability to anticipate others'

intentions, emotions, and actions. By scanning two people simultaneously engaging in a joint decision-making task, we captured the emergent and bidirectional nature of these complex interactions. We tested how two communicators explore each other's minds, and how that exploration aligns opinions.

In two 10 minute conversations, dyads (N = 60) discussed how to best allocate money to five solutions to two controversial public health problems while being scanned. Both partners were instructed to either persuade their partner or compromise with each other. Partners individually allocated money before and after the conversation, enabling us to track how the conversation changed their opinions and whether they found agreement. Results showed that conversation improved agreement: participants agreed more after the conversations. Instructions to compromise amplified this effect: Participants changed their opinions more in the compromise condition, resulting in significantly more agreement than in the persuade condition. Next, we tested how conversation aligns opinions. We hypothesized that flexibility and novelty are key to agreement. That is, dyads may diverge in order to align. We tested this hypothesis by tracking individual and dyadic exploration of mental state space throughout the conversation. We used a model that decodes mental states from whole-brain activity patterns, allowing us to decode each person's 'location' on each dimension in mental state space at each moment. We measured two types of motion through this mental state space: individual exploration and dyadic divergence. Divergence was computed as the distance between the two speakers at each moment of time across the whole conversation, where increasing distance represents a higher dyadic exploration.

Both individual and dyadic exploration of mental state space reliably predicted changes in opinion and agreement. Individuals who explored a larger mental state space moved closer to their conversation partners' opinions, leading to more agreement relative to less exploratory participants. Dyads who diverged in mental state space showed greater agreement than dyads that converged. Instructions to compromise amplified divergence and ultimate agreement relative to instructions to persuade. Together, these results suggest that trying to find agreement may require more individual and dyadic exploration, something that happens naturally when people are motivated to compromise but not persuade.

S2.3 - Coordinated Neural State Transitions during Joint Decision-Making

Shannon M. Burns¹, Emily B. Falk², & Diana I. Tamir³, Matthew D. Lieberman⁴

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Theories of social interaction posit that in order to coordinate with other people effectively, separate minds must mutually adapt to each other and converge on overlapping mental representations. Through this, one can anticipate the other people's behavior, form joint goals, and operate as cohesive social units.

However, the mechanistic nature of "mutual adaptation" at the neural level is still in question. In particular, some work finds synchronous neural activity in social cognition and/or attention areas as characterizing social interaction, while other research finds negative correlations between whole-brain pattern similarity and successful social outcomes like enjoyment and understanding.

In this work, we attempt to reconcile these findings by investigating two hypotheses. First, does the timing of neural state switches correlate between brains during social interaction, even if the neural states themselves don't align? This would indicate that divergent neural patterns of interacting brains are still coordinated and complementary. Second, does synchronized activity in the mentalizing network relate to more coherent neural state switches? This would provide evidence of a mutual monitoring system that enables broader mental coherence at the dyad level.

To answer these questions, we analyze data from 107 fNIRS dyads and 60 fMRI dyads who all participated in naturalistic joint decision-making conversations during hyperscanning. Analyses are conducted with intra- and inter-subject pattern correlation to identify switch points in neural states within participants and synchrony of neural activity across participants. Results from this work will help clarify the specific mechanisms by which interacting brains mutually adapt and create successful social interaction.

S2.4 - Dyadic brain state analysis: A novel approach for understanding cross-ideological communication

Ashley L. Binnquist¹, Stephanie Dolbier¹, Benjamin A. Tabak², Matthew D. Lieberman¹

¹University of California Los Angeles, ²Southern Methodist University

Ideological conflict has fueled polarization in recent decades along with growing partisan antipathy, political violence, and dehumanization. A strong democracy depends on citizens' ability to debate, disagree, and effectively communicate ideas, yet many avoid cross-ideological communications (CIC) altogether. When people do engage in CIC, it can be difficult to determine whether the interaction was productive based on self-report and observation alone. Hyperscanning, the collection of neural data from multiple people as they interact, provides a powerful tool to better understand these complex social interactions. Neural synchrony has been shown to be an important indicator of friendship, cooperation, and shared reality (Lieberman, 2022). However, assessing the neural data from real-time CIC may benefit from a less restricted model of the individual and shared neural states that represent interpersonal conflict communication, negotiation, and resolution. This talk will present a novel method to analyze hyperscanned neural data with a K-means machine learning model, adapted from Cornblath et al. (2020), to determine the most common brain states utilized during face-to-face communication across a sample and within an individual. Participants from two cities, Los Angeles and Dallas, had two conversations with each other over Zoom – one neutral conversation and one oppositional conversation on an ideological topic for which they disagreed. Neural activity was simultaneously collected during both conversations using functional near infrared spectroscopy (fNIRS). Self-reported forecasts and experiences of the conversations were collected along with video recordings of the interaction. Individual and dyadic time-dependent brain states were analyzed along with self-report, facial recognition, and coder-rated measures.

Findings from time-dependent analysis of dyadic brain states will also be compared with other current dyadic analysis methods, such as neural synchrony and wavelet coherence, to highlight their relative contributions to understanding the neural bases of conversations. Current findings emphasize the potential for brain state analysis to provide a potentially suitable method of analysis of real-time interpersonal communication, such as CIC, that may help account for the complexity of face-to-face communication.

Friday, April 12 09:00-10:30

Symposium 3 - Neuroscience of Narration

Mareike Bacha-Trams¹, Yaara Yeshurun², Iiro Jaaskelainen³, Sam Nastase⁴

¹University of Duisburg-Essen, ²Tel Aviv University, ³Aalto University, ⁴Princeton University

The importance of narratives in our society is highlighted by biologist Stephen J. Gould's adage that humans are "the primates who tell stories". Narratives create a sense of community and bind individuals into functional social groups. However, the modern digital sphere provides a new arena for narratives and the characteristics of digital and social media affect how narratives are created and how they synchronize or polarize different individuals.

Although narratives have existed for so long, the neuroscientific mechanisms of their processing have not yet been fully explored. Recent developments in the field of social neuroscience as e.g., advancements in data analysis algorithms for functional magnetic resonance imaging (fMRI) have enabled investigation of socially complex interactions such as narratives and their underlying neural correlates. With investigating narrative elements in ecologically valid stimuli, such as movies, audiobooks, news articles, or conversations, ambiguous and convergent features could be studied that may be overlooked in isolated test settings.

This symposium, focusing on the neuroscience of narratives, will show how contextual background shapes the perception and interpretation of a narrative. The symposium will survey different aspects of the social cultural and affective role of narratives in our everyday social lives. The first talk focuses on neural synchronization between followers of different religions and political orientations when watching political videos (Yeshurun). The second talk investigates factors of credibility in news articles as a form of narratives (Bacha-Trams). The third talk explores speaker-listener relationships in context-rich conversations (Nastase) and the fourth talk investigates the impact of the thinking style and cultural background when perceiving narratives (Jaaskelainen). Taken together, the symposium showcases how neuroimaging can provide promising insights into the neurocognitive mechanisms supporting socio-cultural features of narrative processing, including news and political broadcasting (talk 1 and 2), social feedback (talk 2 and 3), cultural understanding (talk 1 and 4), and speaker-listener coupling (talk 3 and 4). The symposium offers unique perspectives from two women and two men speakers from four different countries (Finland, Germany, Israel, USA).

S3.1 - Neural synchronization in a polarized world

Yaara Yeshurun¹

¹Tel Aviv University

People frequently interpret the same information differently, based on their prior beliefs and views. In this talk, I will describe two neuroimaging projects done in our lab testing how prior beliefs and views shape the neural response to real-life events. In the first project right- and left-wing participants were scanned while watching political videos before and after the elections in Israel. Due to the unstable political situation during those times, the scans were two and a half years apart. In the second project, religious, secular, and Ex-religious participants were scanned while watching videos containing content that generates controversy among those groups. Results of both projects suggest group-dependent differences in brain activation and synchronization in higher-order regions. Surprisingly, such differences were also revealed in early brain processing, such as in primary visual and auditory cortices. Moreover, preliminary neuroimaging results revealed that when participants changed their beliefs and views (following external events), there were differences in the brain response that depended on changes in participants' interpretation and emotional response to the video clips. These differences were most pronounced in the hippocampus, amygdala and caudate, suggesting that differences in individual's interpretation are reflected in regions involved in emotion, memory and reward. Taken together, our results suggest that polarization is not limited to higher-order processes, but rather already emerges in early brain processing.

S3.2 - The credibility of modern tales: News reports as an example for the use of narrative in a digitalized world

Mareike Bacha-Trams¹

¹University of Duisburg-Essen

BACKGROUND: Narratives are a very efficient way to convey knowledge and information. In difference to simply report facts, narratives embed events into a story, creating relations and making them socially relevant. Thus, it may not surprise that today's news is often presented in the form of a narrative. One main element of narration used in news is to increase the emotionality of the reported events in order to make the news more tangible. Further, the influence of other social group members is of relevance for evaluating the credibility, e.g., by receiving social feedback. Thus, in the here reported studies we were particularly interested in how the emotionality as well as social group behavior such as feedback might affect the evaluation of news credibility.

METHOD: In this multidisciplinary approach with one functional magnetic resonance imaging (fMRI) study and one behavioral study we investigated specific factors of news evaluation. In the fMRI study, we aimed at examining the underlying

neurocognitive mechanisms of news evaluation by using a three-factorial within-subject design in typically-developing human adults (N = 36). The participants evaluated news of three news topics (based on the emotions of fear, disgust and surprise), in two different writing styles (emotional and neutral) and in three contexts (a daily newspaper, a regional newspaper and a tabloid). They further received social feedback. In the behavioral study, participants (N= 64) were confronted with chat messages in groups with group members who were either all of the same opinion (cooperative) or on two different opinions (confrontative) regarding the credibility of read news.

RESULTS: Analyzing the fMRI data using general linear modeling, we found specific brain activity patterns for the evaluation of news credibility in lateral frontal, medial frontal, and lateral parietal cortices, many of them part of the Default Mode Network. Further, while differences in brain activity for distinct topics and sources were less pronounced, emotionally written news impacted news credibility strongly. A comparison of the groups in the behavioral study showed that the members in the cooperative groups were less likely to change their evaluation of news credibility after the chat than members of confrontative groups. However, the group atmosphere was rated better in cooperative groups.

CONCLUSIONS: Taken together, our findings thus indicate that affective and social neurocognitive aspects as particularly the perceived emotionality in news itself as well as in corresponding exchange with others impacts the evaluation of news credibility. Using characteristics of narration as the embedding in emotional and social contexts also in news not only showed to elicit brain activation associated with e.g., reflecting the own self, mentalizing, taking perspective or feeling empathy and reward but further that these features were crucial for deciding if news are credible or not.

S3.3 - Learning a shared linguistic space for transmitting our thoughts to others in natural conversations

Samuel A. Nastase¹

¹Princeton University

We use language to communicate our thoughts to others. Real-world communication, however, is often spontaneous, interactive, and fundamentally contextual—making it unamenable to experimental control. In this talk, I argue that we can position large language models emerging from the machine learning community as computational intermediaries for translating neural activity from one brain to another in natural conversations. These self-supervised models learn the rich, context-sensitive structure of language from real-world examples, allowing us to quantify contextual meaning in a way that was previously inaccessible. I show how we can use contextual embeddings from these models to capture the linguistic content of brain-to-brain coupling in two conversation datasets: (1) unconstrained, face-to-face conversations in dyadic pairs of ECoG patients, and (2) interactive, dyadic conversations acquired using fMRI hyperscanning. Using ECoG, we show that linguistic content emerges in the speaker's brain prior to word articulation, then reemerges in the listener's brain shortly after word articulation—word by word in spontaneous conversations. Using the spatial coverage fMRI, we uncover brain-to-brain linguistic coupling that extends beyond the classical language network into default-mode and theory-of-mind areas. These findings suggest that large language models key into the same context-sensitive linguistic space that human speakers use to transmit their thoughts to others.

S3.4 - Cultural background and analytical vs. holistic cognitive styles shape shared understanding of narrative information

Iiro P. Jääskeläinen¹

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Previous behavioral studies have suggested that shared understanding of narratives can be shaped by the cultural background of experimental subjects. Here, I present evidence from recent neuroimaging studies disclosing how the cultural background of subjects can shape how the brain processes narratives. In the first study, we presented a 71-minute audiobook to 48 Finnish subjects with Finnish vs. Russian family background. We used a behavioral wordlisting task and latent semantic analysis to probe similarities/differences in the meanings elicited by the audiobook: the subject groups diverged both in several parts of the story that had culture-specific elements but also in some parts with neutral descriptions. Inter-subject correlation (ISC) of brain activity disclosed differences in temporal regions that process semantics of individual words and in precuneus that has been associated with processing of narrative-level information. Additionally, secondary visual cortical areas showed between-group differences, suggesting differential shared visual imagery during audiobook listening. Pooling the data across the groups suggested these and additional regions as supporting shared understanding of the audiobook. In the second study, we used an analytical-holistic cognitive styles scale widely employed in cross-cultural studies to probe how these cognitive styles shape how the brain processes a drama movie. We observed widespread divergence in brain activity between analytical and holistic thinkers, including in precuneus. Notably, the subjects were all of the same ethnicity, thus controlling for the potential other cultural differences between samples of analytical and holistic thinkers if they had been recruited from two different countries. Taken together, our results suggest that even subtle differences in cultural family background shape shared understanding of narratives, and that this takes place in brain regions responsible for processing of words, narratives, and visual imagery. Our results also support the notion that analytical vs. holistic cognitive styles, often manifested in representatives of Western vs. Eastern cultures, respectively, can significantly shape how the brain processes a narrated movie stimulus.

Saturday, April 13 09:00-10:30

Symposium 4 - Neural, network, and neural network approaches for social relational representation

Eshin Jolly¹, Jae-Young Son², Miriam Schwyck³, Manasi Malik⁴

¹Dartmouth College, ²Brown University, ³Columbia University, ⁴Johns Hopkins University

In a memorable scene from the classic film *Mean Girls* (2004), the transfer student Cady is guided through the great blooming buzzing confusion of a high school cafeteria. Within moments, she is able to perceive the social relationships within and between cliques. Almost instantly, Cady identifies that the popular 'plastics' are the school's power brokers, and she quickly learns a mental map of the friendships, enmity, and shifting alliances within her network. By the end of the film, she is proficient in navigating social decisions with far-reaching consequences, like strategically gossiping to boost her own status. Although most people's social lives are a little less dramatic than Cady's, all of us face the same cognitive challenge of using relational information to perceive, infer, learn, represent, and navigate social relationships.

In this symposium, each presenter addresses distinct components of how the mind solves these cognitive problems: Manasi Malik uses graph neural networks to explain how humans use structured visual information to make judgements about social relations; Miriam Schwyck characterizes what makes social brokers so effective at learning others' relationships within a network; Jae-Young Son identifies abstraction and replay as key cognitive mechanisms for representing and navigating longer-range chains of social relationships; Eshin Jolly demonstrates that the brain represents other people in terms of their relationships and provides evidence that person memory relies on neural reinstatement of social interactions. Together, our abstracts provide multifaceted insights into the broader question of how we make sense of relational information about the complex, vast, and evolving webs of the social world.

S4.1 - Person memory is supported by the neural reinstatement of social interactions

Eshin Jolly¹, Sushmita Sadhukha¹, Maryam Iqbal¹, Luke J. Chang¹

¹Dartmouth College

BACKGROUND AND AIM: How does remembering other people comport with our understanding of episodic memory? One possibility based on prior work in social cognition is that we remember people as a function of their intrinsic attributes (e.g. personality traits) (Uleman & Kressel, 2013). Another possibility based on event-segmentation theory is that people are simply contained with the broader events that we use to segment our experiences (Zacks, 2020). More recent work has demonstrated that relationships between people drive how we represent and remember others (Jolly et al., 2023). We compared these possibilities using naturalistic neuroimaging to estimate a measure of neural reinstatement by having participants watch a rich character drama and later recall what they could about each character in an unconstrained manner.

METHODS: Participants (N=36) watched the first four episodes of the television show *Friday Night Lights*, and later performed a naturalistic character recall task in which they recounted aloud what they could remember about each main character for two minutes while undergoing fMRI. Average memory patterns were estimated for each recalled character separately for each participant in 268 parcellated regions of interest. Three estimates of neural reinstatement were computed in each region by comparing the spatial similarity of each memory pattern to brain activity during episode watching for: (a) general narrative events involving a character; (b) specific moments in time when a character could be seen or heard; (c) even more specific moments when a character having a social interaction. Reinstatement effects were compared within each participant using a multi-level model to identify what regions showed preferential reinstatement of social interactions when remembering each character. To link reinstatement activity to memory content, we further identified any regions in which the magnitude of neural reinstatement for specific social interactions predicted the probability of participants remembering that specific relationship when recalling a character.

RESULTS: Overall, several notable regions within both the social brain (dmPFC, pSTS, ATL) and episodic memory (PMC, hippocampus) networks showed preferential reinstatement for social interactions relative to general character information or events that involved a character. Within these identified regions, a single node within the right pSTS predicted the probability of participants recalling specific relationships as a function of reinstatement magnitude for observing those particular relationships.

CONCLUSIONS: This study provides neural evidence that social memory for individuals consists of the information we learn about how they interact with others. This provides a mechanism for why we represent and remember people through their relationships with others (Jolly et al., 2023) rather than intrinsic attributes like traits (Uleman & Kressel, 2013) or more general narrative events (Zacks, 2020). These findings also provide convergent evidence for recent work demonstrating that social interaction features can predict time-series activity in the pSTS when recalling general narrative information (Masson et al., 2022). This raises the possibility the pSTS in particular may play a role in memory beyond social perception (Pitcher & Ungerleider, 2021) by specifically reinstating social interaction information that we acquire.

S4.2 - Relational visual representations underlie human social interaction recognition: An investigation using Graph Neural Networks

Manasi Malik¹, Leyla Isik¹

¹*Johns Hopkins University*

Humans possess a remarkable ability to effortlessly recognize social interactions from visual input. Attempts to model this ability have typically relied on generative inverse planning models, which make predictions by inverting a generative model of agents' interactions based on their inferred goals, suggesting humans use a similar process of mental inference to recognize interactions. However, growing behavioral and neuroscience evidence suggests that recognizing social interactions is a visual process, separate from complex mental state inference. Yet despite their success in other domains, visual neural network models have been unable to reproduce human-like interaction recognition. We hypothesize that humans rely on relational visual information in particular, and develop a relational, graph neural network model, SocialGNN. We find that SocialGNN matches social interaction judgments at the level of human agreement on a dataset of animated shape videos, performs significantly better than a matched neural network model without graph structure, and is on par with generative inverse planning models. Unlike prior models, SocialGNN can predict human judgments in both animated and natural videos without explicit representations of the agents' mental states. These results suggest that humans can make complex social interaction judgments without an explicit model of the social and physical world, and that structured, relational visual representations are key to this behavior.

S4.3 - The role of one's own social network position in learning new networks: Brokerage is associated with better network learning

Miriam E. Schwyck¹, Meng Du², Carolyn Parkinson²

¹*Columbia University*, ²*University of California, Los Angeles*

BACKGROUND AND AIMS: Navigating our complex social lives requires understanding where others sit in our social networks. Some individuals may be more attuned to the structure of their social world, and thus, better able to learn new social networks due to having accumulated accurate priors about social network structure in their own lives. Correspondingly, such individuals may acquire more advantageous positions in their own social networks. Here, we tested if brokers (i.e., people who connect otherwise disparate people in their own networks) were better at learning novel network structures.

METHODS AND RESULTS: In four studies, we systematically tested how participants' brokerage capacities within their realworld social networks was associated with learning and remembering new networks. We found that brokers were especially good at recalling new networks that were structured like typical realworld social networks, but not "unnaturally" structured ones, suggesting that brokers are attuned to the structure of real-world networks. Within these "naturally" structured networks, brokers were especially good at learning the ties that existed, rather than focusing on ties that were missing. They were also better at learning about other brokers' ties within these networks, compared to participants who had lower brokerage capacity. To test if this advantage was domain-specific, we framed the networks for some participants as flight networks among airports, rather than friendships among people. We found no differences in the association between brokerage and network learning between these two conditions, suggesting this advantage may be domain-general.

CONCLUSIONS: All humans must navigate social networks, both new networks and familiar ones. This work illuminates the mechanisms of network learning based on one's own experiences, establishing new links between one's own social network position and one's ability to learn new network structures.

ACKNOWLEDGEMENTS AND FUNDING: This work was supported by funding from the National Science Foundation (DGE-2034835).

S4.4 - Replay shapes abstract cognitive maps for efficient social navigation

Jae-Young Son¹, Marc-Lluís Vives², Apoorva Bhandari¹, Oriel FeldmanHall¹

¹*Brown University*, ²*Leiden University*

BACKGROUND: To make adaptive social decisions, people must anticipate how information flows through their social network. While this requires knowledge of how people are connected, networks are too large to have firsthand experience with all possible routes between individuals. How, then, are people able to accurately track information flow through social networks? Drawing inspiration from a long history of spatial navigation research, we test whether people learn abstract cognitive maps that enable the identification of efficient routes between remotely-connected individuals, and whether, during overnight rest (e.g., sleep), a replay-like mechanism reshapes these cognitive maps to aid social navigation through long chains of social relationships spanning distinct communities.

METHODS AND RESULTS: To test whether humans use cognitive maps to solve the challenge of social navigation, we created a task requiring subjects to navigate information flow through a friendship network. We had subjects take the navigation task immediately after learning about the network, then brought subjects back to the laboratory the next day after overnight rest to test whether navigation accuracy improved after sleep. Even immediately after learning, subjects achieved above-chance navigation accuracy for long-range navigation problems (e.g., friends-of-friends-of-friends-offriends). After overnight rest, subjects were more accurate at solving all navigation problems, with a particularly pronounced improvement for the longest-range problems spanning multiple communities. Using computational modeling, we found that subjects' behaviors

are best explained by a model in which people learn network members' longer-range, multistep connections. Results reveal that this model provides a natural interface for a replay-like mechanism to stitch knowledge of pairwise relationships into longer sequences of multistep relations, enabling representation of more abstract cognitive maps after overnight rest.

CONCLUSION: To navigate complex webs of relationships, people must anticipate how information flows, which requires understanding how network members are connected. We find that people are proficient at solving social navigation problems requiring inference about how information spreads through a network, aided by representing it as an abstract cognitive map encoding not only direct, onestep friendships, but also integrating over indirect, multistep connections. These cognitive maps of social networks are refined during overnight rest using a replay-like mechanism that efficiently reuses experiences from prior learning to facilitate mental representation of abstract network structure, such as the existence of communities and the individuals that bridge them. Our results provide mechanistic insights into how people learn abstract cognitive maps of social networks through experience and replay, and suggest that abstraction is the lynchpin of how social navigation problems are solved.

Symposium 5 - A.I. Approaches to Social & Affective Neuroscience

Mark Thornton¹, Ren Calabro², Grace Qiyuan³

¹Dartmouth College, ²University of Chicago, ³University of California, Los Angeles

Artificial Intelligence (AI) is playing an increasingly large role in both our day-to-day lives and in our research programs. The recent "AI Spring" has resulted in a number of tools that have revolutionized all areas of psychology and neuroscience. The talks in this symposium use a variety of AI tools, including Natural Language Processing (NLP) and Deep Neural Networks (DNN) to examine topics ranging from the linguistic patterns that characterize the political divide in the U.S., the identification of specific neural circuitry to social memory encoding, and the analysis of multimodal features of dyadic interaction. The session concludes with a talk from our invited speaker, Mark Thornton, on how Artificial Neural Networks present a transformative tool for analyzing and understanding social and affective cognition.

S5.1 - Deep Social Neuroscience

Mark Thornton¹

¹Dartmouth College

The past 15 years have witnessed a major shift in machine learning research: the deep learning revolution. The artificial neural networks (ANNs) that have emerged from this shift carry considerable promise for social and affective neuroscience research. In this talk, I will discuss how the field can capitalize on the advantages of ANNs - particularly their scalability and flexibility - while avoiding or mitigating their shortcomings. Using examples from my own and others' research, I will discuss two key applications of ANNs. First, I will discuss how researchers can leverage the scalability of ANNs to annotate, manipulate, and generate stimuli and participant behavior. Second, I will discuss how the flexibility of ANNs can make them excellent cognitive models for a wide variety of social and affective phenomena. Together, these applications of ANNs have the potential to catalyze increasingly naturalistic and computational research in the field.

S5.2 - Decoding Political Bias Using Brain Imaging and Deep Language Models

Ren Calabro¹, Ryleigh Nash¹, Kaushal Gumpula¹, Uladzislau Andreichuk¹, Su Karaca¹, Daniel Grzenda¹, Yuan Chang Leong¹

¹University of Chicago

BACKGROUND AND AIMS: People with different political leanings often interpret the same sentences or phrases in vastly different ways, which contributes to growing political division. For example, the phrase "defund the police" carries different connotations for conservatives and liberals. Our work aims to utilize brain imaging and deep language models to quantify and predict differences in how conservatives and liberals interpret polarizing political content.

METHODS: We fine-tuned Bidirectional Encoder Representations from Transformers (BERT) models separately on 1200 conservative- and liberal-leaning immigration-related news articles (Fig. 1). This resulted in two language models, conBERT and libBERT, that provide a proxy of how language representations differ in conservative and liberal text sources. Each model was fit to fMRI data of 38 partisans watching immigration-related political videos, and the proportion of variance explained was computed. We adopted a classification analysis to test the hypothesis that participants' brain data would be better fit by the model matching their political leaning (Fig. 2A). A participant was classified as conservative if the fMRI time series was better fit by conBERT, and liberal if libBERT provided a better fit. Classification accuracy was computed at each voxel and adjusted for multiple comparisons using FWE-rate cluster size correction (cluster-forming $p=0.001$).

RESULTS: Cosine distance between model embeddings were higher for political news articles than neutral news articles ($p < 0.001$), indicating that the two models developed distinctly different interpretations of politically charged content. The left anterior cingulate cortex (ACC) and the left anterior insula (AI), key regions of the brain's salience network, were better fit by the BERT model aligned with the participants' political ideology (FWE $p < 0.05$; Fig. 2B). Classification accuracy was 81.6% in the left ACC and 89.5% in the left AI. These results suggest that regions in the brain involved in determining what information to prioritize at a given moment are selectively attuned to one's political beliefs when viewing naturalistic political content.

CONCLUSION: Our findings indicate that distinct patterns of brain activity when conservatives and liberals viewed political videos are captured by deep language models aligned with participants' political beliefs. These results suggest that divergent brain activity between the two groups reflect divergent semantic representations of the same content. They also suggest that fine-tuning deep language models to specific ideological contexts offer a novel approach for modeling partisans' intrinsic beliefs and biases. Using these models to study how political beliefs modulate neural representations may help us better understand the psychological roots of political differences and inform interventions aimed at bridging partisan divides.

S5.3 - How do brains and body language align during conversations? An fNIRS hyperscanning investigation with deep neural network (DNN) analyses of multimodal dynamics

Grace Qiyuan Miao¹, Joyce Yanru Jiang¹, Ashley Binnquist¹, Rick Dale¹, Francis Steen¹, Matthew Lieberman¹

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Conversations between people represent complex non-linear combinations of nonverbal and neurocognitive responses, in addition to the words that are spoken. New tools are needed to wrangle these multimodal components into coherent models of conversations. Although the psychological aspects of conversations have been examined (Kardas et al., 2022), these other conversational channels remained unexplored. Using functional near-infrared spectroscopy (fNIRS), a portable neuroimaging device, we investigate the neurobiological foundations of social connections initiated by conversations among stranger dyads. By coupling neural activations with audiovisual recordings of participants (N=70 dyads), we aim to explore the multimodal synchrony across neural and behavioral dimensions during dyadic conversations. Rather than running discrete analyses of neural and nonverbal data, time series data from each are being entered as features into a multimodal deep neural network (DNN) – including channel-based fNIRS signals typically used in synchrony analyses and OpenFace data that quantifies facial expressions over time with artificial intelligence algorithms. In our pipeline, time-series data is segmented into 5-second chunks, reduced to 32 dimensions using an Autoencoder DNN, and then examined for the degree to which dyads exhibit synchronous movement, occupy nearby locations, and cover similar territory in a 3-dimensional representation of their conversation. Results show that real dyads score differently on these variables than permuted dyads. For example, remoteness between individuals of a dyad in this space (measured as Euclidean distance) is significantly smaller (closer together) than across dyads ($B = -0.95$, $t = -6.2$, $p < .0001$ in 10,000 comparisons). Additionally, dyadic synchrony, defined by the covariation of position across 3 dimensions using Pearson's correlation r , is significantly greater between individuals of dyad compared to baseline ($t = 8.6$, $p < .00001$). Results support the presence of brain-to-brain synchrony. Moreover, this neural synchrony may be integrated quantitatively with other behaviors in a single machine-learning model. These variables will be compared across conversational depths (i.e., shallow/deep), gender compositions (i.e., male-male/female-female/male-female), and racial backgrounds (i.e., same/different), and related to self-reported social connections formed. A goal of this work is to make a meaningful contribution to the broader literature on multimodal synergy and to elucidate the complex interplay between various channels involved in social communication and connection.

SANS Conference Abstracts



Poster Session I
Thursday, April 11, 2024
15:45 - 17:00

P1-A-1 - Physiological correlates of self-protective bias in response to negative social feedback using a wearable device

Jinhee Kim¹, Gahyun Lim¹, Hackjin Kim¹

¹Korea University

BACKGROUND AND AIMS: In daily interactions, people often face various forms of social feedback that can elicit defensive responses. This study primarily investigates the psychophysiological features of self-protective responses triggered by negative social evaluations with the purpose of developing a mobile system utilizing biometric signals for real-time self-esteem monitoring.

METHODS: Fifty-eight participants (36F, 22.55 ± 2.38) engaged in a reciprocal artwork evaluation task using a smartphone application while their cardiac activity was monitored by a wearable smartwatch. In each trial of the task, participants were paired with a unique partner from which they received positive, negative, or neutral evaluations of their artwork for a total of 75 trials. These evaluations had the potential to influence participants' subsequent binary choices regarding the partner's creativity, representing a manifestation of self-protective behavior. Trial-by-trial fluctuations of the Value for Self-Protection (VSP) were modeled based on a reinforcement learning approach. Heart rate changes, measured by photoplethysmography, were analyzed at the onset of evaluative feedback in addition to resting heart rate variability indices. In addition, a pre-study survey was completed by participants to measure depression symptoms.

RESULTS: Behavioral results revealed a distinct pattern of self-protective responses in which participants made quicker and more critical judgments on partner's artwork in higher VSP trials. In addition, depression severity was linked to an inclination for negative creativity assessments in the high VSP trial. Around four seconds post-feedback, trials with high VSP exhibited transient heart rate deceleration, with a sustained effect observed in the cardiac profile. The depressed group did not display distinct heart rate patterns based on VSP. The degree of heart rate deceleration in high VSP trials negatively correlated with individual resting heart rate variability.

CONCLUSIONS: This study demonstrates cardiovascular reactivity to social evaluations, potentially reflecting an individual's orienting responses and cognitive load. These findings contribute to our understanding of the physiological features underpinning self-protective bias in social contexts and highlight the role of individual psychophysiological differences. Additionally, this study lays the groundwork for the development of mobile systems utilizing wearable devices for real-time monitoring of self-esteem fluctuations in response to social feedback.

ACKNOWLEDGEMENTS AND FUNDING: We thank Minyoung Kim, Daon Lee, Kyunghwan Lee for their help with data collection. This research was supported by the National Research Foundation & funded by the Korean government (MIST) (NRF-2021M3A9E4080780).

P1-A-2 - Exogenous emotional cues influence the hedonic experience of reward

Samantha Reisman¹, Joseph Heffner², Oriol Feldmanhall¹

¹Brown University, ²Yale University

BACKGROUND AND AIMS: Making accurate judgements about who to trust, share, or cooperate with is critical to our social well-being. Our current understanding of how we make social decisions is primarily informed by frameworks of value-based choice, which detail how our experiences of environmental reward influence behavior. These experiences are shaped in part by endogenous emotion signals, which respond to violations in reward expectations and track reward volatility. In the social world, there are signals that may shape how we experience environmental reward, including exogenous emotional cues (e.g., observing someone smile), which often fluctuate and can therefore deeply influence our endogenous emotions during social interactions. However, because existing value-based frameworks do not account for exogenous emotional cues, we know little about their influence on the human experience of reward. Across two studies, we explore whether fluctuating exogenous emotion cues influence experiences of reward to guide social choice.

METHODS: In Study 1, participants (n = 95) play the role of the Receiver in a Dictator Game with partners that differ in how often their emotions fluctuate (i.e., emotional volatility). On each trial, partners display an emotion (i.e., sad, happy) and provide a monetary gift (i.e., \$0, \$1). In Study 2, participants (n = 47) played as the Investor in a Trust Game, where monetary outcomes were dependent on their partner's actions (i.e., defect, reciprocate).

RESULTS: In Study 1, we find that receiving a monetary reward from a happy partner is experienced as more pleasurable than receiving a monetary reward from a sad partner. However, the pleasure of getting a reward from a happy partner is attenuated when the partner is emotionally volatile. In Study 2, we find that receiving money from a happy partner who reciprocates a trust decision is experienced as more pleasurable than receiving money from partners who are equally trustworthy but sad. Additionally, we find that partner happiness buffers against the unpleasantness felt when that partner defects, but emotional volatility significantly dampens the positive experience of interacting with a happy partner overall. These exogenous emotional cue effects were unique to the social domain; a nonsocial comparison task revealed that fluctuating shape colors do not alter the hedonic experience of reward.

CONCLUSIONS: Although value-based decision-making frameworks do not account for the impact of exogenous emotions on choice, these findings reveal that exogenous emotion cues influence our experience of reward.

ACKNOWLEDGEMENTS AND FUNDING: This study was funded by the Carney Innovation Grant from the Robert J. and Nancy D. Carney Institute for Brain Science to OFH.

P1-A-3 - Loneliness and resting parasympathetic activity interact to differentially influence approach behaviors for social and non-social information

Mary Mousa¹, Anita Restrepo², Emily Silver², Alexander Heno¹, Kelly Faig³, Karen Smith¹

¹Rutgers University - Newark, ²University of Chicago, ³Hamilton College

BACKGROUND AND AIMS: Loneliness, or perceived social isolation, is thought to increase social approach, and simultaneously increase sensitivity to potential threats. These motivational shifts work together to reduce feelings of loneliness by allowing individuals to build and maintain relationships while also avoiding further social rejection. However, the circumstances under which loneliness results in approach as compared to avoidance remain unclear. The parasympathetic nervous system (PNS) is innervated by prefrontal cortical and subcortical circuits that play an important role in motivated responding, including social engagement. Resting PNS activity has been linked to variability in approach and avoidance behaviors, with individuals with high resting PNS demonstrating more flexible adaptation to salient cues. Thus, resting PNS activity represents one factor that may moderate responses to loneliness. Indeed, prior research has found that high resting PNS activity is associated with an increased likelihood of approach behaviors in lonely individuals. Here, we build on this research, examining whether this effect differs for social and non-social positive and negative information.

METHODS: To examine this question, 117 participants, aged 18 to 53 years, were recruited from Rutgers University-Newark and the broader Newark area. Participants completed an approach-avoidance task in which they were asked to make decisions about whether to approach or avoid positive and negative social or non-social images. Measures of resting PNS and self-reported loneliness were also collected.

RESULTS: Loneliness was associated with reduced approach (increased avoidance) of negative information for individuals with higher resting PNS. For individuals with lower resting PNS, loneliness was associated with increased approach of nonsocial but not social negative information. There were no differences in how individuals approached positive social and non-social information.

CONCLUSIONS: Our findings suggest loneliness shifts motivational behaviors in meaningful ways, and these shifts are moderated by resting PNS activity. Lonely individuals with high resting PNS may be better able to flexibly leverage competing approach and avoidance motivations in a context-dependent manner, increasing avoidance of negative information while maintaining approach of positive. We discuss these findings in the context of prior research examining interactions between parasympathetic cardiac activity and loneliness and the role the PNS may play in adaptive motivated responding.

ACKNOWLEDGEMENTS AND FUNDING: M.S.M. was supported by NIH G-RISE grant 5T32GM140951

P1-A-4 - Mind Games: Impact of Affect and Stress on Competitive Social Decision-Making

Fnu Avisha¹, Arjun Ramakrishnan², Scott Rennie³, Yaoguang Jiang³, Michael Platt³

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BACKGROUND AND AIMS: Real life social decision-making is a complex process that requires continuous prediction of our social partners' beliefs, desires, and intentions. In order to simplify and understand the underlying mechanisms, previous studies have typically focused on discrete gameplay and assumed rationality of players, supported by normative game theory models. Moreover, the impact of emotions on decision-making in general, and even in discrete gameplay, leading to deviations from normative accounts, has been demonstrated in recent studies. However, the influence of emotions on continuous social decision-making remains unexplored and forms the basis of this study.

METHODS: We examined the influence of happiness and focus on strategic decisions within the context of a two-player, competitive, virtual hockey game. 28 young adults played the game, where participants (referred to as kickers) guided a ball to the finish line, and a trained opponent (acting as the goalie) aimed to block it using a bar. The zero-sum game consisted of 50 trials. Before each trial, participants rated happiness and focus on a 0-100 scale. An Emotiv's 32-channel cap recorded EEG signals from frontal locations (FP1, FPz, FP2, and/or Fz, F3, F4, F7, F8). Alpha/beta and theta/beta bandpower ratios were used as proxies for acute stress induced by competitive gameplay.

RESULTS: Playing the game led to an increase in stress, as evidenced by a decline in frontal theta/beta and alpha/beta ratios during the trial. Whereas, successful goal scoring resulted in increased happiness, focus and reduction in stress. Strategic complexity, operationalized as the total number of trajectory changes in a trial, correlated with trial success, suggesting that complex trajectories were more likely to lead to victory. Lastly, focus and strategic complexity were compromised under stress. However, interestingly, we observed that happiness moderated the impact of stress on focus and strategic complexity. That is, higher levels of happiness reduced the impact of stress on focus and strategic complexity.

CONCLUSIONS: These findings highlight how affective states, particularly happiness, impact strategic decision-making in a competitive game. This study contributes to the evolving field of continuous social decision-making, and provides insights into the impact of emotions on strategic choices. These results augment the growing body of work on the impact of emotions on decision making.

ACKNOWLEDGEMENTS AND FUNDING: This research was funded by The Brain and Behavior Research Foundation (Grant ID 27649), the DBT RLS Re-entry fellowship, the IIT Kanpur start-up grant, the DBT Wellcome Trust IA fellowship (IA/I/20/2/505204) to AR, NIH grants R37-MH-502 109728-01 and R01-MH-108627-01, and the Simon's Foundation grants to MLP.

P1-A-5 - Structural variations in the midcingulo-insula network predict individual differences in social preferences and social network position in adolescence

Junho Bang¹, Kiho Sung², Yoosik Youm², Sunhae Sul¹

¹Pusan National University, ²Yonsei University

BACKGROUND AND AIM: Despite recent evidence on the relationship between structural changes in the social brain and development of other-regarding processes, how such neurobehavioral differences contribute to adolescents' real-life social experiences is yet to be investigated. In this study, we explored how structural features of empathy-related brain, particularly anterior mid-cingulate cortex (aMCC) and anterior insula (AI), are associated with individual differences in social preferences of adolescents, and how this relationship influences their social relationships in real-life context.

METHODS: We analyzed three-wave longitudinal data (April 2022 to February 2023) collected from the first-year students at a girls' high school (N = 59), which was part of Korean Study of Adolescents' Health (KSAH). Cortical thickness of aMCC and AI (estimated from the structural MRI), dispositional empathy (measured with a empathic concern subscale of IRI; Davis, 1980), and social preference for distributive justice (quantified by applying an economic utility model to participants' choices in a distribution task; Kameda et al., 2016) were obtained from the Time2 data. Longitudinal changes in a local broker position within peer network at school were measured using the complete social network data from the beginning (Time1) and end (Time3) of school year. We examined whether and how the structural features of aMCC and AI are associated with the students' social preferences and social network position.

RESULTS: First, aMCC and right AI cortical thickness positively correlated with empathic concern, suggesting their involvement in empathy-related processes. Second, this neurobehavioral predisposition was associated with preference that prioritizes the maximization of the share for the least advantaged (i.e., maximin preference over utilitarian preference). Third, preference concerning others in need predicted changes in individuals' social network position as a local broker from the beginning of the school year (Time1) to the end of the school year (Time3). A path analysis revealed that cortical thickness of the empathy-related aMCC and AI predicted the change in the social network position via the maximin preference.

DISCUSSION: Our findings show that the structural features of the empathy-related midcingulo-insula network contribute to real-world social experiences of adolescents by shaping their social preferences involving empathetic concern for others in need. Future research may benefit from understanding the interaction between social and cognitive development during adolescence, considering that the aMCC and AI are key regions of the midcingulo-insula network, which has recently been suggested to play a critical role in general cognitive function.

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P1-A-6 - State Anxiety is Associated with the Prospective Estimation of Self-Control Costs

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¹New York University, ²NYU Langone Health

BACKGROUND AND AIMS: Self-control failures are a challenge for healthy and clinical populations and are common during negative affect states like stress or anxiety. Emerging work has demonstrated that exerting self-control is cognitively costly, providing one explanation for this difficulty. We previously showed that the cognitive cost of self-control can be measured behaviorally and that stress exposure increases these costs. However, this work focused on the experiential costs of self-control—that is, the control cost participants register when confronted with temptation. It is unclear how these costs are estimated prospectively and further, how states of anxiety and depression—which are linked to lapses in self-control—might affect this estimation process. Here, we sought to extend this work to examine how prospectively estimated self-control costs relate to self-reported anxiety and depression.

METHODS: Healthy dieters (n=47, Mage=29.4) completed a two-session behavioral study. During session 1, participants provided self-reported foods ratings and completed a state and trait anxiety inventory (STAI-S, STAI-T, respectively) and the Beck Depression Inventory (BDI-II). A week later, participants repeated the STAI-S and completed the self-control decision task. On each trial, participants viewed a food image that varied on temptation (low, medium, high), quantity (small, medium, large) and exposure time with the food (1-60 min). They reported trial-by-trial WTP (from a \$15 study endowment) to avoid the food depicted on each trial. A realization phase followed this, where one trial was randomly selected and played out for real. We examined how choice behavior related to self-reported measures of anxiety and depression.

RESULTS: A statistical analysis focused on the association between anxiety and depression and control costs at higher levels of temptation and exposure times. State anxiety directly before the task was positively correlated with WTP to avoid temptation ($r=.401, p=.028$), suggesting that higher states of anxiety relate to greater self-control costs. This extends our previous work on stress and self-control costs to state-dependent levels of anxiety. Interestingly, this correlation was not observed for depression scores ($r=.177, p=.235$) or trait anxiety ($r=.199, p=.176$), offering further evidence that it is (1) selective to anxiety and (2) relies on a state-dependent mechanism.

CONCLUSIONS: Our data reveal a novel association between self-reported state anxiety and an increased cost of exercising self-control. It is possible that, in the same way anxiety allows one to anticipate threats, it also allows one to anticipate self-control failures, leading to higher control costs as a preparatory response to avoid such failures. However, a more motivation-based pathology like depression may not be positioned to exert the same effect. Future work may seek to determine the cognitive mechanisms through which anxiety leads to high self-control costs.

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P1-A-7 - Cerebellar social reinforcement learning in adolescents

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Traditionally, the cerebellum has been thought to only contribute to motor functions. However, recent evidence indicates that most of the cerebellar cortex is involved in non-motor processing, with a significant portion of the posterior cerebellum being implicated in social cognition. The posterior cerebellum has been shown to be structurally connected to the striatum and is thought to play a role in reinforcement learning. This cerebellum-striatum pathway has been shown to be critical for pro-social behaviors in rodents. While there has been significant attention given to the ventral striatum in examining social reinforcement in adolescents, the posterior cerebellum and its connectivity to the ventral striatum has not been examined in this work. In the present study, the sensitivity of the cerebellum to social reinforcement learning signals will be examined in a sample of adolescents, aged 11-14. Currently, data has been collected from 45 adolescents, with a goal of collecting 50. Participants will engage in a social learning fMRI task in which they view their own responses to a survey about their likes and dislikes, followed by an option to push a button to learn about their peers preferences (or computer for a nonsocial control). The similar peer responds with positive feedback (thumbs up) 75% of the time and negative feedback (thumbs down) 25% of the time. The dissimilar peer is the reverse while the computer condition has a 50% probability of positive or negative feedback. This event-related design task had 24 trials in each of the four runs. Behaviorally, it is hypothesized that participants would begin to respond more quickly for the similar peer than the dissimilar because of the higher probability of positive feedback. We use a Rescorla-Wagner reinforcement learning model to estimate prediction errors. Neuronally, we hypothesize that regions within Crus I and II of the cerebellum and the ventral striatum will correlate with social prediction errors in adolescents. Furthermore, we hypothesize that Crus I and II will share positive functional connectivity with the striatum. Lastly, while both the ventral striatum and Crus I/II of the cerebellum will be activated for feedback trials, predict that a representational similarity analysis will reveal differences in the representation of feedback between these two regions, indicated different contributions to social reinforcement learning. This study will be novel in directly examining social prediction errors in the cerebellum using computational modeling in adolescents, leading to a new conceptual model of cerebellar-striatal social reinforcement learning and its role in social development.

P1-A-8 - The Role of the Socioeconomic Status of Clinicians' Neighborhood in Pain Assessment and Treatment Decisions: Psychological and Brain Mechanisms

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Minoritized individuals and women are regularly under-prescribed opioids and other analgesics while the opposite is true for non-Hispanic White populations. This inappropriate analgesic prescription contributes to both poor pain management and opioid abuse. Past research exploring the mechanisms underlying these disparities has indicated the socioeconomic status (SES) of the clinician playing a significant role in their treatment decisions. However, little is known about the role of the clinician's neighborhood SES in pain assessment and treatment outcomes. To explore this relationship, we conducted a medical simulation study with medical trainees playing the role of the doctor while undergoing fMRI. In the study, 65 clinicians saw medical profiles and videos of 36 mock patients experiencing evoked pain and made pain assessments and treatment decisions. Patients identified as one of three demographics: non - Hispanic Black, Hispanic White and non - Hispanic White. Clinician neighborhood SES was measured by connecting clinicians' reported childhood and current zip code with the Area Deprivation Index (ADI), which indicates the disadvantage of a neighborhood in national and state rankings. Based on past literature, we hypothesized that clinicians from low SES neighborhoods would prescribe more analgesics to minoritized individuals and women than clinicians from higher SES neighborhoods. However, after analyzing our data using a linear mixed effects model with the SES of the clinicians' current zip code, we found that clinicians living in more advantaged neighborhoods rated the pain of their patients as higher than clinicians from disadvantaged neighborhoods, and significantly higher for female than male patients. In addition, advantaged neighborhood clinicians were more likely to prescribe any kind of treatment to all their patients, regardless of the race of the clinician or the patient. Our pre-registered analysis plan is to firstly explore the same relationship using the clinicians' childhood zip code to test whether the same effects remain. Then, we plan to add the ADI of the neighborhoods of the clinicians in a structural equation model to test if it predicts other variables that can play a role in clinician decision making, for example, clinician pain sensitivity stereotypes about the race of the patients. Furthermore, we will explore potential underlying mechanisms driving this relationship, like dispositional empathy of clinicians living in neighborhoods with different SES using the Interpersonal Reactivity Index. Finally, we will conduct an exploratory univariate general linear model analysis to investigate whether there are differences in the brain activation of doctors from high vs. low SES current and childhood neighborhoods. The study's findings may inform interventions that could ameliorate disparities in pain treatment. Results of aforementioned, pre-registered and exploratory analyses will be presented at the meeting.

P1-A-9 - Neural circuits supporting willingness to pay for social experiences

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BACKGROUND AND AIMS: Social rewards foster shared social experiences and promote social connection. Yet, few studies have attempted to quantify the desire to engage in social relative to non-social experiences, or the ways in which reward related circuits and those supporting social cognition support social valuation. This pre-registered study aims to address these gaps by characterizing the neural mechanisms supporting the willingness-to-pay (WTP) for social experiences.

METHODS: Participants (target pre-registered N = 50; ages 18-35) will identify 10 non-social and 10 social activities they enjoy

doing prior to an fMRI session; they will also complete self-report assessments of social support and social function. While undergoing fMRI, participants will complete a monetary reward task (adapted from Fareri et al., 2012) to earn money for a subsequent WTP task. Next, we will present participants with the social and non-social experiences they provided, one at a time, asking them to visualize engaging in each. Last, participants will perform a WTP task in which they will make 100 binary choices between the social and non-social activities they provided (i.e., all possible combinations), each at different price points (ranging from \$0.10-\$0.50). Participants will indicate which experience they want to 'purchase' on each trial using the money earned in the monetary reward task. Data collection is underway; we expect to have 25 participants collected and fully analyzed by April 2024.

EXPECTED RESULTS: We expect that WTP for social experiences will be positively associated with perceived social support and overall social function. We also expect increased activation in the ventral striatum and default mode network (DMN) when participants choose social relative to non-social experiences in the WTP task, similarly varying with social support and social function. Last, we expect that DMN activation during the visualization task will be predictive of both participants' choices and of DMN activation during decision-making in the WTP task. fMRI data will be preprocessed with fMRIPrep; statistical analyses will be carried out via a general linear model in FSL. fMRI analyses will use an anatomically defined ventral striatal ROI (Tziortzi et al., 2011) and a functionally defined DMN ROI (Smith et al, 2009). Relations between neural activation, choice behavior and individual difference measures will be tested via multiple regression.

CONCLUSIONS: Expected results have implications for revealing how neural representations of social experiences can predict social valuation and how individual differences in social function may contribute to engagement of reward-related and social cognitive circuits during social decision-making. Such findings may have the potential to enhance our understanding of disorders characterized in part by atypical social valuation such as depression, autism, and substance use disorders.

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P1-A-10 - Midfrontal Theta as an Index of Conflict Strength in Approach-Approach vs. Avoidance-Avoidance Conflicts

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The seminal theory of motivational conflicts (Lewin, 1931; Miller, 1944) distinguishes between Approach-Approach conflicts, in which a decision is made between desirable alternatives, and Avoidance-Avoidance conflicts, in which a decision is made between undesirable alternatives. The behavioral differences between Approach-Approach and Avoidance-Avoidance conflicts are well documented: both Lewin's and Miller's original conceptualization, as well as abundant empirical research that followed, showed that Avoidance-Avoidance conflicts are more difficult to resolve than Approach-Approach ones. However, there is little to no research looking into the neural underpinnings of the differences between the two conflict types. To date, most of the research regarding the neural underpinnings of conflict has focused on conflicts induced by stimulus-response compatibility (SRC) tasks, such as the Stroop task (Stroop, 1935). These tasks are different from motivational conflicts in key aspects: In SRC tasks, conflict is manipulated in a discrete manner (there are either conflict trials or no-conflict trials), and there is an objectively correct response set by the task rules. Motivational conflicts, in contrast, vary in the continuous degree of conflict, and they are based on a subjective structure of preference. In our research, we thus aimed to depict the neural underpinnings of resolving motivational conflicts, focusing on the difference between Approach-Approach and Avoidance-Avoidance conflicts.

Participants (N = 32) completed a motivational conflict task, in which they repeatedly decided between two positive (e.g. to be smart or rich) or negative (e.g. to be stupid or poor) personal characteristics, constituting Approach-Approach and Avoidance-Avoidance conflicts, respectively. While completing the task, a continuous EEG signal was recorded. We found that midfrontal theta oscillations, an established neural marker of conflict, were greater in Avoidance-Avoidance conflicts than in Approach-Approach conflicts, for a prolonged period starting whole seconds before the actual motor response. We further found that higher levels of midfrontal theta were associated with shorter decision times on a single-trial basis, indicating successful recruitment of control, and that this effect was stronger in Avoidance-Avoidance conflicts than in Approach-Approach ones.

Taken together, our results show that Approach-Approach and Avoidance-Avoidance conflicts are distinguishable on the neural level and at a much earlier stage than looking at their decision times would allow for. The implications of these results go beyond motivational conflicts, as they establish midfrontal theta as a measure of continuous degree of conflict in subjective decisions.

P1-A-11 - Representations of monetary and social feedback across social and non-social contexts

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Rewards guide our behavior and contribute to our mental representations of the world (Smith & Delgado, 2015). Reward processing occurs during both monetary and social feedback tasks and involves overlapping and distinct brain regions in generating the reward experience (Lin et al., 2012). To investigate how monetary and social feedback are neurally represented in both social and non-social contexts, 44 participants completed two reward-processing tasks in a 3T fMRI paradigm. With this data, we will investigate activation patterns of monetary and social reward feedback using representational similarity analyses (RSA) across the 10 different task outcomes.

In the shared reward task, participants played a card-guessing game with a close friend, confederate, or computer, and received a monetary win or loss, shared with the partner. In the social doors task, participants chose between two doors that revealed a monetary win or loss, or between two strangers that revealed social approval or rejection from the selected peer (participants were told real peers would view and rate their photo).

Our analyses will utilize representational similarity analysis (RSA) on fMRI data collected during task outcome feedback. We will primarily examine activation in ventral striatum (VS), ventromedial prefrontal cortex (vmPFC), amygdala, and temporoparietal junction (TPJ). These ROIs were selected for their roles in reward processing and social cognition.

We have four primary hypotheses that will be evaluated by whole-brain and ROI analyses. Beta estimates for RSA will be generated from neural data collected during task feedback. A similarity matrix using these estimates will capture neural activity to the various outcomes.

1) Per whole-brain RSA, each task will be more similar to itself than to the other task, across feedback conditions. 2) Positive outcomes (social and/or monetary reward) will elicit greater VS activation compared to negative outcomes (social and/or monetary loss). The vmPFC and amygdala will similarly encode outcomes regardless of valence. TPJ will not show strong representational differences based on reward outcome type (social or monetary feedback). 3) Monetary and social outcomes will be similarly represented in VS, vmPFC, and amygdala across tasks. Social outcomes will have greater cross-task similarity in TPJ compared to monetary outcomes. 4) Social agent outcomes (where feedback is received from or with a friend or stranger) will result in greater cross-task similarity in TPJ compared to non-social agent outcomes (where feedback is received with a computer or solo). Social and non-social agent interactions will be similarly represented in VS, vmPFC, and amygdala across tasks.

These RSA results will provide insight into neural activation similarities 1) across task type, 2) across reward types, 3) across feedback types, and 4) across social contexts. Results will further delineate the contributions of each ROI to reward-related processing.

P1-A-12 - The influence of outcome predictability on social decisions when facing threatening individuals in virtual reality

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Adaptive avoidance of threatening individuals is one key aspect of human social behavior. Threatening expressions of others can promote the execution of several types of behavior, ranging from simple stimulus-driven reactions (e.g., fight/flight, habitual avoidance) to more complex goal-directed actions (e.g., instrumental avoidance). The multiplicity of action control systems raises the question of how the brain selects from among these control modes. Previously, it has been proposed that the arbitration between stimulus-driven and goal-directed strategies depends on the controllability of action-outcome associations (Dorfman & Gershman, 2019). More specifically, when an individual's actions have little or no influence on the outcome of the action, a "spectator" mode, based on stimulus-response associations, prevails. In this situation, a more complex "actor" (goal-directed) mode, which takes into account stimulus-response-outcome associations, is not justified. In a series of three studies, we aimed at testing the influence of outcome (un)predictability on social avoidance of angry individuals in a virtual reality scenario. Participants (Ntot = 150) had to rapidly choose where to enter between two available elevators, each containing an avatar with either a neutral or an angry facial expression. In one condition (outcome-predictability), the avatar remained in the chosen elevator after the participant's decision, whereas in the outcome-unpredictability condition, the avatar left the elevator and a new one entered, randomly displaying a neutral or angry expression. Results showed that avoidance of the angry individual was more pronounced in the outcome-predictability condition, due to more efficient evidence accumulation during choice, as revealed by drift-diffusion models. Consistent with behavior, cardiac deceleration was stronger in the outcome-predictability vs. unpredictability condition. Overall, goal-directed avoidance in response to threatening individuals predominates under conditions of outcome predictability. Theoretical and clinical implications will be discussed.

P1-A-13 - Understanding political outgroup harm through a computational and neuroscientific approach

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BACKGROUND AND AIMS: As U.S. partisan violence increases, it becomes more critical than ever to understand the mechanisms of political outgroup harm. Here, we asked whether the tendency to harm political outgroup members stems in part from basic differences in the valuation of outgroup vs. ingroup members' pain.

METHODS: Across six preregistered behavioral studies we used a computational approach to investigate aversion to political ingroup vs. outgroup pain. Specifically, we used the Hypothetical Harm Aversion task in which participants (Deciders) made decisions between amounts of money for themselves and amounts of shocks for anonymous individuals who would play the role of the Receivers. They were instructed that the money was always for themselves (the Decider), while the shocks were always for the Receiver. We then modeled participants' choice behavior as a function of target party membership and reward value to examine whether the subjective value of outgroup pain was lower than ingroup pain.

RESULTS: As expected, participants showed reduced harm aversion when deciding for political outgroup vs. ingroup members whether individuals were represented abstractly with just political party labels (Studies 1, 3, & 4) or more concretely with face images and party labels (Studies 2, 5, & 6). In all studies, participants sacrificed fewer financial resources to avoid harming political outgroup members than ingroup members. Further, participants enacted the greatest physical harm against political outgroup members and were consistently fastest to harm them and slowest to help them.

CONCLUSIONS: These behavioral findings suggest that individuals place a lower value on outgroup pain and that harming outgroup members may be more reflexive than helping them. In an ongoing neuroimaging study of this paradigm, we are

examining the neural underpinnings of political outgroup vs. ingroup harm. Specifically, we are investigating neural regions associated with early visual processing of faces (i.e., FFA) to examine the role of perceptual dehumanization and regions associated with social cognition (e.g., mPFC, dmPFC, ACC) to examine the role of mentalization and similar processes when engaging in political outgroup vs. ingroup harm. Importantly, this design allows us to disentangle whether individuals engage separable processes when harming political outgroup vs. ingroup members, or if harm towards both ingroup and outgroup members relies on the same cognitive processes, just to a different degree. By studying the psychological and social cognitive mechanisms involved in politically motivated intergroup harm, we hope to better understand how violence is increasingly perpetrated against political rivals.

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P1-B-14 - The Conceptual, Neural, and Cultural Bases of Social Relationship Knowledge

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A defining characteristic of social complexity in *Homo sapiens* is the diversity of our social relationships. We build connections of various types with a wide range of people in our families, schools, workplaces, neighborhoods, and online communities. How do we make sense of such complex systems of human relationships? The basic structure and organization of relationships have long been studied in social sciences, but no consensus has been reached. Here, by using online surveys, laboratory cognitive tasks, natural language processing, and computational modelling on diverse modern cultures across the world (total $n = 20,425$) and ancient cultures across more than 3,000 years of history, we examined universality and cultural variability in the ways that people conceptualize relationships. We discovered a common representational space for relationship concepts, comprised of five principal dimensions (formality, activeness, valence, exchange, equality) and three core categories (hostile, public and private relationships). The data also revealed rich cultural variations in relationship conceptualization across space and time and suggested that people's understanding of relationships can vary as a function of religion and modernization. A follow-up functional MRI study ($n = 38$) using RSA, encoding, and decoding analyses revealed that multiple regions of the social brain, such as the medial prefrontal cortex, temporoparietal junction, and the precuneus, are recruited to represent and process information about social relationships. Our work reveals the fundamental cognitive constructs, neural mechanisms, and cultural principles of social relationship knowledge and advances our understanding of human sociality.

P1-B-15 - The neural correlates of ambiguous social feedback in Black Americans

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BACKGROUND AND AIMS: Humans are social creatures with an intrinsic desire to be accepted by their peers. One way to monitor where one stands in their social environment is by use of social feedback, adjusting one's sense of standing based on whether peers provide positive or negative feedback. However, for members of minoritized groups, social feedback from majority group members includes extra layers of ambiguity; negative feedback could be perceived as evidence of bias or discrimination, while positive feedback might be discounted as not genuine and rather based on a desire for the evaluator to not appear prejudiced. While behavioral research has documented these additional layers of ambiguity in processing feedback across group lines, to our knowledge, no known neuroimaging work has interrogated the neural correlates of cross-group social feedback. Thus, we examined the neural correlates of receiving positive and negative social feedback in Black Americans using functional MRI.

METHODS: Nineteen Black adults were led to believe they received real feedback on their portrait from other adults, both White and Black, in their local community. During scanning, participants viewed a picture of a supposed evaluator along with sham feedback from the evaluator. Feedback was either positive or negative, and either a stereotype of Black Americans or a non-stereotype.

RESULTS: Results demonstrated that there was differential neural activity when anticipating and receiving feedback from White vs. Black adults. Specifically, participants showed greater activity in regions of the default mode network (e.g., MPFC, PCC) when anticipating feedback from White (vs. Black) evaluators. Further, we observed greater activity in salience network regions (dACC, insula) when participants received negative, stereotype-relevant feedback from White (vs. Black) evaluators.

CONCLUSIONS: These results suggest that the neural regions recruited during the processing of social feedback vary as a function of group status of the evaluator, with greater DMN activity when anticipating feedback from out-group members and greater salience network activity when being negatively stereotyped.

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P1-B-16 - The Social Neuroscience of Being Tolerated

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In culturally, religiously, and ideologically diverse societies, people inevitably disapprove of certain outgroup beliefs, practices, or norms when these conflict with their own values. In such cases, tolerance involves consideration of reasons to nevertheless allow that which one objects to. Tolerance is widely promoted for managing such conflict in organizational, national, and international bodies, including the EU and the UN. Despite this, psychological research on tolerance only recently began. To address this gap,

we take a social neuroscience approach to shed light on the psychological experience of being tolerated. Participants were randomly assigned to one of three conditions in the Cyberball game, the classic (1) Acceptance or (2) Rejection conditions, or a novel (3) Tolerance condition, in which the participant was included yet disapproved of by the other players. EEG was recorded during the task. Results revealed that being tolerated by others involves neural processes relating to the same 'social pain' associated with the experience of rejection. These results illuminate a key complexity in diversity and toleration.

P1-B-17 - Computational and neural mechanisms of decision-making causing same-race vs. other-race civilian casualties during intergroup conflicts

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BACKGROUND AND AIMS: Civilian casualties in intergroup conflicts raise serious ethical and moral concerns. However, the factors that drive decision-making that leads to civilian casualties are not fully understood. In this study, we have focused on how the race of outgroup civilians influences decision-making processes that determine punishment. Specifically, we have examined the computational and neural mechanisms that underlie punishment decision-making when outgroup civilians belong to the same race or a different race compared to the ingroups.

METHOD: We created a hypothetical scenario in which participants had to decide whether to launch a weapon that would harm outgroup soldiers, as well as an outgroup civilian who was nearby. We manipulated the racial identity of the civilians to be either Asian or Caucasian.

RESULT: Participants, recruited from China (N=372, Asian) and the US (N=407, Caucasian), were presented with scenarios that might result in either same- or other-race civilian casualties. We recorded the decisions and reaction times of the participants in various scenarios. The scenarios were different in terms of the expression of the outgroup civilian, which could be either painful or neutral. Drift diffusion model analyses of behavioral performance revealed a more conservative strategy, i.e., larger threshold distance (a), of decision-making when confronting same- vs. other-race outgroup civilians who show painful expression ($P(\text{asame_race_pain} < \text{aother_race_pain}) = 0.028$). Notably, this finding was observed for both Chinese and American participants and there was no significant difference between the two cohorts ($P(\text{aChina} < \text{aUS}) = 0.232$). To further investigate the neural underpinnings of this race effect, we recorded event-related potentials (ERPs) from Chinese adults (N=81, Asian) while they made decisions in the same hypothetical scenario task. The behavioral data replicated the race effect ($P(\text{asame_race_pain} < \text{aother_race_pain}) = 0.022$). The ERP data showed that the central P2 at 171-221 ms was enlarged by pain vs. neutral expression of same-race civilians (average of Cz, C1, C2, C3, C4; $t = 2.31$, $p = 0.026$, $d = 0.36$), but not other-race civilians ($p > 0.05$). Interestingly, the increased amplitudes of P2 by pain vs. neutral expression of same-race civilians was linked to a more conservative decision-making strategy, i.e., a larger threshold distance (a), when confronting the same-race civilians who show pain expression ($\beta = 0.0016$, $p = 0.043$).

CONCLUSIONS: Our findings provide insight into the computational and neural bases of a more conservative decision-making strategy in intergroup conflicts when involving harm to the same-race outgroup civilians.

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P1-C-18 - Memory for Negative and Positive Emotional Video Clips

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BACKGROUND AND AIMS: Emotional events and stimuli typically are remembered better than neutral ones [i.e., the Emotional Enhancement of Memory (EEM) effect]. Most previous studies of this phenomenon in the laboratory have used pictures or words as stimuli. We explored the EEM effect using stimuli that are more rich, lifelike, and externally valid than pictures and words: Brief naturalistic video clips.

METHODS: We asked how memory for video clips may be related to their emotional valence (i.e., negative, positive, or neutral) across four online studies.

RESULTS: In Study 1, undergraduate student participants recalled videos of different valences that had been initially viewed under full or divided attention: Negative and positive videos were recalled more often than neutral ones, and divided attention at encoding reduced memory overall. We followed up with three yes-no recognition memory studies (all under full attention), each with independent sets of participants. In Study 2, participants showed enhanced discrimination for the negative videos and a more liberal criterion for the positive ones. Study 3 replicated Study 2, and also examined participants' subjective recollective experience (i.e., Recollected vs. Familiar vs. Guess). Again, participants showed enhanced discrimination for the negative videos and a more liberal criterion for the positive ones. In addition, they reported enhanced recollective experience for the negative videos. Study 4 asked about confidence in the recognition memory decision. Although in this study memory for the emotional videos was not superior to that for the neutral ones, participants reported enhanced confidence in their memories of the negative videos.

CONCLUSIONS: These results build on, and are more easily generalized to the real world than, those that have come from pictures and words. We suggest several ways in which this work can be followed up, capitalizing on the ecological validity of these video clips.

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P1-C-19 - Fast auditory and pupillary responses to high temporally modulated sounds suggest the existence of a human magnocellular auditory pathway for threat detection

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BACKGROUND AND AIMS: Neural models for emotional processing in vision suggest the existence of an ultrafast magnocellular route to the amygdala, which allows for efficient detection of threat and adaptive behavior in humans. This route is known to mediate coarse visual processing, eliciting faster neural responses to threat than other more fine-grained pathways. In the auditory domain, animal evidence suggests the existence of a similar route for threat detection, but it remains unknown in humans. We investigated, with fear conditioning, a procedure that depends on amygdala response, whether a magnocellular pathway to the amygdala, particularly sensitive to high temporal modulations, mediates faster auditory and pupillary responses to threat than a parvocellular pathway, sensitive to low temporal modulations. We recorded electroencephalography (EEG) and pupillometry of 28 healthy participants while they detected voices.

METHODS: Voices were either paired (conditioned) or unpaired (not conditioned) with an unpleasant white noise (unconditioned stimulus - US), which determined their threatening significance. All voices were amplitude modulated at either high (40 Hz) or low (10 Hz) rates, aiming at differentially activating a fast (magnocellular) versus a slower (parvocellular) auditory pathway, respectively. We analyzed behavior (e.g. stimulus ratings, response time), pupillary size, and EEG activity for conditions of interest. This allowed us to dissociate neural activity potentially elicited by each of the hypothesized emotion auditory pathways.

RESULTS: Behavioral and pupillary results suggest that fear conditioning was effective; participants were aware of the pairing between the conditioned and the US stimuli ($p < .0001$), they rated the conditioned stimuli as more negative and arousing than non-conditioned stimuli ($p = .01$; $p = .002$), and showed differential pupil dilations ($p < .05$) and response times ($p = .03$) for conditioned versus non-conditioned stimuli. In turn, threatening (conditioned) stimuli at high amplitude modulation (AM) rates elicited earlier auditory ($p < .05$) and pupillary ($p < .05$) responses than those presented at low AM rates. Finally, early auditory threat responses to high AM sounds correlated with response time in higher anxiety participants ($p = .01$).

CONCLUSIONS: These results are compatible with faster cortical responses to threat when encoded through magnocellular inputs to the amygdala, and suggest the existence of an auditory route for threat detection in humans, similar to that in vision. Thus, high temporal modulations in sounds may constitute an optimal tool to investigate a putative fast auditory route to the amygdala, similarly to other stimulus parameters (e.g. low spatial frequencies) traditionally used in vision.

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P1-C-20 - Trait anxiety exacerbates the impact of face masks on valence judgements for emotionally ambiguous surprised faces

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BACKGROUND AND AIMS: Deciphering emotional signals from facial expressions of others is key to successful social interactions. Whereas most facial expressions convey a clear valence signal, one exception is surprise, which can be perceived as either positive or negative. Leveraging this ambiguity, we implemented drift-diffusion modeling (DDM) to disentangle the decision-making process of valence of surprise. Here we used face masks to provide an ecologically valid way to further obfuscate the valence signals from surprised faces. Importantly, we aimed to inspect the influence of trait anxiety based on its known role in processing ambiguity.

METHODS: 95 healthy undergraduate students participated in the present study (40 females, ages 16-29). In the valence judgement task, they were shown 244 photos of surprised faces where each face was presented twice, with and without face masks. On each trial, participants were presented with a two alternative forced-choice valence rating task (i.e., positive or negative). Next, we fit DDM models to decompose the individual reaction time (RT) and response data from the task into interpretable parameters (drift rate, decision threshold, starting point bias, non-decision time). We built a within-subjects model with the non-masked condition as the baseline. Finally, we built separate models and compared the parameters for high and low trait anxiety groups.

RESULTS: RT for masked surprised faces were longer than their non-masked counterparts ($p < 0.001$), whereas the ratio of 'negative' responses did not differ between conditions ($p = 0.102$). DDM analysis revealed that face masks affected the valence judgement process. Specifically, face masks increased 1) the amount of information needed for decision ($P(a_{\text{mask}} < 0) = 0$), 2) the a priori bias towards negative judgement ($P(z_{\text{mask}} < 0) = 0.977$), and 3) the time required for all processes excluding evidence accumulation (e.g., sensory input, motor output) ($P(t_{\text{mask}} < 0) = 0$). Finally, when comparing groups based on trait anxiety, the impact of masks on drift rate (i.e., information accumulation speed) differed substantially ($P(\text{HighAnx}_v_{\text{mask}} > \text{LowAnx}_v_{\text{mask}}) = 0.979$), with masks decreasing the absolute drift rate only in the high anxiety group ($P(\text{HighAnx}_v_{\text{mask}} < 0) = 0.040$). Also, masks influenced non-decision time to a larger extent in the high anxiety group ($P(\text{HighAnx}_t_{\text{mask}} > \text{LowAnx}_t_{\text{mask}}) = 0.983$).

CONCLUSIONS: Our findings suggest that face masks impact the decision making of valence for surprised faces, and that trait anxiety exacerbates their effects. These findings complement previous research on socioaffective information processing and its alteration in anxiety. We plan to link these behavioral results with neuroimaging data acquired from the same sample, aiming to elucidate their neural underpinnings.

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P1-C-21 - The Effect of Transcranial Direct Current and Magnetic Stimulation on Fear Extinction and Return of Fear: A meta-analysis and Systematic Review

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BACKGROUND AND AIMS: Anxiety and fear-related disorders are among the most prevalent mental illnesses. Non-invasive brain stimulation methods such as transcranial direct current stimulation (tDCS) and transcranial magnetic stimulation (TMS) have been employed to modulate anxiety and fear-related symptoms, but their therapeutic effects remain inconclusive. Pavlovian conditioning and extinction are experimental analogs of exposure therapy in the clinical setting and have been employed to investigate the neural mechanisms of fear extinction and the return of fear.

METHODS: We conducted a meta-analysis and qualitative review on the effects of tDCS and TMS on fear extinction and the return of fear in non-primate animals and humans, by searching PubMed, Web of Science, PsycINFO, and Cochrane Library. The pooled effect size was quantified by Hedges' g , calculated by R software using a random effects model.

RESULTS: We identified 16 articles on the tDCS effect (8 animal studies and 8 human studies), with 482 subjects in the active group (246 animals and 236 humans) and 293 subjects in the sham group (137 animals and 156 humans). Six articles on the TMS effect (3 animal studies and 3 human studies) were included, with 147 subjects in the active group (45 animals and 102 humans) and 138 subjects in the sham group (43 animals and 95 humans).

Our findings show that both anodal and cathodal tDCS of the prefrontal cortex significantly inhibit short-term contextual and cued fear retrieval in animal models (Hedges' $g = 0.83$, 95% CI [0.35, 1.31] for anodal effect on contextual fear, Hedges' $g = 0.97$, 95% CI [0.07, 1.86] for cathodal effect on contextual fear, Hedges' $g = 0.45$, 95% CI [0.08, 0.83] for anodal effect on cued fear, Hedges' $g = 0.96$, 95% CI [0.24, 1.68] for cathodal effect on cued fear). In human studies, anodal tDCS over the medial/ventromedial prefrontal cortex enhances fear extinction (Hedges' $g = -0.55$, 95% CI [-1.1, 0]), whereas TMS over the dorsolateral/ventromedial prefrontal cortex has an inhibiting effect on the return of fear (Hedges' $g = -0.29$, 95% CI [-0.56, -0.03]).

CONCLUSIONS: The current findings shed light on the optimal non-invasive brain stimulation protocols for targeting the neural circuitry of threat extinction in humans. Anodal tDCS over the mPFC/vmPFC enhanced fear extinction, whereas TMS over the dlPFC and vmPFC has an inhibiting effect on the return of fear.

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P1-C-22 - Using a novel web app to examine dynamic emotional states and their relation to depression and trauma symptoms

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Emotional flexibility, or the ability to express appropriate emotional reactions in response to one's environment, is hypothesized to be reduced in emotion disorders like depression and post-traumatic stress disorder (PTSD). However, current paradigms that measure emotional flexibility fail to capture emotion dynamics in real time. In a pre-registered study ($n=300$), we tested if fluctuations in emotional reactions to custom musical pieces relate to symptoms of depression and trauma. To capture real-time changes in emotional valence and arousal in response to music, we developed a novel mobile emotion tracking application called the Mobile Emotion Compass. Our results revealed a significant relationship between the severity of self-reported depression and trauma symptoms and the likelihood of transitioning across emotional states tracked by the Mobile Emotion Compass. Specifically, participants with higher depression and PTSD symptom scores were more likely to stay in emotionally "inflexible", or low-transition, emotional states. Similarly, higher depression and PTSD symptoms were related to a higher likelihood of going from a high-transition, or "flexible", to a low-transition, or "inflexible", emotional state. Latent profile analyses identified distinct symptom clusters across participants. Participants who were in the highest latent symptom profile had lower valence and higher arousal ratings on average compared to participants in the medium and low symptom cluster profiles. Furthermore, machine learning algorithms, such as a random forest classifier, trained on Mobile Emotion Compass valence and arousal ratings were able to decode latent profile symptom identity greater than statistical chance. These results support the idea that emotional flexibility is a potential phenotype of emotional disorders like depression and PTSD. Importantly, inflexible emotional responses may contribute to features of emotional memories common to PTSD, potentially exacerbating symptoms of anxiety and trauma-related disorders. They also demonstrate the efficacy of the Mobile Emotion Compass as a tool for assessing individual differences in emotional flexibility and its relationship with psychopathology.

P1-C-23 - Emotional Episodic Retrieval is Associated with a Hemispheric Asymmetry Reduction in Older Adults

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BACKGROUND AND AIMS: Prior research has reported a prefrontal hemispheric asymmetry reduction with older age (HAROLD), such that older adults show greater bilateral prefrontal cortex (PFC) activity than young adults when completing cognitive tasks (Cabeza, 2002). While the HAROLD model has been shown on numerous tasks, few tasks have extended findings from neutral stimuli to emotional stimuli. It is an open question how emotion would affect the HAROLD model. Here, we examined the effects of the emotional content of the stimuli and participants' age on the laterality of PFC activity during memory retrieval.

METHODS: Sixty-three participants ages 18-85 (Mean age = 47.92, SD = 19.80, 30 Females) underwent fMRI while completing a memory task in which they indicated which retrieval cues had previously been associated with studied emotional (positive, negative) or neutral events, and which cues were novel. We compared brain activity when correctly recognizing cues for emotional relative to neutral events, including participants' age as a regressor. Based on Monte Carlo simulations (Slotnick et al., 2003), the significance threshold was set at $p < .005$ with a 29-voxel extent.

RESULTS: Controlling for the effect of age, emotional memory retrieval was associated with primarily left-lateralized ventral PFC activity. However, when examining the effect of age, results revealed that older age was associated with increased recruitment of the right ventrolateral PFC.

CONCLUSIONS: These results are among the first to suggest that older adults may have less lateralized emotional memory retrieval networks than younger adults. These results would be consistent with the suggestion that older adults' emotional memory retrieval benefits from the types of controlled processes that require engagement of compensatory, bilateral recruitment.

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P1-C-24 - Neural signatures of individual differences in the impact of interoceptive signals on preference decisions

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Many previous studies have shown that interoception plays a pivotal role in the decision-making process. This study aims to identify the neural mechanisms underlying individual differences in how interoceptive signals impact preference decisions. Participants were tasked with choosing between two movie titles based on either subjective preferences or the luminance of the characters, while undergoing fMRI scanning. In each task condition, half of the trials were incongruent, where the less preferred movie had higher luminance, while the rest were congruent. Individual differences in interoception were measured through a heartbeat counting task and self-reported surveys. Repeated-measures analysis of variance on inverse efficiency scores (i.e., response time/accuracy) revealed a significant congruency effect (CE) in both task conditions, indicating that incongruency between preference and luminance information resulted in a loss of decision-making efficiency. Individuals with higher interoceptive awareness (IA) exhibited lower CE in the luminance task. Analyses of fMRI signals at decision onsets demonstrated that individuals with a larger CE in the luminance task engaged the superior parietal cortex during both preference and luminance decisions, while those with a smaller CE showed increased activation in the rostromedial PFC (rmPFC) region during preference compared to perceptual decisions. These findings suggest that individuals with less accurate IA employ a valuation mechanism relying on external sensory information for both preference and non-preference decisions. In contrast, those with more accurate IA predominantly utilize distinct valuation mechanisms: using a valuation mechanism relying on internal bodily information for preference decisions and resorting to external valuation for perceptual decisions. This research was supported by the Bio & Medical Technology Development Program of the National Research Foundation (NRF) funded by the Korean government (MSIT) (No. 2022M3E5E8018285) and the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (No. RS-2023-00218987).

P1-C-25 - A bitter game to swallow: An examination of moral and gustatory disgust responses

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BACKGROUND & AIMS: Disgust is a basic emotion [1]. Physiologically, it has a visceral signature, nausea, and behaviorally, individuals distance themselves from disgusting stimuli. Expressively, disgust includes the mouth gape, tongue extension, lifting of the upper lip, and the nose wrinkle. This facial expression evolved to keep organisms from ingesting toxins [2-7], and in humans moral disgust is a response to violations of moral norms [8-10]. Research indicates a physiological overlap between moral and gustatory disgust [9], showing that similar facial motor activity in the levator labii (LL) occurs when individuals are given unfair splits of money and when tasting bitter liquids [8]. But it is unclear whether these two types of disgust influence one another. Eskine et al. (2011) found a connection between gustatory and moral disgust, namely that participants given a bitter liquid made harsher moral judgments, but Ghelfi et al. (2022) failed to replicate this result. We investigate this connection on a physiological level and test if rinsing with water negates this interaction, as handwashing does with visual and moral disgust [12].

METHODS: To test our hypothesis that gustatory disgust affects moral disgust resulting in stronger electromyography (EMG) responses in the LL, 30 participants were given sweet, neutral, or bitter liquids prior to playing 2 rounds of a game where they received fair or unfair money splits. Participants completed 3 conditions: water only, rinse (participants rinsed with water after each sweet or bitter taste), and no rinse. Moral disgust scores helped address our hypothesis that this effect would also be seen on a self-reported level. We also hypothesized that rinsing with water would negate this relationship, both in EMG and self-report.

RESULTS: As predicted, preliminary findings from a subset of participants ($n=19$, analysis in progress) show that when faced with unfair monetary splits a bitter taste caused greater LL activity compared to neutral tastes (Welch's $t(55)=2.25$, $p < .05$, $CI=[0.42, 7.36]$, Cohen's $d=.5$) and sweet tastes (Welch's $t(31)=2.43$, $p < .05$, $CI=[0.56, 6.42]$, Cohen's $d=.7$). An exciting novel trend indicates that rinsing after quinine could negate this effect (Welch's $t(29)=1.70$, $p=.1$, $CI=[-0.4, 5.27]$, Cohen's $d=.5$). Our results

are in line with Ghelfi et al.'s (2022)—bitter taste pre-exposure did not influence self-reported moral disgust (Welch's $t(35)=0.62$, $p=.54$ CI=[-0.28, 0.53], Cohen's $d=.1$), but Eskine et al.'s (2011) findings appear to be relevant to EMG responses.

CONCLUSIONS: Our initial results indicate that gustatory disgust influences moral disgust when measured with EMG. The novel trend shows that rinses negate this relationship supports previous research on cleansing practices [20]. Finally, we replicated Chapman et al.'s (2009) findings that moral and gustatory disgust elicit similar LL EMG responses.

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P1-C-26 - Shallow neural networks for auditory collision detection predict subjective affect

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BACKGROUND AND AIMS: Human emotional experience is shaped by auditory input. For example, greater subjective arousal and more negative valence are associated with acoustic intensity in environmental sounds (Yang et al., 2018), and greater arousal is associated with spectral flux in music clips (Gingras et al., 2014). Behaviorally relevant stimuli carry specific acoustic features. For example, looming threats are associated with a particular pattern of rising auditory intensity and decreasing spectral contrast as the sound source approaches the listener. Looming sounds are associated with greater subjective arousal and increased negative valence (Bach et al., 2009), as well as BOLD activity in auditory cortex and the amygdala (Seifritz et al., 2002; Bach et al., 2008). It is unclear, however, whether looming-specific acoustic features predict subjective affect in broader naturalistic stimuli. We investigated this question by constructing a shallow convolutional neural network and training it to classify impending collision from simulated sounds. We hypothesized that once trained, the shallow auditory neural network would also be able to predict affect ratings to naturalistic sounds.

METHODS: We trained a single layer convolutional network to classify cochleagrams (McDermott & Simoncelli, 2011; Feather et al., 2023) [KA1] of simulated looming, receding, and static sounds as "hit" vs "no hit." After successful training, we assessed whether model outputs predict valence and arousal rankings of 1213 environmental sounds (Fan et al., 2017).

RESULTS: We found that model-based collision probability was associated with greater arousal (cross-validated $R^2 = .48$) and negative valence (cross-validated $R^2 = .37$) in the environmental sounds. Critically, we found that model-estimated collision probability improved the prediction of both arousal ($DR^2 = .02$, DAIC = 5) and valence ($DR^2 = .04$, DAIC = 48) compared to measures of loudness and flux alone.

CONCLUSIONS: These results show that a simple computational system for collision detection learns representations of looming that are uniquely associated with variation in human affect. Future work is needed to map such representations to stages of auditory pathways, and test whether looming sound features predict affect evoked by sounds from other domains such as speech and music.

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P1-D-27 - Examining the role of cultural values in emotion regulation

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OBJECTIVES: Emotion regulation is essential to everyday life and well-being. Adaptive emotion regulation (ER) is associated with mental and physical health, and its outcomes are dependent upon the person, the situation, and the strategy used to regulate emotions. Previous studies have investigated how ER interacts with situational contexts and have begun to investigate how person factors play a role. Culture, in particular, shows unique effects on emotion regulation strategy outcomes. However, investigations have been limited by its broad operationalization as either race, ethnicity, or Eastern (e.g., Japan) vs. Western (e.g., U.S.). Some research suggests that cultural values may better predict individual differences in which ER strategies are selected and how they affect wellbeing. In this novel, cross-sectional study, we will explore ties between cultural values and a panoply of ER strategies and how these ties predict wellbeing. Our aims are to expand upon prior examinations of ER and culture to assess associations between cultural values, a wide range of ER usage, affect, and health, and to investigate any moderating effects, such as perceived stress, on ER strategy usage, affect, and health.

METHODS AND ANALYSIS: We will recruit Rice University undergraduates (target $N = 315$ based on power analysis) and use surveys assessing cultural values (i.e., Schwartz's Value Survey, which assesses cultural values at the individual level) as well as validated measures of ER usage, perceived stress, positive and negative affect, depressive symptoms, and general health. We hypothesize that ER strategy usage will vary as a function of cultural values; specifically, we expect to replicate previous research findings which show that higher levels of Hedonism (e.g., endorsement of 'pleasure' or 'enjoying life' as guiding life principles) will be negatively associated with expressive suppression, and higher levels of Power (e.g., endorsement of 'social power' or 'authority') and Embeddedness (e.g., endorsement of 'social order' or 'obedient') will be positively associated with expressive suppression. We will also explore whether cultural values mediate the relationship between ER usage and wellbeing (i.e., health and affect), and whether perceived stress may serve as a moderator.

IMPLICATIONS: Results from this study will expand our understanding of how individual differences in cultural values are related to ER usage, affect, health, and well-being. This knowledge may contribute toward future experimental research and intervention development designed to improve individual well-being in increasingly personalized and effective ways that take cultural values into account.

P1-D-28 - Neural patterns following frustrative nonreward in adolescents with varying sexual abuse exposure

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BACKGROUND AND AIMS: Sexual abuse during childhood is associated with increased risk for psychopathology in adolescence. However, sexual abuse-related neural pathways to adolescent psychopathology are not well understood. Altered neural patterns after denial of an expected reward (frustrative nonreward) are a potential underlying pathway. The present study aims to identify neural patterns after frustrative nonreward in a group of adolescents with varying sexual abuse exposure.

METHODS: Adolescents (N = 24; Mean Age = 14.55; SD = 1.71) enriched for sexual abuse exposure were drawn from a sample seeking treatment for trauma. During fMRI acquisition, adolescents completed a monetary incentive delay task modified for frustration induction. The task provided accurate feedback after 40% of hit trials (i.e., reward received) and denied reward after 60% of hit trials (i.e., reward blocked, frustrative nonreward). Sexual abuse exposure was measured using the child-reported Sexual Abuse Trauma Index subscale of the Trauma Symptom Checklist for Children. Activation and ventral striatum connectivity in the anticipation period of the next trial following reward feedback were calculated. ANCOVAs examined associations between these neural patterns and levels of sexual abuse exposure.

RESULTS: Activation analyses indicated a significant Sexual Abuse × Condition (i.e., reward received vs. reward blocked) interaction effect for eight clusters in prefrontal, occipital, and parietal regions. Two interaction patterns were revealed in these regions. First, across clusters in bilateral ventral prefrontal cortex and left cuneus, the interaction was driven by the reward blocked condition such that there were exaggerated activation differences between adolescents with higher vs. lower levels of sexual abuse after reward blocked compared to after reward received. Second, across clusters in bilateral dorsal prefrontal cortex and right superior parietal lobule, the interaction was driven by both conditions such that higher sexual abuse related to decreased activation after reward blocked yet increased activation after reward received; conversely, adolescents with lower sexual abuse showed the opposite pattern. Across multiple clusters in prefrontal cortex, adolescents with higher sexual abuse showed less left ventral striatum connectivity after reward denial vs. reward receipt.

CONCLUSIONS: Our findings suggest that adolescents who experienced sexual abuse have trouble recovering from negative emotions and reorienting to future tasks after being denied expected rewards. Moreover, their altered neural patterns extend to both frustrative nonreward and reward receipt. Our study shows that impaired neural reward processing represents a potential pathway to psychopathology in sexual abuse-exposed adolescents and may inform novel hypothesis-driven interventions.

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P1-D-29 - Disentangling patterns of amygdala-prefrontal connectivity involved in negative emotion, pain, and cognitive control

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BACKGROUND AND AIMS: A plethora of studies link amygdala-prefrontal cortex functional connectivity with emotion evaluation and regulation, as well as internalizing symptoms. Yet, regional specificity is often lost by averaging signals within regions despite indications of functionally dissociable neural populations. We sought to elucidate meaningful patterns of amygdala-prefrontal connectivity using multivoxel models of negative emotion, pain, and cognitive control in the prefrontal cortex. This approach provides a framework in which fine-grained patterns related to distinct functions can be parsed within regions.

METHODS: The three multivoxel signatures in six prefrontal regions were obtained, totaling 18 predictive models (Kragel et al., 2018). These signatures were applied to subjects in the Human Connectome Project Dataset (N = 100, aged 25-32), the Boston Adolescent Neuroimaging of Depression and Anxiety dataset (BANDA; MDD or GAD diagnosed N = 139, control N = 63, aged 14-17), and the Perturbation of the Depression Connectome dataset (PDC; MDD diagnosed N = 148, control N = 48, aged 20-64) to sample individuals ranging from good mental health to those with internalizing symptoms. We derived maps of prefrontal connectivity in the amygdala by correlating the expression of the signatures with signal in each amygdala voxel acquired during resting fMRI. Pooling data across groups, significant voxels (P < .05, FDR-corrected) were aggregated across six region maps for each domain to form convergence maps.

RESULTS: Hierarchical clustering analysis showed that the 18 amygdala connectivity maps were clustered together more within signature than within region (linear mixed effects, $b = 0.1346$, $SE = 0.0071$, 95% CI [0.1209, 0.1483], bootstrapped $P < .001$). The average functional connectivity between the negative emotion convergence map and the six regional negative emotion pattern expression were correlated with the first principal component of depression, anxiety, and neuroticism in the BANDA dataset ($r = -.1587$, 95% CI [-0.2914 -0.0201], $P = .025$) and the first principal component of depression, anxiety, and functional disability in the PDC dataset ($r = -.2127$, 95% CI [-0.3426 -0.0747], $P = .003$).

CONCLUSIONS: Multivoxel patterns across regions supporting specific functions were more similarly connected to the amygdala than patterns from identical regions. This suggests that components of task-evoked BOLD responses may reflect the architecture of distributed neural networks, as opposed to the activity of functionally independent neural populations.

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P1-D-30 - Associations between parental psychopathology and functional emotion regulation brain networks in children

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BACKGROUND AND AIMS: Children of parents with mental illnesses have an increased risk of developing mental health problems, even beyond genetic influences¹. Emotion regulation (ER) skills can positively affect mental health trajectories, yet a child's ER development is influenced by parent's ER². Consequently, parental psychopathology might impede with the development of adaptive ER skills and their underlying neurocircuitry³. Morawetz et al. (2020)⁴ identified two cortical networks encompassing lateral dorsal prefrontal cortex (PFC) regions (ERN1), and ventrolateral PFC regions (ERN2) that are associated with ER, one subcortical limbic network (ERN3) linked to emotion reactivity and generation, and a fourth subcortical-cortical integrative network (ERN4). The aim of this study was to investigate the associations between current parental psychopathology and connectivity patterns between and within these ER networks in children.

METHODS: We used resting state functional magnetic resonance imaging data of 9–10-year-olds (N = 4202) from the Adolescent Brain Cognitive Development (ABCD) Study⁵ that was preprocessed by the ABCD-BIDS Community Collection 3165. Raw Adult Self Report externalizing, internalizing and total problem scale scores reported by a biological parent served as measures of parental psychopathology. Using linear-mixed models, we tested for associations between parental psychopathology and child functional connectivity in brain networks associated with regulation and perception of emotions⁴. Each model included one connectivity measure as the dependent, and one parental psychopathology dimension as the independent variable. Age and sex were used as covariates and family ID as a random effect. In an ongoing second part of the analysis, we will additionally test whether connectivity patterns within and between ER networks partially mediate the relationship between parental and child mental health at a later timepoint using multilevel mediation models.

RESULTS: After correcting for multiple comparisons, we found a negative association between parental internalizing problems and within-network connectivity in ERN1, and between-network connectivity between ERN2 and ERN4. Parent's externalizing problems were negatively associated with ERN3 within-network connectivity. Finally, total parental psychopathology was negatively associated with within ERN1, within ERN3, and between ERN2 and ERN4 connectivity, and additionally positively related to between ERN1 and ERN2, and between ERN 2 and ERN3 connectivity.

CONCLUSIONS: Our results indicate that parental psychopathology co-occurs with disruptions of connectivity patterns within and between ER networks that have been associated with successful ER. Further research is needed to test if these connectivity patterns disruptions affect child psychopathology development.

P1-D-31 - Emotion Regulation Strategies Moderate Age-Related Differences in Corticostriatal Connectivity During Experiences of Shared Reward

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Previous studies have found corticostriatal activities in response to reward processing altered as a function of partner's social closeness and age (Fareri et al., 2012, *J Neurosci*; Fareri et al., 2022, *NeuroImage*). However, less is known about how these effects are modulated by emotion regulation which also associates with corticostriatal response to reward (Martin & Delgado, 2011, *J Cogn Neurosci*). In the current pre-registered study (<https://osf.io/f5tv6>), we seek to understand how emotion regulation modulate links between social closeness, age, and corticostriatal connectivity during reward processing, especially ventral striatum (VS) connectivity with regions associated the default mode network (DMN), such as ventral medial prefrontal cortex (vmPFC), temporoparietal junction (TPJ), and precuneus cortex. Although data collection is ongoing, the current sample includes 51 participants (Female=32, Male=18, Non-binary=1; White=29) from age 21.4 to 71.8 (mean=44.6, sd=17.0). All participants underwent fMRI while playing a card guessing game for monetary outcomes (win or loss) that could be shared with three partners - a close friend of the participant, a stranger, or the computer (adapted from Fareri et al., 2012, *J Neurosci*). On a different day before completing fMRI, the participants also completed Emotion Regulation of Self and Others Scale that measures individual differences in emotion regulation strategies to regulate one's own and other people's feelings (Niven et al., 2011, *Curr Psychol*). They also completed Inclusion of Other in the Self Scale that measures social closeness (Aron et al., 1992, *J Pers Soc Psychol*). Participants' social closeness rating is significantly different between friend, stranger, and computer ($F(2, 100)=95.89, p<0.05$). Our preliminary neuroimaging analyses indicate emotion regulation moderates the association between age, social closeness, and the VS-DMN connectivity during reward sharing. We found the association between precuneus connectivity and making oneself feel better is higher in older adults than younger adults when sharing reward with a friend relative to a stranger [i.e. friend(win) > stranger(win)]. In addition, we found the association between vmPFC connectivity and making others feel worse is lower in older adults than younger adults when sharing with a friend relative to sharing with a stranger [i.e. friend(win>loss) > stranger(win>loss)]. We also found the association between TPJ connectivity and making others feel better is lower in older adults than younger adults when sharing with a friend and a stranger relative to a computer [i.e. (friend+stranger) > computer]. Our study will help elucidate age-related differences in how social closeness and emotion regulation modulate responses to reward. Understanding how these processes differ across the lifespan may provide insight into maladaptive social decision making in older adults, such as risk for financial exploitation.

P1-D-32 - The Impact of Virtual Reality Go/No-go Training Combined with Repetitive Transcranial Magnetic Stimulation on Food Craving

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BACKGROUND AND AIMS: Cognitive training and neuromodulation have been increasingly recognized for regulating food cravings. In most research, these strategies were administered separately, each having limitations in effect sizes. This study explored whether the concurrent application of repetitive transcranial magnetic stimulation (rTMS) and go/no-go training (GNG) is more effective than using each method alone.

METHODS: Participants (n=118), women aged 18-39 years with elevated trait food cravings and preferences for high-calorie foods, were randomly allocated to one of four groups: active/no-go, active/neutral, sham/no-go, and sham/neutral. Participants in the active groups underwent high-frequency rTMS targeting the left DLPFC. Participants in the no-go groups consistently associated high-calorie foods with non-responses and low-calorie foods with responses in a virtual reality (VR) environment. Implicit and explicit responses to foods were assessed before and after the treatment using the single-category implicit association test (SCIAT) and craving rating task, respectively. Additionally, a food choice task was administered after the treatment.

RESULTS: For data analyses, changes in attitudes and ratings were computed by subtracting pre-scores from post-treatment. We divided participants into "restrained eaters" and "unrestrained eaters" based on Restraint Scale scores due to the crucial role of restrained eating in explaining responses to food stimuli. All measures entered 2 (Stimulation) × 2 (GNG) × 2 (Restrained eating) ANOVAs for statistical significance. For high-calorie food SCIAT scores, there was a significant 3-way interaction. Post-hoc tests showed that unrestrained eaters in the active/no-go group had a greater decrease in implicit positive attitudes toward high-calorie food than those in the active/neutral group. Among restrained eaters, active stimulation overall increased positive attitudes towards high-calorie food than the sham stimulation groups. For high-calorie food ratings, there was a 3-way interaction effect. Unrestrained eaters in the active/no-go group showed reduced cravings than those in the active/neutral group. For low-calorie food ratings, there was a significant GNG main effect, indicating increased cravings in the no-go groups than the neutral groups. Food choice scores showed a significant GNG main effect, with no-go groups choosing high-calorie food less than neutral groups.

CONCLUSIONS: These results align with prior studies showing the efficacy of GNG training in modulating food cravings and show the potential of neuromodulation as a combined treatment for better effects. Also, we reveal the importance of restrained eating status as a critical moderator of the treatment effect.

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P1-D-33 - Separating Phases of Cognitive Reappraisal: Generation and Implementation in Multiple Samples and the Brain

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BACKGROUND AND AIMS: Cognitive reappraisal is a powerful form of emotion regulation that involves reinterpreting a stimulus or situation in a way that changes one's emotion in accordance with one's goals. We recently reported on a novel task (GENIMP) that separates picture-based reappraisal into two component phases: generation of alternate interpretations (generation) and the elaboration and implementation of a single reinterpretation (implementation). We observed that the vast majority of affective change typically associated with picture-based reappraisal occurred during the implementation (rather than the generation) phase.

METHODS: In a series of follow-up studies, we use the reappraisal GENIMP task to examine a) the replicability of these results in two online samples (N = 48 and N = 283), b) the neural correlates of generation and implementation (N = 45), and c) baseline performance on the generation and implementation task in a clinical sample of treatment-seeking patients with clinically elevated depression symptoms (N = 30).

RESULTS: Results indicate significantly greater change in affect following implementation than generation ($F(3, 280) = 95.64$, partial $\eta^2 = .51$). Furthermore, reappraisal generation was associated with engagement of the semantic network (bilateral parietal, middle temporal, and left temporal pole), whereas reappraisal implementation was associated with engagement of self-referential regions (inferior frontal and posterior cingulate). Executive control and monitoring regions (mPFC, dIPFC, and anterior cingulate) were also engaged during both generation and implementation.

CONCLUSIONS: We observed strong support for the separability of reappraisal generation and implementation. Future directions include examining reappraisal generation and implementation in a clinical sample of patients with elevated depression symptoms after a 4-week course of cognitive therapy. **ACKNOWLEDGEMENTS AND FUNDING:** Funded by NIMH R15MH106928 award to KM and CW.

P1-E-34 - Jumping to Attributions and internalizing symptoms

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BACKGROUND AND AIMS: Self and other social evaluations are universal experiences, and attributing to others that they evaluate us positively or negatively has is important for psychiatric disorders such as anxiety (including social anxiety) and

depression. We aimed to elucidate computational mechanisms behind social learning, which have been implicated in internalizing disorders. We aimed to improve the Social Evaluation Learning Task (SELT) task for use with young people and internalizing disorders.

METHODS: An improved version of the task was created with stakeholder input. 130 UK participants completed the SELT-R and questionnaires assessing depression and anxiety symptoms as well as lifetime experience of internalizing disorders. We used model comparison to test a key hypothesis: that people first classify others as positive or negative ('jump to attributions'), then refine these views. This is the classify-refine model, shown in Fig. 1. We hypothesized that model parameters would correlate to current symptoms (anxiety in general, social anxiety and low mood), as well as lifetime prevalence of internalizing disorders.

RESULTS: Stakeholders identified many areas for improvement of the delivery of the task, and generated novel ideas for further research, e.g. whether computer avatar identity may bias attributions. Improvements are detailed in Table 1.

In support of our key hypothesis, 'classify-refine' models performed robustly better than previous, Bayesian models (Wilcoxon $p = 2.3E-5$; Fig. 2).

Our sample had low current symptoms, but 33.8% reported a previous anxiety or depression diagnosis. In support of our hypothesis, task parameters were correlated with Anxiety factor scores, with higher symptoms associated with greater decision noise ($p=0.018$) and less flexible policies ($p=0.028$). Remarkably, a greater decision noise parameter was associated with previous internalizing diagnoses over and above current symptoms ($p=0.011$ not controlling for current symptoms, 0.041 controlling for anxiety scores). Contrary to our hypotheses, social anxiety was not significantly related to task performance, and neither was low mood.

CONCLUSIONS: Our results replicate recent findings regarding the importance of classify-refine processes of social attributions. Furthermore our data - which in need of replication - suggests that the computational structure of making such attributions reflects underlying risk as well as current symptoms of internalizing disorders. This sets the stage for future investigations into the cognitive mechanisms of self and other evaluations in such disorders.

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P1-E-35 - Sex-Specific Neural Correlates of Social Interaction in Autism Spectrum Disorder

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BACKGROUND AND AIMS: Autism Spectrum Disorder (ASD) involves challenges in social interaction that differ by sex, yet the neural underpinnings of sex-specific social impairments in ASD remain poorly understood. Utilizing a dynamic social interaction task in conjunction with 7T MRI, we aimed to investigate sex differences in neural tracking of social signals in ASD ($n=36$; mean age: 27.5, 55.5% male), typical development (TD; $n=31$; mean age: 26.5, 45.2% male), and clinical controls (misophonia; $n=22$; mean age: 32.1, 18.2% male).

METHODS: Participants simulated interactions with virtual characters. Each interaction shifted a character's position in a 2d 'social space' framed by power and affiliation. GLMs with parametrically modulated regressors assessed whole brain activity in association with social distance, reflecting the distance between character's locations and the participant's point-of-view. Behavioral associations were assessed with ANOVA, controlling for age, sex, and head motion when applicable. All analyses were corrected for multiple comparisons.

RESULTS: Across all groups, participants showed significant neural tracking of social distance (FWE-corrected peak- and cluster-level $p's < 0.01$) in the posterior cingulate cortex (PCC), and bilaterally in the temporoparietal junction (TPJ), dorsolateral prefrontal cortex (dlPFC), and parahippocampal gyrus (PHG). In all regions except the R TPJ, females showed stronger neural tracking than males (PCC: $F=7.63$, $p=0.016$; L TPJ: $F=9.02$, $p=0.012$; L dlPFC: $F=6.31$, $p=0.024$; R dlPFC: $F=4.67$, $p=0.039$; L PHG: $F=5.71$, $p=0.027$; R PHG: $F=9.10$, $p=0.012$). Within ASD, increased self-reported social anxiety was associated with reduced tracking in the PCC ($F=10.67$, $p=0.037$) and L PHG ($F=7.41$, $p=0.019$), regardless of sex. In contrast, there was a significant sex by ASD-symptom interaction on PCC tracking ($F=4.77$, $p=0.037$). Males with more severe autism symptoms (Autism Diagnostic Observation Schedule; ADOS) trended towards worse tracking ($r=-0.3$, $p=0.21$), whereas females with more severe autism symptoms trended towards increased tracking ($r=0.45$, $p=0.094$). Behaviorally, the groups significantly differed in social distance ($F=15.53$, $p<0.001$), such that individuals with ASD showed larger social distances than both TD ($t=4.41$, $p<0.001$) and misophonia ($t=4.68$, $p<0.001$) groups. Lastly, there was a trending group-by-sex interaction on social distance ($F=2.78$, $p=0.068$), such that, in ASD only, females trended towards larger social distances than males ($t=-1.83$, $p=0.076$).

CONCLUSIONS: Our results suggest that there are sex differences in neural tracking of social distances across diagnoses. In ASD, neural tracking of social distances shows sex-agnostic relationships with general social symptoms but sex-specific relationships with core ASD symptoms.

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P1-F-36 - The Effect of Task Type on State Empathy

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BACKGROUND AND AIMS: Empathy is considered a multidimensional construct based on trait-level research; it is typically divided into affective constructs such as affective sharing and cognitive constructs such as empathic concern and perspective-taking. Whether state empathy is also multidimensional has yet to be assessed using a within-subjects design. State empathy tasks are rare and their behavioural results remain inconclusive. The present study used a within-subjects design to investigate whether the affective and cognitive dimensions of state empathy manifest differently as a function of what is being asked of the participant.

METHODS: Participants viewed contextual priming images depicting hands and feet in painful and neutral scenarios, followed by faces making pained or neutral expressions always congruent with the prime. Participants completed three empathy tasks in response to these stimuli as well as a gender discrimination control task. In the affective sharing task, participants rated their own level of discomfort in response to the stimuli. In the empathic concern task, participants rated their level of concern for the person displayed in the stimuli. In the perspective-taking task, they rated how much pain they thought that person was in. As expected, significantly greater empathy ratings were found for painful stimuli relative to neutral stimuli in all empathy tasks but not in the control task.

RESULTS: Importantly, task type significantly modulated empathy ratings even in response to neutral stimuli (i.e. no pain displayed), with empathy ratings on the perspective-taking task being significantly lower than ratings on the affective sharing and empathic concern tasks. When difference scores between painful and neutral conditions were used, state empathy was lower for affective sharing relative to both cognitive empathy tasks, but no difference between empathic concern and perspective taking tasks was seen. These results indicate that the trait-level multidimensionality of empathy is only partially preserved at the state level.

CONCLUSIONS: Participants may have difficulty distinguishing their level of concern for individual targets from their estimations of how much pain the target is in. Alternatively, participants may be able to disambiguate these constructs, but their levels of concern may be directly proportional to their metacognitive perceptions of others' pain. Our findings suggest that the differences between different types of cognitive empathy may not be persistent or meaningful outside of trait-level research contexts.

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P1-F-37 - Investigating the relationship between dopaminergic signaling, hyperthymic temperament, and loneliness

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BACKGROUND AND AIMS: Temperament is conceptualized as the fundamental emotional and behavioral pattern of individuals, which greatly shapes social behaviors. However, the neurobiological basis of temperament is yet to be clarified. This study aims to explore the links between temperament, social connection, and their potential biological underpinnings.

METHODS: In a sample of 26 healthy subjects, we investigated the biological correlates of temperament and its psychological-behavioral features with a multimodal approach, including: electroretinography (ERG), with the ERG b-wave amplitude representing an indirect proxy of the dopaminergic signaling; resting-state functional magnetic resonance imaging (fMRI), providing information on intrinsic brain activity; actigraphy, objectively quantifying motor activity; and a large battery of , providing information on temperament, psychological dimensions (such as psychomotor activity, affectivity, and thought), and social connection.

RESULTS: Our findings show that: 1) dopaminergic signaling (indirectly assessed by ERG) was positively associated with levels of motor activity and pleasure experience; 2) intrinsic brain activity in the default-mode network (DMN) was negatively associated with levels of motor activity; 3) increased levels of motor activity and pleasure experience, as well as decreased levels of repetitive thinking, were linked to the hyperthymic temperament; 4) dopaminergic signaling (indirectly assessed by ERG) was positively associated with objective social network size, while hyperthymic temperament was negatively associated with subjective loneliness.

CONCLUSIONS: Based on these findings, we speculate that dopaminergic signaling may inhibit DMN activity, promoting levels of motor activity and pleasure experience, as manifested in the hyperthymic temperament, which in turn facilitates the formation of social ties. This may finally result in increases in objective social connectedness and a reduction in subjective loneliness.

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P1-F-38 - Ideological brains: mapping individual variations in national ideology on variations in brain dynamics during a naturalistic viewing paradigm

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Since the mid-20th century, the complex interplay of two distinct ideologies, especially regarding the China-Taiwan relationship, has been prominent among individuals who live in Taiwan. This study investigates how Greater Chinese and Taiwanese Refinement ideologies influence brain dynamics and subjective experiences in two independent studies. In Study 1, 52 participants (22 males, 30 females; mean age 21.15) watched a Pro-China video. Those with a stronger Greater Chinese ideology reported higher liking ($r = 0.516$, $p < 0.001$) and feelings of resonance ($r = 0.426$, $p = 0.001$), while Taiwanese Refinement ideology had no significant effect on these feelings (liking: $r = -0.019$, $p = 0.894$; resonance: $r = 0.070$, $p = 0.622$). Study 2 involved 60 participants (28 males, 32 females; mean age 22.05) undergoing fMRI while viewing the same video. Intersubject representational similarity analysis showed that Greater Chinese ideology corresponded with similarity in brain dynamics in areas related to executive control processing, including the dorsal anterior cingulate cortex (dACC), dorsolateral prefrontal cortex (DLPFC), supplementary motor area (SMA), and insula, as well as areas involved in reward processing, such as the orbitofrontal cortex (OFC) and nucleus accumbens (NAcc). No significant brain dynamic associations were found for Taiwanese Refinement ideology. This research demonstrates that national ideologies significantly impact subjective experiences and neural processing when exposed to ideologically congruent stimuli. It highlights the profound effects of individual ideological differences on cognitive processing in response to ideologically charged content, indicating a complex relationship between personal ideology and brain dynamics.

P1-F-39 - An investigation of neural responses related to interpersonal space

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'Interpersonal space' refers to the distance we maintain to others to optimise safety and interactions. This distance and its regulation are key components in social interactions. Our study aimed to investigate the neural correlates of interpersonal space by varying the distance between a confederate and participant while recording EEG. To do so, we measured alpha-band suppression as an index of attentional engagement. Given that arousal and threat detection engage attention, we predicted that reducing the interpersonal distance would engage attention and lead to greater alpha suppression. Further, we also note that individuals vary greatly in their interpersonal distance preferences. As well as contextual variability, we also predicted such individual differences could be associated with social anxiety and therefore could further modulate attentional engagement (and alpha suppression).

Participants in our experiment stood still while a confederate either slowly approached or withdrew from them. We recorded EEG activity while standing participants passively viewed a confederate that was either 1) approaching/receding from them or 2) standing still at the distances that constituted the start and end points of movement in the dynamic condition: 0.5m (within personal space) and 4.5m (outside personal space). They were encouraged to stand still and hold eye contact without further task instructions. Participants also completed a social anxiety measure (Brief Fear of Negative Evaluation Scale) and comfort distance tasks.

We collected data from 44 participants (11 male; $M = 19.8$ years); data preprocessing and analysis will be done in line with standard conventions associated with the analysis of EEG oscillations. We will calculate alpha band (8-13Hz) across posterior electrodes (P7, P3, O1, P8, P4, O2). Static conditions will be analysed with an ANCOVA comparing alpha oscillations at near and far, with covariates of comfort distances and measures of social anxiety. Alpha oscillations in dynamic conditions will be analysed with a factorial ANCOVA: 2 (near, far) \times 2 (approach, recede), again using comfort distances and measures of social anxiety as covariates.

We predict greater alpha suppression in the conditions close/approaching than when the confederate was further away/withdrawing. We further predict alpha suppression differences will covary with social anxiety levels and comfort distances. Specifically, the differences between proximal and distal processing will be enhanced in those with high social anxiety and participants who prefer to maintain a greater interpersonal distance with an interactant. This would serve as new evidence for the role of attention in interpersonal space processing in a social context.

P1-F-40 - Changes in Parenting and Mating Motivation and Associated Brain Function Across the Transition to Fatherhood

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BACKGROUND AND AIMS: In species where males provide parental care, they often experience biological changes across the transition to fatherhood that prepare them to increase investments in parenting and decrease investments in mating. Human males experience hormonal changes across this transition, but whether they also experience motivational changes accompanied by changes in brain function has not been investigated. Here we designed an effort-based decision-making task in which men could exert effort to view either infant or adult female stimuli of different reward magnitude.

METHODS: Participants included 39 first-time, expecting fathers (32.97 ± 3.57 years) and 35 partnered non-fathers (29.11 ± 4.56 years) as control participants, en-route to a final sample size of 50 in each group. Expecting fathers were enrolled between 4-5 months of their partner's gestation and followed longitudinally. Here, we compare behavioral and neuroimaging data collected

at 4-5 months gestation to that collected when the infant is 4 months of age. During fMRI scanning, participants chose whether to accept or reject a series of trials in which both effort level and reward magnitude were varied. 24 trials involved infant pictures and 24 trials involved adult female pictures.

RESULTS: Previously, we reported that expecting fathers accepted fewer female trials compared with non-fathers along with no significant difference in the proportion of accepted infant trials. These findings persisted at the 4 month postnatal visit, when fathers again accepted fewer female trials ($t(74)=-2.00$, $p=.05$), while there was no difference in the proportion of infant trials accepted ($p>.05$). Nor was there a significant pre- to postnatal change in the proportion of either female or infant trials accepted ($p>.05$). While behavioral data revealed no apparent shift in motivation across the transition to fatherhood, neuroimaging results presented a different picture. In response to cues that anticipate the presentation of infant stimuli, fathers showed larger pre- to postnatal increases in activation than non-fathers within bilateral nucleus accumbens (NA) and bilateral substantia nigra/ventral tegmental area (SN/VTA). Fathers also showed larger pre- to postnatal increases in activation to the presentation of infant pictures within the medial preoptic area (MPOA). Contrary to predictions, non-fathers exhibited a larger decrease in the right nucleus accumbens response to cues that anticipated the presentation of female stimuli (all fMRI results survive $p<.05$ small volume correction).

DISCUSSION: Given the role of the MPOA, VTA and NA in parental approach motivation, our results are consistent with life history theory predictions of biological changes that prepare men for fatherhood.

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P1-F-41 - Examining Links between Neural Sensitivity to Social Feedback, Social Experiences, and Loneliness in Adolescents

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Loneliness, or perceived social isolation, is the negative emotional response to an experience of discrepancy between the desired and actual quality or quantity of one's relationships (Peplau & Perlman, 1982). Loneliness increases during adolescence and is higher in individuals on the autism spectrum (Vanhalst et al., 2013; Rotheram-Fuller et al., 2010). Long-term loneliness can result in multiple negative psychological outcomes such as stress, anxiety, depressive symptomology and self-harm (Hedley et al., 2018). Thus, there is a pressing need to understand factors that contribute to the development of loneliness among autistic and nonautistic youth. While limited work has examined this in adolescence, theoretical models of loneliness based on research with nonautistic adults (Cacioppo & Hawkey, 2009) have identified factors that create and sustain loneliness. These factors include both social cognitive and social reward systems, such that social-cognitive systems are engaged more when perceiving negative social stimuli and social reward systems are engaged less for positive social stimuli.

Our sample will include 75 adolescents with and without autism aged 11-14 (approximately 30 autistic and 45 nonautistic). Participants will complete an fMRI task where they receive feedback about how similar their likes and dislikes are to that of two other peers (or a computer for a nonsocial control). The positive social feedback (thumbs up) occurs when participant and peer agree and negative social feedback (thumbs down) is given when they disagree. A nonsocial control includes positive and negative nonsocial feedback. Trait Loneliness will be assessed using an adapted version of the Loneliness Rating Scale (Asher et al., 1984). Contrasts of interest will be positive social feedback (peer positive vs computer positive) and negative social feedback (peer negative vs computer negative). We will extract beta values from each contrast from within a priori defined ROIs encompassing regions associated with reward and salience systems. We will test the relations between neural sensitivity to negative and positive social feedback, social experiences, and loneliness using separate multilevel models. We hypothesize that greater neural sensitivity to negative social feedback will predict loneliness and reports of negative social experiences will mediate relations between neural sensitivity to negative social feedback and loneliness. Second, we hypothesize that reduced neural sensitivity to positive social feedback will be related to loneliness and reports of negative social experiences will mediate relations between neural sensitivity to positive social feedback and loneliness.

Taken together, this study is important because it will be the first to use ecologically-valid approaches to test whether social-cognitive and social-reward systems relate to loneliness via their effect on social experiences in adolescents.

P1-F-42 - Close Minds Overcome the Self through Empathy

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BACKGROUND AND AIMS: Empathy exerts a profound influence on social connectedness and mental health. While laboratory-based tasks often successfully elicit empathy in controlled environments, exerting empathy in everyday life is often challenged by the presence of personal concerns and mood fluctuations that may be especially difficult for the empathizer to overcome. Additionally, although much of the literature focuses on empathy for the distress of strangers, in everyday life, people frequently empathize with close others and have more opportunities to give or receive empathy for positive emotions than negative emotions. Thus, the current research expands the study of empathy to investigate the neural correlates associated with spontaneous empathy for one's romantic partner's positive and negative experiences when participants are challenged to overcome their own affectively salient situations.

METHODS: To investigate these processes, we introduce a novel fMRI paradigm, the Connected Lives Overcome the Self

through Empathy (CLOSE) task, and employed the task in 131 participants across 71 romantic couples. The CLOSE task elicits spontaneous empathy for one's partner by displaying simultaneous positive, negative, or no social feedback to oneself and one's partner, thus requiring participants to overcome their own response tendencies in order to empathize with their partner.

RESULTS: In contrasts involving overcoming one's self-situation to empathize with one's partner's feelings, results revealed activation in brain regions associated not only with affective empathy (e.g., anterior insula, dorsal anterior cingulate cortex) and cognitive empathy (e.g., temporo-parietal junction, medial prefrontal cortex), but also with cognitive control (e.g., dorsolateral prefrontal cortex). Notably, overcoming self-negative feelings to empathize with a partner's positive experience involved higher activity in brain areas related to reward processing (e.g., putamen, caudate, and orbital frontal cortex), cognitive control (e.g., dorsolateral prefrontal cortex), and cognitive empathy (e.g., middle cingulate cortex and precuneus) than the reverse scenario. Additionally, neural activity across participants within cognitive empathy regions was positively correlated with partner-reported support provision across a week-long daily diary assessment completed outside of the laboratory.

CONCLUSIONS: Overall, this study reveals insight into the neural correlates of how individuals transcend their own feelings to empathize with others in affectively challenging contexts that mimic the complexity of everyday life. Results highlight the significance of cognitive control in transcending self-focused feelings to support empathic responding and underscore the pivotal role of cognitive empathy in fostering prosocial behaviors.

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P1-F-43 - Men with make up, Woman without children: Validation study of gender norm transgressions

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Gender is a complex construct that develops through socialization. Social norms relative to gender are called gender norms. They are the perception someone has of what their reference group does or approves of in terms of behaviours depending of someone's gender (Cislaghi & Heise, 2020). People internalise models of those gender norms. They then act and evaluate others' actions accordingly. When those norms are strict and can't be violated without consequences, such as discrimination, they are called restrictive gender norms. Restrictive gender norms are detrimental for health, opportunities, rights and freedoms, most importantly for women and gender minorities (e.g. Cislaghi & al., 2022; Cislaghi & Heise, 2020; Heise & al., 2019; Weber et al., 2019). Therefore, it is important to study the psychology of restrictive gender norms including means of reducing them. To do so, we first need to identify what is considered as gender norms. Past work have shown that gender norms for men include winning, emotional control, risk taking, violence, primacy of work, being a playboy and being self-sufficient (Houle & al., 2015; Mahalik & al., 2003; Parent & Moradi, 2009). On the other hand, gender norms for women include being thin, domestic, relational, modest, and taking care of children (Mahalik et al., 2005). However, in our rapidly changing society, these past data may not be as relevant as they were: the study of gender and gender norms clearly calls for more recent data. The objectif of our study is to identify current restrictive gender norms among the American adults and validate gender norms scenarios that could be used in further studies. We developed 121 scenarios presenting possible gender norm transgressions (e.g. a man is a stay-at-home dad) and duplicated each scenario so that each behaviour are done by a man and a woman (e.g. a woman is a stay-at-home mom), for a total of 242 scenarios. Participants will be asked to evaluate the level of inappropriateness of the scenario (1: Not inappropriate, 100: Totally inappropriate). 250 adult Americans participants from Amazon MTurk will complete this online task on LimeSurvey. T-tests will be done for each scenario to see if there is a significative difference between the inappropriateness of the transgressions when done by a man or a woman. Scenarios where we find such a difference will be considered as restrictive gender norms. The influence of age and gender of participants will also be explored. This study not only will help validate (or invalidate) the past literature, it will also serve for a future project in which social learning will be studied as a potential way to reduce restrictive gender norms. Indeed, reducing restrictive gender norms has been identified as a promising way to increase health and gender equality in a series recently published by the Lancet (2019).

P1-F-44 - Understanding the experiential self: Modeling self-concept coherence through beliefs about life experiences

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How do people construct coherent life stories that contribute to their self-concept? Recent research developed a network theory of self-concept coherence by mapping people's beliefs about how traits relate to one another. Traits most important to coherence are those that more traits in the network depend upon for meaning, as any revision to those central traits would require greater revisions across the self-concept. Here, we extend this work by mapping people's beliefs about how their life experiences relate to one another, and whether more central life experiences are most important to the self-concept. Participants will first map the connections between their life experiences, and then recall and evaluate the importance of their past experiences while undergoing functional magnetic resonance imaging. We predict that more central memories will be more important to the self-concept. Due to their importance, recalling more central memories may be associated with greater activation in self-referential (vmPFC) and memory processing (hippocampus) regions. The findings will help decode the cognitive and neural processes that underpin personal narratives and self-concept coherence.

P1-F-45 - Conversation Similarity Predicts Social Relational Inference

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BACKGROUND AND AIMS: A striking commonality across major life transitions, such as enrolling at a new school, starting a new job, or entering retirement, is the need to learn new social structures. Success in learning these structures is critical for feeling a sense of belonging and minimizing mental and physical health problems associated with social disconnection and loneliness. We conducted a naturalistic behavioral study to investigate whether one avenue of interpersonal interactions – conversations – aided in social relational inference, that is learning about the valence and strength of social relationships.

METHODS: Healthy adults (n = 57, mean age = 19.08 + 1.48 years) watched a mid-season episode of the television show “Survivor”, and reported their perception of friendship and rivalry between all unique contestant pairs every 6.5 minutes. All contestant dialogue from this episode was transcribed, as well as all dialogue from the 12 episodes that preceded the selected episode. Using the Universal Sentence Encoder, a pre-trained, 512-dimensional word embedding model, we quantified the similarity in meaning, or “semantic similarity”, of conversations between all contestant dyads in each episode.

RESULTS: We fit a beta generalized mixed-effects model to investigate if dyadic semantic similarity from the selected episode predicted participant-level friendship and rivalry ratings and found that semantic similarity predicted social relational inference (b = 1.47, p < .001). We also fit a linear mixed-effects model to investigate if greater semantic similarity during relationship formation predicted later participant-level friendship ratings and found that greater initial semantic similarity most strongly predicted friendship inference ($\beta=0.06$, p < .001).

CONCLUSIONS: These results suggest that conversational semantic similarity may be bidirectionally related to social relational inference, predicting valenced relationship judgments and acting as a precursor to relationship formation. Conversational content can be informative for social judgments and may act as a potential mechanism of social relational inference. Future research will expand upon these findings to include functional neuroimaging in order to explore the neural mechanisms that support social relational inference in naturalistic settings.

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P1-F-46 - Mentalizing from self and friend perspectives: A naturalistic method for assessing neural similarity in mentalizing regions and relations with shared emotion and social anxiety

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BACKGROUND AND AIMS: Mentalizing, the ability to interpret others’ emotions and intentions (Frith & Frith, 2003), is important for dynamic responding during social interactions. Neural regions associated with mentalizing also are associated with self-focused thought (Lieberman et al., 2019), which may underlie mentalizing ability (Bradford et al., 2015). Socially anxious individuals may exhibit over-mentalizing (Maresh & Andrews-Hanna, 2021) and rigid environmental filtering (Pérez-Edgar, 2018), that may inhibit flexible responding to interaction partners. Neural similarity (NS), or how similarly individuals process information, is related to successful social interactions (Dziura et al., 2023), potentially driven by emotion (Nummenmaa et al., 2012). The current study used a novel paradigm to assess NS in dyads that engaged in a live social interaction and then re-lived the social interaction by watching clips from their perspective and their friend’s perspective. We assessed contributions of self and other perspectives, dyadic shared emotion and social anxiety to NS within mentalizing regions.

METHODS: 64 friends (32 dyads; 79.9% White; Mage = 19.68, SDage = 1.23) engaged in a social interaction while their perspectives were recorded via mobile eye-trackers. Participants rated their social anxiety (Liebowitz, 1987). Participants completed a scanner task where they watched 18 20s clips from their perspective and their friend’s perspective while fMRI data were collected. After each clip, they rated how positively and negatively they felt. Whole-brain analyses were FWE corrected (p < .05) and clusterized. Clusters were subsetted against the Neurosynth mentalizing atlas. Signal for retained clusters was deconvolved and realigned to each trial. Trials were then aligned across dyads to compute ICCs for Classic NS (participants viewed the same clip of the same moment) and Perspective NS (participants viewed different clips of the same moment) creating 4 conditions: Self Classic (P1 self & P2 friend), Friend Classic (P1 friend & P2 self), Self Perspective (P1 self & P2 self) and Friend Perspective (P1 friend & P2 friend).

RESULTS: We ran preliminary multilevel models in 17 dyads with complete data (7616 observations) and found that regardless of neural region, dyads exhibited more NS during Self Perspective compared to Self Classic on trials they rated more similarly than their average (b = 0.02, p = .012). However, we found that higher levels of social anxiety were related to greater NS during Friend Perspective compared to Self Classic on trials they rated less similarly than their average (b = -0.001, p = .019).

CONCLUSIONS: Our preliminary results suggest shared emotion may enhance NS when experiencing the same moment from each person’s own perspective and that social anxiety may affect NS from an alternative filter. **ACKNOWLEDGEMENTS AND FUNDING:** F31 MH121035; F32 MH131269

P1-F-47 - Sharing goals with human and non-human agents: a neurofunctional investigation

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BACKGROUND AND AIMS: Action monitoring have been extensively studied at the intrapersonal level, but we often share the environment with others. What is the relationship between their actions and ours? Interpersonal action monitoring (IAM)

includes all processes aimed at monitoring other people's actions. The present study investigates if an IAM does exist and what the underlying mechanisms may be, by focusing on observed-error processing. If the IAM does exist, it could be a by-product of the simulation processes at work when observing other people's actions. In this case, it should only occur with a human partner. Alternatively, IAM may depend on goal representation: if this was the case, an observed error would affect the observer's behavior only when it is an obstacle to some goal. We experimentally tested these hypotheses by creating a design in which we manipulated the social and goal-related dimensions, which are thought to respectively modulate simulation and goal representation processes.

METHODS: In an event-related fMRI experiment, 24 healthy participants played sequences of notes in turns with a co-actor that was believed to be either another participant or the computer (Human vs. Non-Human co-actor, social manipulation) during an Interactive and Non-Interactive context. While in the latter context the partner's performance was irrelevant, in the former the participant and the partner together accumulated points when performing the correct sequence (goal-related manipulation). In 50% of the trials, the co-actor made a mistake.

RESULTS: The partner's accuracy (Correct action vs. Error) modulated the neural activity in areas responsible for action monitoring (including fronto-parietal and fronto-opercular regions) in both contexts. However, while neural activity in the posterior medial frontal cortex and right frontal operculum (responsible for own intentional action monitoring) predicted the agents' post-error behavioral adaptations in the Interactive context, in the Non-Interactive context they correlated with the parietal activations responsible for exogenous attention. This was true independently of the partner's social nature. However, only in the Interactive context, the activation patterns of error-related neural activity enabled to decode what partner (human vs. non-human) the participant was playing with.

CONCLUSIONS: Altogether, these data suggest that the goal-related dimension strongly determines proactive monitoring of the partner's action, as opposed to the reactive processes at work when pursuing independent goals. The social dimension of a partner's error is differently coded only when agents are collaborating; otherwise, the error is no more than an expectation violation that does not need to be managed through an adaptive behavioral adjustment.

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1-F-48 - Reward learning promotes less flexible social choice than trait learning

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BACKGROUND AND AIMS: People learn about their social world both by learning about traits that others possess (e.g., "they are generous") and by learning reward-based associations (e.g., "they lead to rewards"). Each of these forms of learning reflects a distinct process that is encoded separately in the brain; both involve activity of the ventral striatum, but trait-learning is uniquely associated with activity in a broader set of regions involved in updating knowledge about other people (the right temporoparietal junction, precuneus, left ventrolateral prefrontal cortex, bilateral inferior parietal lobule, and posterior cingulate cortex) (Hackel, Doll, & Amodio, 2015; Mende-Siedlecki et al., 2013; Amodio, 2019). The objective of this study was to understand the comparative context sensitivity of each of these systems. We tested the hypothesis that, when making social decisions, people's reliance on trait impressions is context-sensitive, while their reliance on reward learning is relatively context-neutral. In other words, after learning an individual is generous, people might favor interacting with that individual specifically in contexts in which generosity is relevant. In contrast, people might generally feel positive toward rewarding individuals across contexts, whether similar to or different from the original learning context.

METHODS: In the present research, participants learned about four targets in a sharing game. These targets independently varied in how rewarding they were to the target (the absolute amount of money they provided) and how generous they were (the proportion of available money they shared). Later, participants made decisions about these targets in a related context (a trust game) and an unrelated context (a trivia game). Participants also rated how likely they were to turn to each target in a variety of contexts that varied in their relevance to generosity.

RESULTS: Participants used generosity in a more context-dependent way than reward information, choosing generous partners specifically for contexts relevant to generosity but choosing previously rewarding partners to a similar extent across contexts. The results demonstrate that use of generosity-based information in decision-making was more dependent on context than was reward-based information. Moreover, we observed no evidence to suggest that people relied on reward learning differently in the two decision contexts.

CONCLUSIONS: We found support for the conclusion that people make choices based heavily on trait-based learning when the context is relevant to the trait, whereas people make choices based on reward learning to a smaller but more consistent extent across contexts. These findings illuminate the interplay of different learning systems in social interaction, suggesting that trait learning offers a large and flexible basis for social choice while reward learning has a smaller but less flexible influence.

P1-F-49 - Neural dynamics and validation of a novel and natural assessment of theory of mind

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BACKGROUND AND AIMS: Naturalistic methodologies (e.g., movie watching) are commonly used to capture the complexity of everyday social interactions. However, as these approaches often focus on group-level differences in brain activation, they

overlook moment-to-moment changes in brain connectivity that may underlie performance deficits. Given the amorphous and non-static nature of these stimuli, a dynamic analysis approach may identify important nuances in brain activity (e.g., notable moments or neural states) that contribute to group differences. Edge timeseries, which allows for the decomposition of the temporal nature of functional connectivity into its momentary components, may thus better address the changing network dynamics in the brain during naturalistic tasks. In the present study we utilized a naturalistic task and dynamic measure of behavior to assess a core social cognitive skill- theory of mind. Theory of mind, the ability to infer others' emotions and thoughts, is impaired among many populations, including cognitively normal older adults, though the magnitude and source of these deficits are not well-understood.

METHODS: We used a movie watching task paired with a dynamic measure of behavior and brain connectivity to gain insight into the mechanisms underlying age-related deficits in theory of mind. Young (N=114, MAge[SD]=21.9[4.0]) and older adult (N=91, MAge[SD]=73.9[6.3]) participants watched a mockumentary-style show while undergoing fMRI. After the fMRI session, participants viewed the same videos again while using a joystick to provide continuous, real-time judgment of awkwardness (a proxy judgment for theory of mind).

RESULTS: The joystick task was validated behaviorally in a separate sample of young adults (N=110, MAge[SD]=18.7[0.9]). Compared to this baseline sample, older adults' ratings were less accurate than younger adults ($t(205)=7.6$, $p<0.001$). Using the ratings as a parametric regressor, we found that traditional theory of mind brain regions (e.g., medial prefrontal cortex, right temporoparietal junction) had significantly ($p<0.05$ FWE corrected) more activation during periods of higher levels of awkwardness. However, our main question related to dynamic brain connectivity throughout the task. We thus used an edge timeseries approach to identify changes in the organization of the networks (particularly the default mode network) associated with the explicit behavioral ratings, identifying both specific moments and larger states that related to the changing stimuli and associated ratings.

CONCLUSIONS: The goal of this work is to better clarify the brain-behavior link of how dynamic naturalistic social theory of mind stimuli relate to an underlying neural network architecture.

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P1-F-50 - Effects of Age on Cross-Cultural Differences in the Neural Correlates of Memory Retrieval

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BACKGROUND & AIMS: Culture can broadly be considered the collection of social, religious, ethnic and other factors which affect learning, behavior and cognition. Although culture can shape memory and its neural correlates, little research investigates effects of aging. This study investigates the neural correlates of memory retrieval for old, new, or similar lures in younger and older adults from the US and Taiwan.

METHODS: 98 Americans (43 older adults, 55 younger adults) and 109 Taiwanese (55 older adults and 54 younger adults) completed the Mnemonic Similarity Task (MST), a task that requires distinguishing old from similar lures (e.g., one exemplar of a cat from another). Participants were completed memory retrieval during fMRI scanning.

RESULTS: For the comparison of old versus new items (hits and correct rejections), younger adults performed better than older adults, as did Americans compared to Taiwanese. The age-related decrease in memory performance was larger for Taiwanese than American older adults. For Americans, the hippocampus was engaged more for new than old items, but the conditions were equivalent for the Taiwanese. For left inferior frontal gyrus (LIFG) the reversal in activity across cultures for young adults was eliminated with age. For the comparison of false memories (correct rejections and false alarms) for similar lure items, a comparison often associated with pattern separation or mnemonic discrimination in the hippocampus, there were effects of age and culture on memory performance. Young adults' tendency to engage LIFG more for correct rejections than false alarms was eliminated with age; age did not interact with culture in LIFG or in the hippocampus.

CONCLUSIONS: Cultural influences on memory performance and the engagement of neural regions during the MST task are apparent in younger adults. However, such differences might be lessened with age, accompanied by worse memory performance. Overall, results suggest that some effects of aging may be universal, but other cultural effects on memory may be eliminated with age.

P1-F-51 - Theta-burst stimulation of the posterior superior temporal sulcus and intersubject synchrony during naturalistic viewing

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BACKGROUND AND AIMS: Sharing an understanding of commonly experienced events is important for forming and maintaining social connections. Findings from social neuroscience show that friends share similar patterns of functional MRI activity (intersubject correlation, or ISC) when viewing the same naturalistic stimuli such as movies. Individuals who are central in a social network show greater ISC with their network partners than those who are less central. Conversely, those that are not well connected or are lonely show more idiosyncratic neural responses, especially in brain regions involved in mentalizing such as medial prefrontal and superior temporal cortex. The superior temporal sulcus (STS) is one region that might play an important role in forming shared neural representations. The STS tracks social interactions during task-based and naturalistic viewing.

In addition, ISC in the STS is associated with greater encoding into memory of social information. The neural response of the STS during social perception is also associated with the size and diversity of social networks. Here we propose that shared representations rely on neural processing that underlies the perception and understanding of social interactions. We have previously shown that transcranial magnetic stimulation (TMS) of the posterior STS disrupts emotion recognition from dynamic stimuli, and others have shown that TMS to pSTS disrupts activity throughout social brain regions. In this study, we used TMS to examine the causal contribution of the STS to ISC and encoding of social information during naturalistic viewing.

METHODS: In one session, participants viewed videos consisting of people, places, food, objects, and scrambled videos, to localize pSTS. Resting motor TMS thresholds were also acquired. In a second scanning session, we administered either inhibitory (continuous) or facilitatory (intermittent) theta burst TMS (TBS) to functionally-localized right pSTS or sham (vertex) TBS in a between groups design, before participants viewed a 20min movie ("The Neighbors Window"). After scanning, participants recalled details from the movie.

RESULTS: Preliminary analyses showed lower ISC following continuous TBS to the pSTS relative to vertex TBS, including in default mode regions, as well as some increases in ISC. Greater ISC following intermittent TBS relative to vertex TBS was observed, including in bilateral temporal and prefrontal cortex and amygdala. Additional analysis will examine the effects of pSTS TMS on intersubject pattern similarity and the dynamics of shared representations.

CONCLUSIONS: This study are expected to provide details about the causal contribution of the pSTS to ISC across multiple brain regions during the viewing of naturalistic social stimuli, and identify the contribution of social perception to the formation of shared representations.

P1-F-52 - Resting-state functional connectivity of salience and default mode networks and associations with empathic and callous-unemotional traits in pre-adolescence

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BACKGROUND AND AIMS: Empathizing with others requires flexibly deploying attention between one's own and other's perspectives. The neural mechanism to which this flexibility can be attributed remains unclear. It may rely on the functional connectivity (FC) of the salience network (SN) and the default mode network (DMN). The SN, involved in attention allocation, serves as a "switch" between the DMN, underpinning social cognition, and the frontoparietal network, serving decision-making. Increased FC within the DMN is associated with higher levels of empathy (Winters & Hyde, 2022), whereas reduced FC within the DMN predicts higher levels of callous-unemotional (CU) traits in pre-adolescence (Umbach & Tottenham, 2021). Reports on associations between empathy and between-network FC are more sparse, with some work observing that FC between the SN and the DMN positively correlates with empathy (Bilevicius et al., 2018) and other work suggesting that decreased FC between these networks may contribute to CU traits in adolescents (Winters & Hyde, 2022). The current study aims to replicate extant findings on within and between SN and DMN FC to determine whether they generalize to a community sample of pre-adolescent youth, a period marked by changes in psychosocial functioning. We hypothesize a positive association between empathy and FC between the SN and DMN, an inverse association between CU traits and within DMN FC, and an inverse association between CU traits and between SN and DMN FC.

METHODS: Forty-three pre-adolescent girls (Mage = 10.02, SD = 1.12) completed an 8-minute resting-state fMRI scan (60 slices with a T2*-weighted echo-planar sequence [TR = 800 ms; TE = 30 ms]). Prior to the scan, children completed the 21-item Empathy Questionnaire for Children and Adolescents (EmQue-CA; Overgaauw et al., 2017), assessing their empathy on a 3-point Likert scale (M = 34.30, SD = 3.2) and the 24-item Inventory of Callous-Unemotional Traits (ICU-Y; Essau et al., 2006) assessing CU traits on a 4-point Likert scale (M = 33.4, SD = 8.04).

RESULTS: We plan to examine FC within the SN and DMN during resting state using the CONN FC toolbox for MATLAB. Using the CONN toolbox atlas regions, our first-level analysis will test region-to-region FC within and between the SN and the DMN. Our second-level analyses will test FC within and between the SN and the DMN and their association with high versus low empathy as a between-subjects contrast; likewise with high versus low CU traits.

CONCLUSIONS: The FC of the SN and DMN networks has identified differences in social behavior, specifically regarding individuals exhibiting CU traits (Winters et al., 2023). By attempting to replicate previous findings, this study could help underscore predictive biomarkers associated with individuals at risk of developing antisocial traits.

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P1-F-53 - Identifying A Neural Signature That Predicts Self-Focus

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People are remarkably self-focused, disproportionately choosing to think about themselves relative to other topics. Self-focus can be adaptive, helping individuals fulfill their needs. It can also go haywire, with maladaptive self-focus a risk and maintenance factor for internalizing disorders like depression. Yet, the neural mechanism driving people to focus on themselves remains unknown. This gap is due to timing: while prior research measures neural activity the moment participants are instructed to self-reflect, a brain state that precedes, or nudges, the bias to spontaneously focus on the self remains undetermined. We identified a default network neural signature from pre-trial activity that predicts 1) multiple indicators of self-focus within our

sample and 2) internalizing symptoms in a separate sample from the Human Connectome Project. This is the first work to “decode” the bias to focus on the self and paves the way towards stopping maladaptive self-focus in its course.

1-F-54 - Learning to trust: The role of uncertainty and experience for younger and older adults

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BACKGROUND AND AIMS: First impressions of trustworthiness based on facial appearances alone can be unreliable. It is also unclear how facial trustworthiness can influence our decisions over different phases of learning (e.g., under uncertainty vs. with experience), especially among older adults.

METHODS: Using the Social Iowa Gambling Task (S-IGT), age-group differences in the impact of facial trustworthiness on trust learning were examined. In the congruent condition (CS-IGT), advantageous decks were paired with trustworthy faces and disadvantageous decks with untrustworthy faces. In the incongruent condition (IS-IGT), this pairing was reversed. Younger (n = 143) and older (n = 129) participants completed either the standard Iowa Gambling Task (IGT), CS-IGT, or IS-IGT. Multilevel modeling considered age group (younger vs. older), task condition (IGT vs. CS-IGT vs. IS-IGT), and choice phase (first 40 trials [uncertainty] vs. last 40 trials [experience]).

RESULTS: Younger and older adults did not differ in performance during the uncertainty phase ($z = -1.10$; $p = .27$), but older adults performed worse than younger adults during the experience phase ($z = -4.40$, $p < .001$) (age group by choice phase: Wald's $\chi^2(1) = 6.75$; $p = .009$). Further, across all participants, performance in the CS-IGT was better than in the IS-IGT ($z = 4.07$, $p < .001$) during the uncertainty phase. During the experience phase, however, participants performed better in the IGT compared to the IS-IGT ($z = 2.90$, $p < .01$) and the CS-IGT ($z = 2.05$, $p = .04$). Regarding learning throughout the task, participants learned across all task conditions, with this effect being most pronounced in the IGT ($z = 5.88$, $p < .001$), followed by the IS-IGT ($z = 4.85$, $p < .001$), and the CS-IGT ($z = 2.53$, $p = .01$) (task condition by choice phase: Wald's $\chi^2(2) = 13.13$; $p = .001$).

CONCLUSIONS: Older compared to younger adults experienced the greatest difficulties in decision-making and learning across all task conditions. Further, in the uncertainty phase, a bias towards trustworthy faces facilitated better performance in the CS-IGT over the IS-IGT, but not the IGT. However, in the experience phase, performance was greatest for the IGT. Although the inclusion of facial cues in the S-IGT initially helped in the congruent over the incongruent condition, these cues did not significantly enhance performance over time beyond the standard IGT. Moving forward, understanding the impact of congruent and incongruent facial cues during decision-making on neural activity and connectivity in regions involved in information integration and trust learning (e.g., anterior cingulate cortex) would be an important next step in uncovering age-group differences in learning to trust.

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P1-F-55 - Grandchildren are distinctly represented in the caregiving network in the grandmaternal brain

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BACKGROUND AND AIMS Grandmothers are important alloparents across human societies. The presence of grandmothers enhances both offspring fertility and grandchild survival, demonstrating the adaptive significance of grandmaternal caregiving. What remains unclear, however, is the specific proximate mechanisms that support grandmaternal caregiving: Is information about the grandchild represented and organized differently from others in the grandmother's brain? Here, we used representational similarity analysis (RSA) to investigate how individuals varying in kinship distance and age are represented in the grandmaternal brains.

METHODS Forty-one grandmothers (Age: 59.1 ± 8.1 years) viewed photos of their grandchild (OGC), their adult child or adult in-law (OC), unknown grandchild (UGC), unknown adult (UC), and control objects inside an MRI scanner. The correlations of multi-voxel activity for these targets were compared across three a priori neural systems previously implicated in affective empathy (i.e., AI, dACC, and amygdala), mentalizing (i.e., mPFC, rTPJ, and precuneus), or motivation/reward processing (i.e., midbrain, ventral striatum, and mOFC).

RESULTS We found that between-category similarity for social targets was significantly higher in the mentalizing system (Mean distance: 0.83 ± 0.14) than in the affective empathy system (1.01 ± 0.17), $t(40) = 6.197$, $p < .001$, and motivation/reward system (1.07 ± 0.17), $t(40) = 7.315$, $p < .001$. Importantly, in all ROIs, the multi-voxel activity pattern for OGC was most distinct of the social targets. Hierarchical clustering consistently revealed a separate clade for OGC despite its hypothesized similarity with UC (Age) or OC (kinship distance, familiarity). In fact, OC was grouped more closely with UC and UGC than with OGC. This grouping pattern was absent in the control ROIs outside the caregiving network (e.g., visual cortices). We then explored if the representational structure of OGC is related to univariate brain activations in response to OGC vs. different social targets and a biological marker associated with sensitive parenting (i.e., DNA methylation of the oxytocin receptor gene). The pattern dissimilarity between OGC vs. UGC in the affective empathy ROI significantly predicted increased activations in the ventral striatum and caudate nucleus for OGC vs. UGC (whole-brain, cluster-wise FWE correction, $Z > 3.1$, $p < 0.05$). We also found that the levels of OXTR methylation in the MT2 region predicted the greater neural differentiation of OGC from UGC ($r = .37$, $p = .017$) and OC ($r = .45$, $p = .003$) within the mentalizing system.

CONCLUSION In sum, our data suggest that grandchildren may form distinct neural representations in grandmothers' brains compared with other individuals, irrespective of kinship distance or age. This multivariate voxel activity may interact with other neural and genetic mechanisms to promote grandmaternal caregiving.

P1-F-56 - Examining links between social media use, resting state functional connectivity, and ADHD traits in young adults

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BACKGROUND AND AIMS: Social media apps have become a ubiquitous part of daily life, especially among youth and young adults. In some cases, these apps may afford some social benefits, but patterns of excessive social media use (SMU) have been associated with attention-deficit/hyperactivity disorder (ADHD; Nikkelen et al., 2014; Ra et al., 2018), so more research is needed to understand the role of SMU in attention-related problems in young adults. Excessive SMU and ADHD share similar cognitive and behavioral features, including impairments in attention, reward processing, and cognitive control (Meshi et al., 2015).

As far as brain measures, ADHD has been characterized by altered patterns of resting state functional connectivity (RSFC) within and between brain networks, including the default mode network (DMN), dorsal attention network (DAN), ventral attention network (VAN), and frontoparietal network (FPN; Norman et al 2022). Initial findings also suggest that excessive SMU is associated with patterns of increased co-activation between attention networks (VAN & DAN) and the DMN, a similar pattern observed among those with frequently reported ADHD traits (Abh et al. 2021).

Thus, the main aim of this study was to further examine links between social media use, patterns of RSFC within and between networks, and ADHD traits among young adults. Specifically, we will conduct preregistered analyses to test the following hypotheses:

Hypotheses: H1: We hypothesize that ADHD traits and overall SMU will share similar RSFC patterns within and between attention networks (VAN & DAN) and the DMN. H2: We also hypothesize that stronger RSFC patterns within and between networks will be associated with more ADHD traits, and this will be exacerbated by problematic SMU.

METHODS: We aim to recruit 80 young adults (aged 18-25) who will complete a self-report questionnaire assessing ADHD traits, social media use, including problematic social media use. Following this, they will undergo an fMRI scan in which resting state activity will be recorded.

Analysis Plan: To estimate RSFC, individual seed to voxel-FC maps will be constructed for the VAN, DAN, and DMN. Correlation coefficients will be estimated and converted to Fisher-z-scores. Between network connectivity will be calculated for each combination of networks (e.g., DMN to VAN). To address H1, we will inspect spatial overlap in connectivity within and between the VAN, DAN, and DMN—with ADHD traits and SMU as covariates. To address H2, we will run a series of multiple regression models with ADHD traits as the outcome measure and RSFC values and problematic SMU (and their interaction) as predictors.

CONCLUSIONS: We hope that these findings will elucidate the role that social media plays in attention-related problems in young adults, as well as identify shared neural mechanisms that underlie these problems.

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P1-F-57 - Brain Networks as Individual-Level Predictors of Changes in Loneliness

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Loneliness, the subjective experience of social isolation, poses a growing public health concern. The COVID-19 pandemic and related social distancing measures have illuminated the varied susceptibility of individuals to loneliness. Recent neuroscience research has identified distinctive brain characteristics in those experiencing loneliness. The current study investigates whether brain networks, measured during a social perception task, can predict individual-level changes in loneliness during the pandemic.

We collected data from the same pool of participants before and during the pandemic (Wave 1 [Baseline]: February 2019–March 2020, N=107; Wave 2 [Pandemic]: May–September 2021, N=76). At Wave 1, participants engaged in a social perception task inside an fMRI scanner that presented photos of their peers. Loneliness was assessed at both waves using two measures: 1) UCLA Loneliness Scale to measure trait-like loneliness; 2) a single loneliness item from the Center for Epidemiological Studies Depression Scale to measure loneliness as a more transient, state-like experience.

Utilizing Connectome-based Predictive Modeling, we employed whole-brain functional connectivity metrics from the social perception task to predict loneliness. A leave-one-out cross-validation iteratively constructed models on N-1 participants (training set), evaluating out-of-sample performance by predicting the loneliness score of the remaining participant (test set). Results indicated that task-based functional connectivity networks at baseline (Wave 1) were significantly associated with individuals' trait-like loneliness. Among 214 pre-defined parcels, increased connectivity within and between visual, ventral attention, and frontoparietal control systems, particularly in the posterior cingulate cortex, insula, inferior parietal lobule, and ventrolateral prefrontal cortex, correlated with higher loneliness in test samples. These predictions remained robust after controlling for head motion, gender, and depression. Moreover, functional networks measured at Wave 1 successfully predicted loneliness during the pandemic (Wave 2). Increased connectivity within and between dorsal attention and frontoparietal control systems, centering on nodes including the lateral prefrontal cortex, predicted higher state-like loneliness during the pandemic.

These predictions persisted after controlling for various factors, including head motion, gender, Wave 1 loneliness, depression, housing situations, and social interactions during physical distancing.

This data-driven approach provides initial evidence that functional brain networks during social perception can predict changes in loneliness. Lonelier individuals exhibited increased connectivity in brain systems involved in cognitive and attentional control processing of social stimuli, suggesting that greater cognitive sensitivity to social cues may contribute to vulnerability to loneliness amid social stressors.

P1-F-58 - Accurate Perceptions of Leadership in Group Conversations

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How accurate are people at perceiving who is leading the conversations in which they're embedded? In this study, we recorded 16 unconstrained four-person conversations (N=64) using face-worn microphones. Participants completed pre- and post-conversation survey items that included big-5 personality questionnaires and measures of self- and other-leadership and conversational control. A state-of-the-art deep neural network was used to automatically transcribe each conversation, allowing us to calculate how many words each group member spoke. We analyzed the associations between these variables to assess the accuracy of people's perceptions of conversation leadership. The results provided convergent evidence for the accuracy of these perceptions. First, there was a high consensus among conversant ratings about who (else) led the conversation. Second, participants' ratings of their own control of the conversation were robustly associated with the average ratings of their leadership provided by the rest of their group. Third, both self-rated and other-rated leadership were associated with objective measures of a target persons' spoken word count during the conversation. And fourth, participants' pre-conversation extraversion scores predicted post-conversation leadership ratings at the end of the study. Together these results suggest that people accurately track the spontaneous emergence of conversation leaders in unstructured informal conversations.

P1-F-59 - Investigating conspecificity and relevance effects on voice identity discrimination in dog and human brains using fast periodic auditory stimulation

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BACKGROUND, AIMS: The ability to discriminate voice identities is essential in many social interactions. Social mates' vocalizations are processed preferentially by many species' brains, but the unique contributions of (hard-wired) conspecificity and (experience-modulated) relevance to this processing preference are unclear. The special relationship of dogs and humans who have shared the same vocal-social environment for thousands of years provides a unique study case to assess the role of these two principles: for companion dogs, humans are highly relevant; for humans with dogs, dogs are more relevant than for humans without dogs. Previous behavioral studies have shown that both dogs and humans can discriminate conspecific individuals by their voice. But a direct comparison between dog and human voice identity discrimination is lacking in both species.

METHODS: In the present study, we investigate the effects of conspecificity and relevance on voice identity discrimination in awake, unrestrained, cooperating dogs and humans using a novel method: a fast periodic auditory stimulation (FPAS) paradigm to measure neural entrainment to rhythmic voice identity changes using non-invasive electroencephalography (EEG). Participants (20 dogs, 20 humans) are presented with short vocalizations: one sound at every 250 ms. Dog sounds are short barks, human sounds are short "ha" utterances. There are four conditions: structured/random dog/human sounds. Every condition is presented in one-minute blocks, with 4 blocks per condition, and with the order of the total 16 blocks pseudorandomized. Structured conditions follow an oddball pattern: two sounds from the same vocalizer are always followed by a third sound from a different vocalizer (AABAAB...), resulting in a base frequency (4Hz, defined by all sounds) and a target frequency (1.33Hz, defined by oddball sounds). Random conditions are used as controls: they contain the same stimuli as their structured counterparts, but no oddball pattern.

ANALYSIS PLANS: We assume that brains only entrain to the target frequency if voice identity discrimination takes place, and only for structured conditions. We will perform frequency domain analyses, calculate Z-scores to define whether power at the frequencies of interest is significantly higher than at the surrounding frequencies, and compare conditions. More efficient voice identity discrimination will be reflected in greater entrainment (i.e. greater power) at the target frequency.

PREDICTIONS: We predict that if processing preferences in voice identity perception are driven by conspecificity, then both dog and human brains will discriminate conspecific voice identities more efficiently than heterospecific ones. But if such preferences are driven by relevance, then dogs will also efficiently discriminate human voice identities; and humans with dogs will discriminate dog voice identities more efficiently than humans without a dog. **FUNDING:** ERC 950159, NAP2022-1-3/2022, ELTE.

P1-F-60 - Perceiver popularity inversely influences spontaneous neural encoding accuracy of familiar others

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BACKGROUND & AIM: Much of human behavior is guided by efficiently and spontaneously processing social stimuli. Popularity is a key type of social information related to status and influence that is encoded in neural representations that are spontaneously activated when viewing familiar others' faces. Prior work suggests accurate encoding of such information varies substantially across perceivers. Yet, little is known about how trait-level variables impact how perceivers spontaneously represent information about their peers when encountering them, and in particular, how a perceiver's own social status relates to how readily and accurately they encode social information about others. We addressed this gap by examining how perceiver popularity affects

the accuracy of spontaneous neural representations evoked when viewing one's peers.

METHODS: A sample of 58 freshman girls in South Korea participated in an fMRI study where they saw photos of their classmates. Popularity nominations for each study were also acquired. These data were submitted to a representational similarity analysis where each participant's neural representations of classmates were compared to those of other participants and to popularity scores based on behavioral ratings.

RESULTS: Results from a whole-brain searchlight replicated prior work, confirming popularity was encoded in regions traditionally associated with social cognition and value-based processes, such as the dorsomedial prefrontal cortex (dmPFC), posterior cingulate cortex (PCC), and anterior temporal cortex. We examined whether perceiver popularity would be associated with having neural representations that were better aligned to group consensus representations (i.e., more 'accurate'). The less popular a student was, the more likely they were to have spontaneous representations of their classmates in dmPFC and PCC that were more closely related to group consensus representations.

CONCLUSIONS: These findings confirm prior work that the brain is highly attuned to information about others' popularity and accesses this information with relatively minimal prompting (e.g., passive face viewing), and further suggest that one's own popularity affects spontaneous encoding of social information about one's peers. While this pattern of results diverges from past findings linking perceiver popularity to neural response normativity when participants view generic stimuli (e.g., videos unrelated to their own lives), it is consistent with prior reports that poorly connected members of social networks tend to have more accurate knowledge about other people in their networks (potentially because less-popular perceivers attend to all members of the network, not just popular individuals).

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P1-F-61 - Multivoxel Pattern Similarity of Vicarious Neural Pain Responses After Meditation Training

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Low perceived social connectedness (social isolation and loneliness) has reached an all-time high in the United States, with nearly half of U.S. adults reporting sometimes or always feeling lonely. Loving Kindness Meditation (LKM, or metta) is aimed at extending feelings of love and kindness to progressively more distant others and has been shown to increase empathy. However, it is unclear whether LKM also has an effect on perceived social connectedness, and if so, whether this effect can be explained by the higher levels of empathy. In this study, 110 participants were randomized to LKM training or a control intervention to measure pre-post changes in perceived social connectedness, love, and loneliness. In addition, 54 participants underwent fMRI scanning at the end of the LKM intervention to assess group differences in empathy for pain by looking at neural self-other mapping and self-reported empathy. We expect that LKM increases social connectedness and love for others and decreases loneliness. Furthermore, we expect that these positive associations are mediated by higher sharing of neural representations and self-reported empathy.

P1-F-62 - Neural signatures of emotional inference and experience align during social consensus

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BACKGROUND AND AIMS: Humans seamlessly transform dynamic social signals into inferences about the internal states of the people around them. Social signaling depends upon both the intended content of the signal (i.e., the "ground truth") and the interpretation of the signal by an observer (i.e., inference). To better understand how social signaling is processed in the brain, we sought to dissociate the neural patterns underlying "ground truth" and inference in a naturalistic storytelling paradigm and test how these patterns relate to empathic accuracy.

METHODS: We collected fMRI data from participants (N = 100) while they rated the emotional intensity of people (targets) describing significant life events. Targets rated themselves on the same scale to indicate the intended "ground truth" emotional intensity of their videos. Next, we developed two multivariate models of observer brain activity– the first predicted the "ground truth" and the second predicted observer inferences. Then we tested how concordance between these two predictive patterns is related to empathic accuracy.

RESULTS: We found that both "ground truth" ($r = 0.50$, $p < 0.0001$) and an observer's inferences ($r = 0.53$, $p < 0.0001$) could be predicted from observers' brain activity. Both models were verified in held-out validation sets.

When bootstrapped (5,000 samples) and thresholded (FDR $q < 0.05$), we found that the "ground truth" pattern relies significantly on brain areas implicated in speech comprehension (right angular gyrus), scene construction (PCC and calcarine sulcus), and mentalizing (bilateral superior frontal gyrus, precuneus, and anterior insula). The inference pattern also relies on mentalizing networks, however, this pattern uniquely recruits areas implicated in social abstraction and somatosensory processing– the temporal pole and S1, respectively.

To test how the alignment of the "ground truth" and inference patterns are related to empathic accuracy, we correlated the models' predictions across all participants. When participants are inaccurate, there is more variance across the predictions of the "ground truth" and inference models, and therefore they are weakly correlated ($r = 0.28$, $p < 0.01$). However, when participants are accurate, there is lower variance between the model predictions ($r = 0.64$, $p < 0.001$). The alignment between the two models

was significantly greater during high accuracy performance than low accuracy performance ($z = -2.71$, $p = 0.003$).

CONCLUSIONS: Using naturalistic socioemotional stimuli and machine learning, we developed reliable brain signatures that predict what an observer thinks about a target, what the target thinks about themselves, and the correspondence between them. These signatures can be applied in clinical data to better our understanding of socioemotional dysfunction.

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P1-F-63 - Neural representations of map- and graph-based knowledge structures for two distinct types of social information during naturalistic social interaction

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BACKGROUND AND AIMS: During social experiences, we accumulate social information about others, organizing it into structured knowledge for subsequent social interactions. This knowledge involves two key components: the personality traits of each individual and the relationships among them. Personality traits can be organized in a map-like structure with coordinates, while relationships can be depicted as a graph-like representation, defined by connections. However, the neural mechanisms underlying the organization of these distinct knowledge structures within the same social group remain unexplored.

METHODS: We created first-person movies and a naturalistic social interaction game with six characters within a 3D Minecraft environment, as described in narrative scripts. We collected high spatial resolution 7T fMRI data from 24 participants during movie-watching and game-playing, involving social decision makings within the conversational context. Following a series of social events in movies and games, participants rated personality and relationship traits of characters, including themselves. To investigate neural representations, neural subspaces of both types of social information were extracted from the hippocampus, a region implicated in organizing relational knowledge, using targeted dimensionality reduction applied to the movie and game neural data. Subsequently, representational dissimilarity matrices (RDM) were generated from participants' ratings, along with beta coefficients of the general linear model from the rating task fMRI data.

RESULTS: The rank correlation between the two social knowledge RDMs and their corresponding neural RDMs revealed that the hippocampus represents both map-based personality traits and graph-based relationships. However, hippocampal representations for these traits were not correlated, indicating distinct mechanisms in structuring the two types of social knowledge. Similarly, the hippocampal subspaces, extracted from the movie and game, were orthogonal, suggesting that separate mechanisms within the hippocampus organize the two distinct knowledge structures during social experiences.

CONCLUSIONS: Diverse forms of social knowledge are acquired during social experiences, encompassing map-based personality traits and graph-based relationships. We demonstrated that the hippocampus plays a crucial role in representing both social knowledge structures for the same group of social agents. Our findings further revealed distinct mechanisms involved in organizing these two knowledge structures during ongoing social experiences and representing them afterward, highlighting the intricate mechanisms for organizing naturalistic social knowledge within the hippocampus.

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P1-F-64 - Influence of socioeconomic status and negative life events on the functional brain maturation and social cognitive functioning in children and adolescents.

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Objective: Childhood and adolescence are marked by significant changes to the functional properties of the brain that support various aspects of higher-level cognition. This developmental period is also sensitive to environmental factors, which can have an outsized influence on brain and cognitive development. Low resource environments and adverse experiences can have detrimental effects on brain development. However, their influence on neurocognitive development is likely not the same; low resource environments, often approximated by socioeconomic status (SES), are associated with delayed development (Rakesh et al., 2023), while adversity (often quantified as number of adverse events) has been shown to accelerate development of structural properties of the brain (Holz et al., 2023). In the current study, we examined the differential influences of SES and adversity on the inherent functional architecture of the developing brain. **Method:** Independent components analysis on resting state fMRI data from children and adolescents aged 7 to 15 (N=185, acquired from the Healthy Brain Network) was computed to identify six networks (Default Mode Network (DMN), Left Executive Control Network (ECN), Right ECN, Hippocampal (HPC), Salience, and Sensorimotor) of interest. Spatial and temporal properties of the six networks were compared to a large cohort of adult (1200 total, with a mean age of 26; separated by sex) resting state data to compute a measure of neural maturity (degree of similarity between the child and adolescent brains with the adults across each network). Regression analysis was used to determine the association between neural maturity and several factors of interest including, age, parental education (i.e., resources), number of negative life events (adversity), executive function and social cognition. **Results:** We found a strong relationship between Negative Life Events and Social Cognition (but not executive function) scores and neural maturity in the DMN ($R^2 = .19$). Specifically, increased adverse events were associated with reduced maturity values, while better social cognitive abilities were associated with increased measures of neural maturity. We also found increased neural maturity within the HPC network was associated with stronger fluid reasoning skills, but not social cognition. Interestingly, we did not find a significant relationship with neural maturity and parental education. **Conclusion:** We found children who experienced more adversity had

less adult-like functional properties of the DMN, independent of their age, but we did not find the same association for parental education. Additionally, we found increased neural maturity within the Left ECN and DMN was associated with better social cognition and fluid reasoning scores. These results suggest that access to resources (parental education) and adversity have differential influences on functional brain development.

P1-G-65 - How Similar Are We? A Reinforcement Learning Process of Shared Similarities and Identification with New Social Groups

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BACKGROUND AND AIMS: Identifying to social groups is vital for people's well-being. When people change social groups, they must initiate an identification process with members of a novel group, which can be facilitated by perceived similarity between oneself and members of the new group. However, the process where people learn the similarities shared with their new group members remains unclear. Research and theories of reinforcement learning suggest that people can infer traits of novel groups (how generous they are) by optimizing their inferences when interacting with members of these groups (Hackel et al., 2015). Can people also learn how similar they are with a new group through a reinforcement learning process? Our goal is to test if the similarities learned through interactions with members of novel groups influence the identification to these new groups.

METHODS: We conducted two experiments with 80 undergraduate students from a francophone University in Montréal (study 1) and 72 students from an anglophone CÉGEP in Montréal (study 2). Participants were invited to play a decision task on a computer where they could compare their personal preferences among many pairs of items (e.g., cats vs. dogs) with members of four different unknown groups. Participants were informed that they would receive 1 point (converted to money) for each member of the selected group who shared their same preference: a reward related feedback. Also, participants were shown the total number of group members with whom they just played. This number varied on each trial and allowed participants to implicitly learn the extent to which (in terms of a proportion) they were similar to members of the selected group: a similarity related feedback. Feedback was manipulated to create four distinct groups based on reward (low or high) and similarity (low or high). After the decision task, participants filled out a questionnaire measuring their level of identification toward each of the 4 groups. For study 2, participants filled a second questionnaire a week later to see if any effect of reward or similarity on identification would be maintained through time.

RESULTS: Factorial 2X2 repeated measures ANOVAs on identification supported both a significant effect of rewards and an even larger significant effect of similarity in both studies. A significant interaction of similarity by reward was found in time 2 of study 2 suggesting that the combined effect of reward and similarity feedback predict long-term identification.

CONCLUSIONS: Our results support that people can learn through reinforcement how similar they are to new groups and that these levels of similarities predict identification toward the respective group and that their effect is maintained through time. Future research should extend analyses with the use of computational modelling to understand how people update their inference of shared similarities with new groups on trial-by-trial basis.

P1-H-66 - The impact of emotion prediction errors on episodic memory

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Emotional events are often remembered better than neutral ones. It has been proposed that enhanced memory for salient events is not only driven by emotions but also by mismatches in expectations about how events unfold (Rouhani et al., 2023). Previous work on prediction errors – typically defined as the deviation between outcome and expectation in a reinforcement learning framework – has investigated the effect of signed and unsigned prediction errors on memory (Rouhani et al., 2018, 2021; Kalbe & Schwabe, 2022). Recent work combining the study of prediction and emotion has suggested that emotion prediction errors can influence learning and decision making (Emanuel & Eldar, 2023; Heffner et al., 2021). However, little work has investigated the role of emotion prediction errors on memory formation. Here, we aim to determine how prediction errors elicited by fluctuations in emotional states impact episodic memory.

Using an openly available dataset, we will examine how signed and unsigned emotion prediction errors drive subsequent memory for items encoded during dynamic emotional states. In the study by McClay et al. (2023), 96 participants encoded sequences of images while listening to pieces of music designed to evoke a range of emotions. Following encoding, participants listened to each piece again while continuously tracking subjective valence and arousal ratings using a novel tool called the 'Emotion Compass.' Twenty-four hours later, they completed an item recognition memory test and temporal source memory test. The original study applied changepoint analyses to the emotion ratings to derive event boundaries and examine their effects on episodic memory.

For the proposed reanalysis, the compass ratings will be used to compute two measures of emotion prediction error: valence and arousal prediction errors. These measures will quantify the difference between the "expected" emotion rating based on a weighted average of recent timepoints and the actual rating during each trial of the encoding phase. The valence and arousal prediction errors, both signed and unsigned, will be entered into separate linear mixed-effects models as predictors of item and temporal source memory. We hypothesize that greater unsigned valence prediction errors will predict better memory. That is, memory will be enhanced regardless of whether participants' emotions are more positive or negative than "expected." By contrast, we hypothesize that arousal prediction errors will impact memory in a directional manner, with enhanced memory when arousal is higher than "expected."

This work will integrate affective and predictive accounts of memory enhancement to reveal how dynamic emotion prediction errors impact episodic memory. It will also shed light on how we update our internal models of the world based on fluctuations in emotional state. This study will pave the way for future work uncovering prediction-related mechanisms that contribute to emotional memory formation.

P1-I-68 - The influence of parenting on adolescent socio-emotional processing and brain development

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Adolescence is defined by changes in social behavior that are supported by the functional reorganization of neural networks dedicated to social information processing. Early life experiences, including caregiving environment, influence the developmental trajectory of adolescent brain maturation. While previous research focuses on extreme deviations in caregiving, such as neglect and abuse, the neurodevelopmental impacts of variability within the normative range of parenting remain understudied. The purpose of this behavioral neuroimaging study is to investigate how individual differences in normative parenting impact the neural processing of socio-emotional movie content during adolescence. Data collection is ongoing for adolescents aged 10-16. Self-report questionnaires and ratings of parent-child interactions during a videotaped cooperative task will be utilized to assess caregiving environment. We hypothesize that distinct dimensions of parenting, such as warmth and responsiveness, will be differentially associated with adolescent neurodevelopment. Bootstrap exploratory graph analysis, a dimensionality reduction method, will be employed to identify latent communities of parenting characteristics. Additionally, adolescents passively view a 14-minute movie clip from Disney Pixar's *Inside Out* during fMRI data acquisition. This naturalistic viewing paradigm features an 11-year-old girl both at home and in the classroom as she deals with the many emotions associated with moving to a new city. Overall, we hypothesize that adolescents experiencing more parental warmth and responsiveness will show functional brain organization indicative of protracted neural maturation. We also hypothesize that associations between parenting and individual differences in adolescent neural processing will be strongest during negative valence emotional scenes, as negative content typically requires greater attention and cognitive processing. EmoCodes, a standardized system for coding the socio-emotional content in complex video stimuli, will be utilized to characterize the positive and negative valence emotional content in the *Inside Out* fMRI paradigm. Then, connectome-based predictive modeling will be implemented to identify adolescent patterns of functional connectivity that predict individual differences in scores on latent communities of parenting. Lastly, we will calculate modularity and global efficiency network statistics to capture the extent to which the brain can be divided into distinct subnetworks and how effectively information is integrated across the entire brain, respectively. This research has the potential to provide novel insights into how variability in parenting affects the trajectory of brain maturation during the developmental period of adolescence.

P1-I-69 - Subjective socioeconomic status predicts scan-associated anxiety in preadolescent Latina youth: Implications for neurodevelopmental research

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BACKGROUND: Experiencing anxiety during a magnetic resonance imaging (MRI) experiment can prevent participants from remaining still and potentially influence task engagement, baseline neural activity, and functional activation patterns (Michalska et al., 2020). The extent to which the scanner environment affects such scan-associated anxiety varies with socioeconomic indicators in adults (Bui et al., 2021), though less is known about associations in youth. The current study examines socioeconomic predictors of scan-associated anxiety in a sample of preadolescent Latina youth, a historically understudied population that disproportionately encounters socioeconomic marginalization and racialized stressors that may amplify MRI-induced negative affect and compromise image quality and interpretation.

METHODS: Forty-six predominantly Mexican-origin Latina girls (M_{Age}=9.30, SD=1.13) self-reported their trait and state anxiety before and after undergoing an MRI scan via the State-Trait Anxiety Inventory (Spielberger et al., 1983). Following the scan, children self-reported their subjective socioeconomic status via the MacArthur Scale of Subjective Social Status (Adler & Stewart, 2007). Hierarchical linear regression analyses then tested whether socioeconomic status (entered at Step 2) predicted scan-associated anxiety over and above any observed effects of age and trait anxiety (entered at Step 1). Participant motion parameters during the MRI scan were also recorded.

RESULTS: Participants' pre-scan state anxiety (M=29.85, SD=5.37) did not differ from their post-scan state anxiety (M=29.30, SD=6.59), $t(45)=.635$, $p=.529$. Participants' community-level subjective socioeconomic status was associated with their pre- ($\beta=-.422$, $p=.010$) and post-scan state anxiety ($\beta=-.444$, $p=.006$), such that lower status was associated with higher state anxiety. Importantly, these socioeconomic effects on pre- ($\Delta R^2=.143$, $p=.010$) and post-scan state anxiety ($\Delta R^2=.158$, $p=.006$) were observed over and above the effects of age and trait anxiety, though no effect of country-level subjective socioeconomic status was observed, $ps>.340$. Exploratory linear regression analyses revealed a significant effect of post-scan state anxiety on participants' in-scanner motion ($\beta=.349$, $p=.030$), controlling for age and community-level subjective socioeconomic status. No effect of pre-scan state anxiety emerged, $p=.254$.

CONCLUSION: The current findings call for researchers to include sociodemographic indices in functional neuroimaging research, particularly for studies with children from historically understudied backgrounds. Apprehension of the scan environment, mistrust of medical settings, and experiences of chronic stress may potentiate scan-associated anxiety that could be incorrectly attributed to trait-level factors. We will also discuss ongoing efforts leveraging community-based participatory research and youth panels to effectively reduce scan-associated anxiety.

P1-J-70 - Higher and lower order emotion feature perception mapping across development

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OBJECTIVE: Reading emotions in others involves multiple levels of cognitive processing: 1) integrating low-level sensory features and 2) applying semantic knowledge to ultimately 3) integrate semantic features with prior knowledge to identify the specific emotion concepts expressed by others. Children learn emotion concepts from the bottom up, with refinement of semantic and conceptual understanding across childhood and adolescence. These three levels of cognition have not been examined in tandem in the context of neurodevelopment, however. The goal of this project is therefore to 1) identify regions of the brain that contribute to each level of cognitive processing and 2) characterize changes in the distribution of these regions across development.

METHODS: This project will use movie-watching fMRI data (two videos) from 823 5-15-year-olds who participated in the Healthy Brain Network Biobank study. Videos were coded for emotion features (e.g., anger, sadness, etc.) and will be coded for both emotion-nonspecific semantic features (e.g., specific words, faces, tools, etc.) and for sensory features (e.g., loudness, shapes, edges, colors, etc.). Both age at scan and pubertal timing will be used to examine associations between feature encoding and development.

ANALYSIS PLAN: First, we will identify the degree to which each voxel/vertex of each participant responds to each feature. Specifically, for each participant, each video feature from all levels will be entered as predictors in a regularized regression model with activation as the outcome variable. This procedure will shrink betas for feature timeseries that are weakly associated with activation to zero, resulting in a sparse set of features associated with activation for each voxel/vertex. The model will be trained on data from one video and tested on the second video to avoid overfitting and enhance generalizability. We will only retain voxel/vertex-level models that fit well on the left-out video. Aim 1: Across the sample, selectivity for each feature at each voxel/vertex will be identified by testing if each voxel is more strongly encoding either the first, second, or third level of cognition based on regression betas. Specifically, we will use paired t-tests to determine if one category is represented more strongly than the others across the sample. Aim 2: We will use support vector regression to identify differences in the regularized regression betas across age and puberty.

IMPLICATIONS: Identifying how low- and high-level feature representation in the brain is associated with age-related emotional development would provide important insight as to how these processes may go awry in pediatric psychiatric disorders.

P1-J-71 - Emotion Perception in Face-to-Face Interaction: A Multi-Modal Approach Using EEG and Machine Learning Techniques

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BACKGROUND AND AIMS: Emotion perception, crucial for social interactions, has been traditionally studied in isolated scenarios, focusing on individuals observing limited stimuli. This approach overlooks the dynamic nature of real-life social exchanges where individuals are not isolated but adapt to each other and their environment. Thus, studying emotion perception in a dyadic setting is essential to capture its interpersonal nature.

The proposed multi-modal approach aims to reduce reliance on any single modality, thereby allowing for a more comprehensive understanding of how neural, physiological and behavioral components of the emotional experience influence emotion perception. Neural signals such as EEG (electroencephalogram) are particularly useful for studying interpersonal emotion processing because their data collection would not interrupt social interactions. In real-life situations, emotion perception is also shaped by how the interplay of facial expressions between individuals impacts empathy, stress response, and social enjoyment. Physiological indicators such as heart rate variability (HRV), also offer valuable insights into the autonomic nervous system's role in emotion processing.

METHODS: To investigate emotion perception in dyadic interactions, we conducted a study that used a multi-modal approach, combining neural signals, physiological indicators, and behavioral features, to evaluate participants' accuracy in perceiving emotions during real-life social exchanges. Data collection has been completed (n=54). Participants were paired and first completed an experience-sharing task, where they shared emotional experience with their partner while their facial expressions, heart rate and EEG were recorded. Participants subsequently watched the video recordings, both of themselves and their partner, and continuously rated perceived emotions using a scale.

RESULTS and CONCLUSIONS: Data analysis will incorporate a multifaceted data structure. EEG power and entropy will be extracted as neural features. Facial Expressions will be coded as a single value representing overall behavioral expressiveness. For physiological features, heart rate measures will be integrated into the model as well. The accuracy with which participants rated emotional videos of their interaction partners will serve as a measure of overall emotion perception.

The effectiveness of combining neural, physiological, and visual features will be evaluated using linear SVM (Support vector machines) and convolutional neural networks (CNN). This approach aims to determine the predictive power of multi-modal data in understanding emotion perception during dyadic interactions. This study proposes a novel approach to understanding emotion perception in vivo, examining it in a multi-modal and dyadic setting to enhance our understanding of how emotional experiences are shared and perceived in real-life social interactions.

P1-J-72 - Dilation in pupil size tracks shame and devaluation: Physiological evidence supporting the Information Threat Theory of Shame

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BACKGROUND AND AIMS: Emotions have been suggested to represent adaptations that coordinate cognitive, physiological, and behavioral mechanisms to solve adaptive ancestral problems (Cosmides & Tooby, 2000). Evidence suggests that the emotion of shame is an adaptation that defends the individual against the threat of devaluation due to the spread of negative personal information (Durkee et al., 2019). The Information Threat Theory of Shame (ITTS) posits that, to operate cost-effectively, the shame system must be calibrated on an event-by-event basis to the magnitude of the devaluative threat. Consistent with the ITTS, previous studies have shown that the intensity of shame people feel when they imagine themselves doing a reprehensible action is closely associated with the magnitude of devaluation that others direct at individuals who take that same action (e.g., Sznycer et al., 2016). The ITTS has not yet been tested using more implicit measures such as physiological responses. This project aims to fill this gap using pupillometry by testing if: a) pupil size varies as a function of the level of shame one feels b) pupil size varies as a function of how much we devalue others and crucially if c) similar to behavioral measures (e.g., Sznycer et al., 2016), pupil size when making shame judgments is positively correlated with pupil size when making judgments about devaluation of others.

METHODS: Adult participants who were randomly assigned to one of two conditions. Participants in the Shame condition had to make judgments about the level of shame they would feel in 25 social scenarios (e.g., You are at the movies, you are talking on your phone). Participants in the Devaluation condition had to make judgment about the extent to which they would devalue another person in the same 25 social scenarios (e.g., Paul is at the movies, he is talking on his phone). During the task, pupil dilation was measured using a Tobii eyetracking system. The average pupil dilation and the average rating for shame and devaluation judgments were calculated across participants for each scenario.

RESULTS: Our preliminary analyzes (N=22) show that higher ratings of shame and more devaluation are both associated with greater pupil dilatation ($r=0.66$, $p < 0.05$; $r=0.57$, $p < 0.05$, respectively). Crucially, consistent with previous results, shame judgment ratings were positively correlated with devaluation judgment ratings ($r=0.92$, $p < 0.001$) and the more the pupil was dilated in response to a certain scenario during shame judgments the more it was dilated during devaluation judgments of the same scenario ($r=0.49$, $p < 0.001$).

CONCLUSIONS: By showing for the first time that shame tracks devaluation of others at the physiological level, our study brings strong support to the Information Threat Theory of Shame and that social emotions are neurocomputational systems that evolved to solve problems related to social value computations.

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P1-J-73 - Effects of listener's feedback on emotional information processing during verbal communication: an EEG study

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BACKGROUND AND AIM: Verbal communication, one of the common ways of social interaction, involves exchanging information between individuals. Appropriate social interaction requires effective processing of semantic and emotional information. Speech comprehension and emotional processing are associated with theta and gamma activity in the temporal, motor, and frontal cortices. Previous research suggests that cross-frequency phase-amplitude coupling (PAC) may represent complex neural mechanisms integrating functional systems across multiple spatiotemporal scales. Evidence has shown that theta-gamma coupling increases when individuals are exposed to speech and engage in emotional tasks. However, little is known about the interplay between listener's feedback and emotional information processing and its underlying neural mechanisms. In this work, we adopted PAC analysis to investigate whether and how listener feedback affects the processing of emotional information during naturalistic verbal communication.

METHODS: We recruited twenty dyads of friends. Individuals took on the roles of either the speaker or the listener. The experiment included two feedback (Able and Unable) and three emotion (Happy, Sad, and Neutral) conditions. Speakers shared the emotional events related to their past experiences. Listeners were instructed not to give feedback in the Unable condition; they were allowed to give brief verbal feedback such as "hmmm" or "yeah" to the speaker's statements in the Able condition. The auditory data of speech/feedback and electroencephalographic signals were simultaneously recorded. PAC with the phase of theta (4-8 Hz) band and the amplitude of the gamma (30-50 Hz) band was utilized to analyze the emotional information integration for listeners. Regions of interest included the superior/middle/inferior temporal gyrus (STG/MTG/ITG), motor/premotor cortex, anterior insula, cingulate cortex, and inferior/orbital frontal gyrus (IFG/OFG). 2-way ANOVA with repeated measures was applied.

RESULTS: We found an interaction between feedback and emotion in the left STG, right MTG, right ITG, left premotor, right IFG, left and right OFC, and right cingulate cortex. Post hoc comparison showed that the PAC values were significantly higher in the Happy-Able than Sad-Able conditions in the left STG, right MTG, right ITG, left premotor, and OFG. The PAC values were higher in the Happy-Able than Neutral-Able conditions in the left STG and right MTG.

CONCLUSION: Our results reveal that the effect of emotion manifests in the Able condition, suggesting that providing feedback during verbal communication plays a crucial role in integrating emotional information.

P1-J-74 - From Opposing Views to Aligned Impressions: Shared Experiences Matter

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Human interaction, an essential part of our daily life, is profoundly shaped by collective experiences, such as communal dining or joint cinematic engagements. These communal activities not only enhance shared experiences but also contribute to the alignment of feelings and thoughts among individuals. Prior research has demonstrated the phenomenon of aligned character impressions in a dyadic movie-watching scenario; however, the extent to which this alignment persists when participants have divergent attitudes toward the experimental stimuli (i.e. movies) remains unclear. To get a deeper understanding of the role that attitudes play in shared experiences, we recruited 222 participants with distinct attitudes, either supporting or opposing the controversial issue of capital punishment for mentally ill offenders. Participants were assigned to one of the three conditions for an 80-minute movie viewing related to the above controversial issue. The control group, named the Solo condition, viewed the movie in isolation. The Dyadic-same condition paired participants with the same attitudes, whereas the Dyadic-opposite condition paired participants with opposing views. After viewing, participants were asked to complete their impression ratings of the six primary characters in the movie. Lastly, we used representational similarity analysis (RSA) to examine the alignment effect among individuals in each group. We hypothesized that compared to those in the Solo condition, only participants in the Dyadic-same condition would reveal an alignment effect, but not for those in the Dyadic-opposite condition. Contrary to our expectations, compared to the Solo group, both the Dyadic-same group, $\beta = 0.2399$, $p < .001$, and the Dyadic-opposite group, $\beta = 0.2396$, $p < .001$, showed significant alignment effects. Our findings suggest that shared experiences lead to an alignment effect, transcending individual attitudinal differences. This unexpected alignment effect highlights shared experience as a potent mechanism for consensus-building, transcending the impact of pre-existing individual attitudes. This study sheds light on the importance of shared experience in shaping collective understanding and bridging divergent perspectives.

P1-J-75 - Deciphering the role of emotion recognition in empathy: distinguishing genuine from pretended facial expressions in pain and disgust

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BACKGROUND: Empathy, the capacity to resonate with and understand others' emotions, is profoundly influenced by our ability to recognize these emotions. Despite its significance, the role of emotion recognition in empathy and its neural underpinnings remain insufficiently explored. To elucidate the mechanisms of emotion recognition and its impact on empathic responses, we conducted two distinct studies in the domains of pain and disgust. These studies were aimed at uncovering unique neural responses associated with affective sharing, particularly in the anterior insula (alns), and examining the networks involved in distinguishing self from others in emotional contexts, notably in the right supramarginal gyrus (rSMG). A key focus was on the neural dynamics and activations that differentiate the perception of genuine versus pretended expressions of pain and disgust.

METHODS: In each study, participants viewed video clips showing individuals either genuinely experiencing pain or disgust (receiving a painful injection or encountering unpleasant odors) or pretending to have these experiences. Notably, all expressions were acted for reasons of experimental control. Participants rated the observed person's expression, the person's perceived feelings, and the participant's own unpleasantness for each video clip. Additionally, we collected data on emotion recognition and empathic traits through questionnaires.

RESULTS: In both the pain and disgust studies, significantly higher ratings were observed for perceived feelings of others and unpleasantness of self when participants viewed genuine expressions compared to pretended expressions. Notably, there was a significant increase in alns activation associated with genuine affect sharing that extended beyond mere perceptual salience. In the pain study, we observed altered neural dynamics between the right alns and rSMG, showing a decreased inhibitory effect for genuine pain compared to pretended pain. In the disgust study, the olfactory cortex, rather than the rSMG, was primarily engaged. The interaction between the alns and the olfactory cortex indicated a heightened excitatory modulatory effect in response to genuine disgust as compared to pretended disgust. Interestingly, this modulatory effect correlated with empathic traits exclusively in genuine pain and disgust, not in pretended conditions.

IMPLICATIONS: These findings indicate that the neural framework of empathy is modulated by the genuineness of observed emotions, recruiting both shared and unique neural pathways in different sensory modalities. This insight is crucial for deepening our understanding of how emotion recognition shapes empathy, potentially contributing to better clinical approaches in empathy-related disorders, including alexithymia and autism spectrum disorder.

P1-k-76 - Dynamic functional connectivity in attention-based neural networks predicts affect ratings above and beyond static functional connectivity

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BACKGROUND: It is increasingly understood that affective states emerge from the functional integration and segregation of neural networks. Advancement in network-based approaches now allows affective neuroscience to examine not only static functional connectivity (sFC) of neural networks (functional connectivity averaged across an affective state), but also dynamic functional connectivity (dFC; time-varying network organization during an affective state). dFC, in particular, may represent variation, or flexibility, in available resources for the brain to perform adaptable behaviors. The current study uses a novel fMRI task and takes a network perspective to examine how sFC and dFC of selected neural networks characterize positive versus

negative affect and are associated with subsequent self-reported valence and arousal.

METHODS: Adults aged 18-67 (N = 73, M = 41.6, SD = 13.75) partook in a 90-min functional fMRI scan where they engaged in social reward and threat imagery (i.e., imagining a pleasant, loving connection versus an unpleasant, judgmental evaluation from a social other). For each of five canonical brain networks, we computed metrics of sFC and dFC that characterized relative within-network integration (within-module degree [WD]) and integration between a network and the rest of the brain (participation coefficient [PC]). Metrics were then used to predict valence and arousal ratings following the imagery tasks.

RESULTS: Planned contrasts revealed that the ventral attention network (VAN) was on average more connected with the rest of the brain during social threat than reward imagery (sFC PC: $t(128.58) = 2.43, p = .043$); its connection with the rest of the brain also became less variable during social threat versus social reward (dFC PC: $t(126.75) = -2.63, p = .026$). In contrast, dynamic integration within the dorsal attention network (DAN) during social reward imagery predicted subsequent positive affect ratings ($t(58) = -2.09, p = .041$), even after controlling within-DAN sFC.

CONCLUSION: Pleasant and unpleasant states might be characterized by relative differences in sFC and dFC of attention-based networks.

P1-K-77 - Time spent in conversation over meals predicts default network function: Evidence from a passive mobile-sensing and fMRI study

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BACKGROUND AND AIMS: Shared meals, often referred to as “commensality,” are key to group-living. Research across the social sciences highlights the importance of socialising over communal meals for building alliances, seeking support, and gathering information (Dunbar, 2017; Dunbar et al., 1997; Powdermaker, 1932; Rozin, 2014). Yet, little is known about how commensality impacts brain function. Here, we combine passive mobile sensing with resting state neuroimaging to extract features from the conversations occurring at eateries that go to predict brain function.

METHODS: Our research combines mobile sensing with resting state fMRI. We passively sensed N=88 participants using a smartphone application that quantified the duration of conversations (sensed via microphones) occurring at locations of social eating (via GPS locational tracking) over two successive durations of 4 weeks (1 month) each. Participants also completed a resting state fMRI scan between the two 4-week periods, which we used to extract brain functional activity in the default network (DMN).

RESULTS: We show that the duration of conversations at eateries over the prior month predict resting state functional connectivity of the left inferior frontal gyrus (LIFG) with the dorsomedial subsystem of the default network (DMN). We then run complementary analyses to establish robustness of these results. Additionally, the duration of conversations at eateries shows better predictability of the voxels from the posterior region of LIFG, which is a region that is related to social and affective processes during waking rest.

CONCLUSIONS: Our results support the classical social psychological theories that suggest commensality may be important to group behaviours (Dunbar, 2017; Powdermaker, 1932). We provide neurophysiological evidence that also relates functional connections between the LIFG, a region consistently associated with language (Klaus & Hartwigsen, 2019) and self-regulation (Arioli et al., 2021; Grecucci et al., 2013), and regions of DMN that are consistently associated with social cognition, with past commensal conversation behaviours.

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P1-K-78 - Neural synchrony predicts future popularity in an emerging community of adolescent girls

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BACKGROUND AND AIMS: At various stages in life, people transition from one environment to another (e.g., enter college, start a new job, etc.), and following these transitions, establish new connections with members of the newly formed communities. However, little is known about what leads some people to become better connected in these emerging communities over time. Recent cross-sectional social neuroscience research examining intersubject correlations (ISCs) of neural responses to naturalistic stimuli in a friendship network illustrates that people with more social connections (i.e., higher in-degree centrality) exhibit more normative neural responses, whereas less central people respond more idiosyncratically. This association was found in brain regions implicated in high-level interpretations and sociocognitive processing, suggesting the possibility that individuals become popular because they experience the world in more similar ways to those around them. Yet, as past work was cross-sectional in nature, it is difficult to ascertain if neural synchrony is a cause or consequence of being well-connected. The current study tested if neural synchrony in an emerging community predicts future levels of connectedness. Further, given that past work on this topic has only involved “WEIRD” samples and given that friendships are particularly impactful on adolescents’ well-being, this study targeted a sample of adolescents in South Korea.

METHODS: Participants were recruited from a girls high school in South Korea. At the beginning of their first year (t1) and a follow-up about 8 months later (t2), participants completed surveys about their social networks, which were used to characterize in-school friendship networks at both time points. At t1, a subset of 58 participants completed an fMRI study where they viewed naturalistic video stimuli.

RESULTS: Neural synchrony measured at t1 predicted perceived popularity and network centrality measures (e.g., in-degree centrality, network embeddedness measured by k-core, and overall network size) both at t1 and—to a greater extent—at t2. These results were observed in default mode and dorsal attention network regions implicated in high-level social cognition and attentional processes.

CONCLUSIONS: Results from the current study showed that neural synchrony predicted future perceived popularity and network centrality, providing evidence for the causal influence of neural similarity on future social network structure. These findings are consistent with the possibility that similar ways of interpreting and attending to the world may foster a sense of shared reality, and thus lead people to occupy more central positions within their networks. In addition, this study is distinctive for extending this line of research to a non-WEIRD sample and an age group for whom social connections may be particularly salient and consequential.

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P1-L-79 - Investigating prosocial behavior towards robots using a neural index of cognitive control

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BACKGROUND AND AIMS: With the growth of generative artificial intelligence and social robots in our daily lives, it's important that we evaluate the effect of human-robot relationships on human cognition. We have previously found that willingness to impart rewards is linked to a behavioral measure of cognitive conflict, and this measure may provide an implicit index of prosocial behavior towards robots. We used a similar paradigm to investigate the relation between a neural index of cognitive control—frontal midline theta oscillations—and prosocial behavior.

METHODS: Participants performed a gambling task in which they randomly won or lost gambles. Following the gamble, participants were required to confirm giving the outcome to a social robot (Cozmo) or keeping the outcome for themselves. Prior to the task, participants were randomly sorted into social and nonsocial groups, where they either played a multi- or single-player variant of "Simon Says." We reasoned that participants who had not interacted with Cozmo would experience greater conflict—as indexed by increased reaction times and frontal midline theta power—when giving outcomes to the robot. Theta power was evaluated relative to the response confirming either giving or keeping an outcome. We administered the "Negative Attitudes Towards Robots Scale" before and after to provide a subjective measure of attitudes towards Cozmo.

RESULTS: We didn't find a significant difference between social groups for the complete subjective scale, but observed a significant difference in the Social Influence of Robots subscale, where participants from both social groups showed positive attitudes towards Cozmo following the experiment. Consistent with previous findings, participants responded more quickly to wins than losses and also responded more quickly to keeping than giving rewards. There was an interaction indicating that the faster response times for keeping wins drove the difference between wins and losses. There were no differences between social groups. We observed theta power was significantly greater in the social group compared to the nonsocial group. Also, there was an interaction between win/loss and social group. Followup tests showed theta power for wins in the social group was larger than the nonsocial group, but that there was no difference for losses between groups.

CONCLUSIONS: While we initially chose frontal midline theta power as an index of cognitive conflict, in the context of our paradigm theta may be more closely linked to the exertion of cognitive control. It's possible that elevated theta in the social condition reflects enhanced motivation to engage in the task. It's noteworthy that theta power differs between social groups, whereas there were only within-group differences for the subjective and behavioral indices. This suggests a neural index of cognitive control may provide a particularly sensitive implicit measure of prosocial inclination towards robots.

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P1-L-80 - Does hedonic happiness promote utilitarianism in moral dilemmas? A neurocomputational investigation on the relationship between happiness and moral decision-making

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AIMS: While happiness is an important metric for morality, particularly concerning the principle of the greatest happiness, it remains unexplored whether and how happiness affects utilitarian judgment in the realm of moral dilemmas. Our research aimed to address how different forms of happiness—hedonic, which is linked to pleasure or gratification, and eudaimonic, which entails living a virtuous and meaningful life—associate with utilitarian judgment in moral dilemmas and to examine the neurological underpinnings of these decision-making processes.

METHODS: Participants (N = 60) reported their levels of hedonic and eudaimonic happiness. They made moral decisions while undergoing fMRI scans, choosing between utilitarian options that benefited the team but harmed an individual, and non-utilitarian options that avoided harm at a monetary loss in two within-subject conditions: other condition (the harmed individual was one of the team members) and self condition (the harmed individual was participants themselves).

RESULTS: Participants with higher hedonic happiness favored utilitarian choices, while those with greater eudaimonic happiness tended to reject them. These patterns were only observed in the other condition, where achieving utilitarian value necessitated the sacrifice of another, and not in the self condition, where utilitarian value could be obtained through self-sacrifice. This happiness-type-dependent decision-making was mediated by a harm aversion parameter ($0 \leq \kappa \leq 1$), which represents the degree to which individuals are willing to forgo increasing amounts of profit to avoid inflicting additional harm. Specifically, participants with higher eudaimonic happiness exhibited greater harm aversion towards others, leading to a devaluation of

utilitarian choices, whereas those with higher hedonic happiness showed less harm aversion, resulting in a greater valuation of utilitarian choices. Consistent with previous research, the BOLD activity of ventromedial prefrontal cortex (vmPFC) was correlated with the chosen value. Interestingly, participants with greater hedonic happiness showed increased functional connectivity between the vmPFC and reward-related brain structures including ventral tegmental area (VTA) and ventral striatum (VS). It seems that higher hedonic happiness is associated with greater reward-, or outcome-, driven choices, which might in turn inhibit the harm aversion, leading to utilitarian choices.

CONCLUSIONS: Our findings provided behavioral and neural evidence on how one's moral position regarding utilitarian vs. non-utilitarian decision can be influenced by hedonic and eudaimonic aspects of happiness.

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P1-N-81 - Stereotype-Based Stressors in Group Contexts: The Role of Stress Contagion and Collective Memory

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BACKGROUND AND AIMS: Group work in STEM can trigger stereotype-based stress (SBS) in women, causing social identity threats and stress-related neural changes. This affects their performance and interactions in dyadic groups within environments characterized by prevalent gender-based stereotypes. The goal of this study is to examine the impact of stereotype-based stress contagion on interactions and memory in mixed-gender and same-gender dyadic performance contexts, with continuous EEG activity monitoring.

METHODS: Participants in dyads were placed in adjacent EEG chambers, communicating via iPad webcam. Dyads were either DMT-PST (SBS context) or PST-PST (neutral). They solved math problems together, receiving real-time feedback on performance, with continuous EEG monitoring, and completed a memory task. Analyses will explore the impact of SBS on EEG patterns and memory in dyadic groups, examining connections between stress responses and performance outcomes in various gender pairings.

RESULTS: It's predicted that SBS contagion will affect memory and performance differently in dyads: DMT partners may struggle, while DMT actors could improve. Initial stress responses are expected to influence these outcomes significantly.

CONCLUSIONS: The results seek to provide deeper insights into how SBS influences not just performance but also memory and learning in diverse group settings. Future research may further illuminate the broader implications of stress transmission in professional and educational collaborations.

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P1-N-82 - Heterogeneity in stress hormones, age and gender contribute to variation in the acquisition of conditioned fear

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BACKGROUND: Models of fear-conditioning serve as a primary translational model for anxiety and trauma-related disorders. Acute stress is a natural and adaptive response to perceived threats, while fear-conditioning is a form of learning in which an individual associates a neutral stimulus (conditioned stimulus, or CS+) with an aversive outcome (unconditioned stimulus, or US), which eventually leads to the CS+ eliciting threat responses itself. Understanding these concepts is important for improving our understanding of stress and anxiety-related disorders, as well as for developing effective interventions to manage them. Stress hormones (e.g., cortisol) overlap with the neural circuits of fear-learning, suggesting that these hormones might affect the way we acquire conditioned fear. Fear-conditioning has been proposed to differ as a function of gender and age, however these results are equivocal across the literature.

METHODS: We combined data from three previously published studies (total N = 205) in which participants underwent a classical fear conditioning paradigm, during which one CS+ was paired with an aversive wrist shock (US), while another stimulus was never paired with shock and thus served as a safety stimulus (CS-). Skin conductance responses (SCRs) were collected during the learning phase and serve as a physiological index of learning. Saliva samples were collected in order to assay neuroendocrine responses to stress (cortisol and alpha-amylase).

RESULTS: We conducted secondary analyses examining two questions (1) how stress hormones (cortisol and alpha-amylase) relate to differential SCRs and (2) how individual factors such as age and gender contribute to variations in the acquisition of conditioned fear. Correlational analyses revealed a negative association between differential skin conductance response (CS+ minus CS-) and cortisol levels ($r = -.182, p = .010$), supporting the notion that increased stress reactivity can lead to deficits in properly distinguishing the CS-shock associations. SCR and alpha-amylase relationships differed between male and female participants, pointing to gender differences in the influence of stress hormones on fear learning. Additionally, age showed a negative correlation with CS- SCRs during early learning ($r = -.148, p < .05$), indicating that older participants may initially demonstrate a reduced response to safety cues.

CONCLUSIONS: Our findings suggest that individual variability in age, gender and stress hormones can affect fear learning. Further research is needed to clarify the mechanisms underlying these age and gender differences in fear conditioning and stress reactivity. Future studies may seek to expand this work in an effort to continue to advance our understanding of the complex interplay between individual factors, stress reactivity, and fear learning.

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P1-O-83 - Learning to communicate a shared wavelength facilitates social connection

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BACKGROUND AND AIMS: Successful group collaboration requires understanding how individuals interpret information and communicate with each other. However, prior expectations based on idiosyncratic experiences in the world can contribute to diverse interpretations, potentially leading to misunderstandings of the intended communication. Being on the same wavelength can instead constrain individual interpretations, fostering improved communication efficiency, and ultimately promoting feelings of connection among group members. Here, we provide an empirical measurement of these group dynamics by having participants play the group communication game “Wavelength”. This game allows for naturalistic social interactions while simultaneously providing experimental control to test hypotheses about the nuances of how people communicate and build social bonds.

METHODS: We adapted the Wavelength game into a real-time multiplayer online platform using Svelte. In this game, participants take turns generating written clues to help a teammate accurately guess a target location on a continuous scale between opposing concepts (e.g., Bad/Good). After each clue is provided, all participants first rate what they think the Guesser believes is the correct target location, before the Guesser’s actual belief is revealed. At the end of each trial, the Guesser makes a final guess, and team members rank-order clues by helpfulness and enjoyment, and report how connected they feel to each of their group members. Each participant plays one trial as the Guesser, resulting in 4 trials per group, with a bonus payout proportional to the Guesser’s accuracy.

RESULTS: First, we will use mixed-effects models to examine social learning by assessing how well participants can predict the Guesser’s beliefs about the target location. We predict that Guessers’ guesses and Clue Givers’ predictions will converge over time to the “true” target location. Second, we will examine how the alignment of concept space interpretations will impact feelings of social connection. We anticipate that Clue Givers will feel a stronger social connection when their clues can be accurately decoded by the Guesser.

CONCLUSION: We present a novel experimental paradigm for studying natural and unconstrained communication in groups while still maintaining experimental control. Our study will elucidate the extent to which communication behavior and shared understandings of lexical concepts facilitate feelings of connectedness and promote successful group collaboration. We hope this work will provide a platform to facilitate computational modeling of these social inductive processes and inspire more empirical investigations of the mechanisms that underpin social interactions.

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P1-O-84 - Learning abstract concepts in children: the role of social interaction

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BACKGROUND AND AIMS: The context of social interaction is a rich ground for multimodal behaviours and brain activity that dynamically coordinate between those engaged and can support successful communication. This context of interpersonal exchange is also the ecological niche where learning concepts occurs over the lifespan, starting with children and caregivers. While much previous research has investigated how children learn concepts, we still know little about how this occurs in real-world interactions. Here, of particular interest is how children learn abstract concepts, as these are detached from their physical, immediate experience. Given their immaterial nature, learning abstract concepts may especially rely on interactive dynamics of face-to-face communication, in terms of behavioural coordination (e.g., turn-taking, questions-answers) and neural synchronisation. This study aims to characterise behavioural and neural coordinative dynamics that underlie children’s abstract concept learning in interaction with caregivers.

METHODS: We present a Functional Near Infrared Spectroscopy hyperscanning study, where caregivers and primary-aged school children take part in a novel, interactive concept learning task. This ongoing research is exploratory, building a dataset of brain and behavioural data to identify significant predictors of successful learning. Conceptual learning is assessed by evaluating children’s comprehension and ability to generalise knowledge to new real-world situations. Additionally, a linear mixed effect regression model will identify coordinative verbal behaviours (e.g., questions-answers, turn-taking) contributing to abstract concept learning. Using Wavelet Transform Coherence analysis across successful learning trials and those that do not result in learning, our study will also uncover whether and when brain-to-brain synchronisation between caregivers and children, over regions involved in social cognition and language (e.g., dorsolateral prefrontal cortex and temporoparietal junction), predicts successful abstract concept learning.

RESULTS: Behaviourally, we hypothesise that our results will show that these key coordinative behaviours, which have been previously found to be relevant in face-to-face communication, will predict abstract concept learning. Also, we hypothesise that inter-brain synchrony will contribute to successful learning, although the pattern may not be linear and may be modulated by the behaviours of the dyad.

CONCLUSIONS: As we take an embodied approach to social neuroscience by simultaneously considering the learning outcomes as well as the behavioural coordination and brain-to-brain synchronisation of the interactive dyad, this study will enhance our understanding of the interplay between brain and behaviour within ecological social interactions that support childhood abstract

concept acquisition.

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P1-O-85 - Interpersonal Alignment of Neural Responses Is Linked to the Effectiveness of Public Service Announcements

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BACKGROUND AND AIMS: Public service announcements require large amounts of money and resources, yet not much is known about what makes certain messages effective at generating targeted behavior change. What determines whether a message is perceived as effective or not? One possibility is that messages that align the minds of viewers would also be perceived to be more effective.

METHODS: To test this, we used neuroimaging to capture brain responses of participants (N=40) as they watched multiple video clips that advocated against texting while driving.

RESULTS: We found an association between neural similarity across participants and perceived message effectiveness, such that when participants found videos to be highly effective, they also had greater neural similarity with one another in regions of the brain within the default mode network. Further, this effect was greater for videos that were categorized as having a high message sensation value (e.g., eliciting greater arousal and sensory responses.)

CONCLUSIONS: Overall, our findings support the idea that messages that synchronize brain responses across participants may be more effective, which has implications for our theoretical understanding of what makes messages more persuasive and likely to succeed.

P1-P-86 - Do I know you? Brain responses to familiar and AI-generated faces

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BACKGROUND AND AIMS: Face perception emerges at birth and continually improves over early development and into adulthood. Familiar faces (e.g., friends, relatives) are more meaningful than unfamiliar (e.g., strangers) or familiar but non-intimate faces (e.g., celebrities). It is important to understand how basic social attention to faces helps improve social connection and well-being, especially for understanding the adolescent social brain and social connections. The brain is able to distinguish between photo-realistic, artificially generated images and authentic images; yet it is unknown how this reveals itself in the context of social well-being and or in comparison to familiar faces. In the current study, we aim to identify how the brain differentiates between (1) AI generated photos and real photos and (2) familiar intimate (friend), familiar non-intimate (celebrity), and unfamiliar (stranger) faces using electroencephalograph (EEG) recording.

METHODS: To do this, we will use AI with photos of the participants' friends to generate the AI-generated stranger photos and match known celebrities to friends based on similar facial features, which allows for the generated images and matched celebrities to share facial commonalities to the friends while still being unfamiliar and/or non-intimate. To better establish differences in responses to AI generated photos and real photos, we will also include real photos of strangers that are matched to the friend photo based on age, gender, and race. Our objective is twofold: First, we will develop the pipeline for generating the faces using AI based upon a friend. Second, we will examine adolescent and adult brain responses to faces based upon type (photograph versus AI) and context (familiar friend, familiar celebrity, stranger). Amplitude and latency will be extracted for the three primary EEG outcomes, post-face onset: P1 component (80-150ms), N170 (180-300ms), and P2 component (180-300ms). This project is one of the first to use AI to generate look-alikes of friends and generate celebrity matches to friends to test brain processes associated and specialized for detecting AI-generated faces.

P1-C-87 - The role of reward functioning in imposter phenomenon

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INTRODUCTION: Imposter phenomenon (IP), also known as imposter syndrome, refers to the subclinical tendency to discount personal achievements and feel like an imposter in relation to one's successes, attributing them to factors outside of personal competence. This failure to internalize positive outcomes might suggest deficient reward functioning related to IP. While this possibility has been suggested in the literature, it has never been empirically explored. Additionally, no neuroimaging studies of imposter phenomenon exist to date.

METHODS: This pre-registered study (t.ly/-azHO) will investigate the role of reward functioning as it relates to IP, examining subjective experience as well as neural underpinnings. We will administer a validated reward processing paradigm (adapted from Delgado et al., 2000; Fareri et al., 2012) to participants (ages 18-35; pre-registered target N = 50) in conjunction with multi-echo fMRI. Participants will play a card-guessing game for monetary outcomes in which they have to guess the numerical value of a card. Correct guesses will be associated with monetary gain (i.e., winning \$5.00); incorrect guesses will be associated with monetary loss (i.e., losing \$2.50). We will also assess individual differences in imposter feelings via self-report on the Clance Imposter Phenomenon Scale (1985), as well as individual differences in self-esteem and locus of control, in order to assess variation in reward related neural activation and connectivity within the ventral striatum and the default mode network.

EXPECTED RESULTS: We hypothesize that the striatal response to rewards relative to losses, will be moderated by IP severity, such that those reporting stronger IP feelings will show reduced reward responses. Additionally, we hypothesize that the ventral striatum will exhibit connectivity with the default mode network during reward processing that will be negatively

associated with IP symptom severity. fMRI data will be preprocessed using fMRIPrep and denoised with TEDANA. Statistical analyses will be conducted via a mixed effects general linear model in FSL. We will interrogate activation in the ventral striatum using an anatomical ROI (Tziortzi et al., 2011) and we will use this ROI in a seed to network generalized psychophysiological interaction analysis (MacLaren et al., 2012). We expect to have data from 25 participants collected and fully analyzed by April 2024.

CONCLUSIONS: Expected results identifying a link between reward functioning and IP would offer a yet unexplored explanation for the failure of individuals struggling with imposter feelings to integrate positive information about their successes into their self-concept. This research offers a larger conceptual framework through which to understand this subclinical but pervasive and distressing phenomenon laying the groundwork for future studies and interventions.

FUNDING: This work is supported by the National Institute of Mental Health (R15MH12297-01 to DSF).

P1-C-88 - Disentangling the affective impact of stimulus proximity and motion using immersive virtual reality

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BACKGROUND AND AIMS: Anticipatory affect, or the emotional states that people experience while anticipating significant outcomes, guides motivated behavior and predicts choice. In recent years, Virtual Reality (VR) technology has been leveraged as a tool for mapping emotions to physiological measures, such as heart rate and pupillometry. However, prior studies have predominantly measured affective states only after the fact. In this study, we aimed to induce and track affect on a second-to-second timescale (coupled with real-time psychophysiological measures), with the goal of elucidating how basic visual characteristics influence affective responses in immersive VR.

METHODS: We designed a variant of the Monetary Incentive Delay (MID) task, which has been shown to reliably elicit changes in self-reported affect and neural activation in response to incentive cues. Subjects (n=30) completed a virtual adaptation of the MID task, which was projected using an HP Reverb G2 Omnicept headset. The task consisted of 96 trials and manipulated three within-subject variables: cue magnitude (six conditions: -\$5, -\$1, -\$0, +\$0, +\$1 and +\$5; cue type (four conditions: proximal, distal, looming and receding); and affective probe (two conditions: anticipation probe or outcome probe). On each trial, participants first saw an incentive cue (2s), followed by an anticipation period (~2s). A target then appeared (350-550 ms), and participants attempted to “hit” it by pressing a button on the hand-held controller. This was followed by an outcome period (2s) and a variable inter-trial interval (2, 4, or 6s). Affect probes were inserted in either the anticipation or outcome phase of each trial, during which participants reported their momentary affective valence and arousal.

RESULTS: Behavioral results suggested that incentive cues influenced affective arousal and valence, such that distal cues had less of an affective impact compared to all other cue variants, and that this effect was not as influenced by cue motion. This finding was also consistent with increased pupillary dilation as a function of incentive cue magnitude, specifically during the anticipation phase of each trial. For the outcome phase, we found that incentive outcomes drove affective valence, such that hits increased, while misses decreased valence. This effect was not influenced by cue proximity or motion.

CONCLUSIONS: Overall, these results suggest that cue proximity but not motion can modulate anticipatory affect. Thus, these multi-modal findings represent a key methodological and conceptual advance towards translating neuroeconomic research into new mediums including self-report and physiology to better understand dynamics of affect and motivated behavior.

ACKNOWLEDGEMENTS AND FUNDING: This work was supported by the Stanford Institute for Research in the Social Sciences (IRISS) and NeuroChoice Initiative of the Stanford Wu Tsai Neurosciences Institute.

SANS Conference Abstracts



Poster Session 2
Friday, April 12, 2024
16:45 - 18:00

P2-A-1 - Predicting personality from representations of uncertainty in the brain

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From an evolutionary perspective, personality has been posited as the fundamental differences in the strategies that people use to achieve their goals. As such, learning the best sources of reward and their representations in the brain may vary with personality traits. To explore this notion, participants completed a multi-armed bandit task, while they were scanned using fMRI. We then tested whether neural responses tracking trial-by-trial estimates of subjective value and value uncertainty in the reward centers could predict BIG5 personality traits and BIS/BAS motivational system. We found that the striatum's response to uncertainty was positively correlated with exploitation of the optimal reward sources in the task as well as independent measures of the behavioral approach system and conscientiousness and negatively correlated with neuroticism. These results open new avenues for inquiry about how individual differences in reinforcement learning strategies vary with personality.

P2-A-2 - Violence decoded: Predicting Moral and Instrumental Violence through fNIRS

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BACKGROUND: There has been a marked rise in some violent crimes (i.e., murders) in recent years [1]. Notably, in 2022, road rage incidents resulting in fatalities rose by 500% since 2012 [2]. Preventing violence is a critical societal concern. This endeavor could benefit from understanding the psychological and neural mechanisms behind aggression. Recent work suggests that such mechanisms may depend on the context. Violence may be driven by moral motivations, where aggression is perceived by the perpetrator as ethically justified in response to perceived wrongdoing, and instrumental motivations. Conversely, instrumental motivations drive aggression as a calculated means to attain specific objectives, like personal gain [3]. Drawing on this work, we hypothesized that the neural predictors of aggressive decisions will also depend on the context.

METHOD: Using economic decision-making game paradigms, participants (target N=40) will make decisions to deliver aversive noise blasts to a confederate while brain activity is recorded using functional near-infrared spectroscopy [4]. The volume of the blasts will be used to index aggressive behavior [5,6]. Participants will first experience noise blasts to understand their aversiveness. Then, they will complete the instrumental or moral aggression decision-making tasks, in counterbalanced order. In the instrumental condition, they will be offered money (i.e., coins) to deliver a noise blast to a confederate. The more severe the chosen noise blast, the more money they will receive. In the moral condition, participants will play the 'dictator game' [7]. They will be offered fair or unfair monetary offers from the confederate and will have the option to deliver noise blasts in response (e.g., as a moral reprimand). They will be told the offers are predetermined such that the blasts have no impact on subsequent offers. After these tasks, participants will complete a "mixed" condition, which is similar to the moral condition but participants are told it is happening in real-time. Thus, blasts may be delivered for moral reasons, instrumental reasons, or both. We will ask subjects to report on their reasons for delivering blasts.

ANALYSIS: To test our hypothesis that distinct neural pathways underlie moral and instrumental violence, cross-validated multivariate analyses will be used to develop models that predict noise blast decisions in each context. We will then test whether and how well these models predict noise blast decisions and subjective reports in the mixed condition.

CONCLUSIONS: Ultimately, by showing that the mechanisms underlying violence depend on the context, this research may help lead to more effective, context-dependent models of violence reduction. Characterizing the functional neuroanatomy of aggression is a key step toward developing translational interventions, such as identifying risk factors for developing antisocial personality disorder.

P2-A-3 - Emotion Prediction Errors in Social Decisions Across the Lifespan

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BACKGROUND AND AIMS: The mind is skilled at making predictions. These predictions play a role in many higher order cognitive processes because the difference between predicted and experienced rewards – or reward prediction error – has been shown to drive learning and guide future decisions. However, prediction about future rewards is not the only form of prospection use when people make choices. Predictions of future emotional experiences, sometimes known as affective forecasting, also drive decision making. A recent series of experiments found that emotion prediction errors—that is, violations of emotion expectations—play an even larger role in punitive social decisions than reward prediction errors (Heffner, Son, & FeldmanHall, 2021). However, this has not been tested in older adults, who make many highly consequential decisions and may rely more heavily on affect-based choice strategies compared to their younger counterparts. In this study, we will test the extent to which the relative impact of emotion prediction error and reward prediction error on punitive choice decisions change across adulthood. We predict that emotion prediction error may become more important for choice in older age, whereas we do not predict that reward prediction error will vary in its predictive value in later life.

METHODS: Participants across the adult lifespan (N ≥ 250; ages 25-85) will complete a social economic task (i.e., Ultimatum Game; Güth, Schmittberger, & Schwarze, 1982) in which 20 age-matched computerized partners are given an initial endowment of money then offer the participant a monetary split of the endowment which can be fair (keep 50%/share 50%), unfair (keep 95%/share 5%), or somewhere in between. The participant must then decide whether to accept the offer and both partners will earn the money in the proposed offer, or reject the offer, leaving both partners to receive no money for that trial. On each trial, participants will report the offer they expect to receive from the current partner (predicted reward), as well as how they predict

they will feel when given this offer (predicted emotion). Following the offer (actual reward), participants will also rate their experienced emotions (actual emotion).

RESULTS: To determine age-related differences in the role of valence, arousal, and reward prediction error in punitive social decisions, we will run a mixed effect logistic regression (using lme4 package in R) with choice (accept vs. reject offer) as the outcome variable and age, prediction errors and their interactions as predictors. **CONCLUSIONS:** These findings will give us a better understanding about how people use predictions of their future feelings to make social decisions and how this prospection may change across adulthood.

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P2-A-4 - Neural correlates of decision-making in the context of contradictory information from peers and professionals

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BACKGROUND AND AIMS: Like most daily decisions, alcohol consumption has pros and cons. It is a social catalyst, associated with status and fun and a serious cause of injury, disease, and death. In line with this ambiguity, diverse stakeholders (e.g. alcohol brands, party-loving friends, health authorities and concerned family) seek to influence alcohol consumption. Their voices create rich information environments with competing alcohol-related messages. How do we integrate competing information during decision-making?

Behavioral work shows effects of competing messages related to the same behavior interfere with each other. For instance, peer conversations about anti-drug media campaigns can cause unexpected boomerang effects. This interference and the subsequent effects of a given message are difficult to predict, because the underlying integration mechanisms are poorly understood.

Persuasion neuroscience has shown the utility of the neural value signal in understanding the neuropsychological drivers of persuasion, but has mostly focused on a single type of message (e.g. only anti-alcohol), ignoring real-world competitors.

We aimed to examine the neural mechanisms supporting decision-making in competitive information environments (pre registration: https://osf.io/fn627/?view_only=7c504cf31260422388b11d5ece8d76b7). Specifically, we examined 1) relative effects of pro- and anti-alcohol messaging on neural indicators of valuation and self-reported alcohol craving, and 2) the extent to which neural responses to each message were context-specific depending on other content in the information environment.

METHODS: Eighty participants viewed alcohol-related messages (3 stance: pro-/anti-alcohol/non-alcoholic x 2 source: professionally-produced/peer-produced; within-subject) while undergoing fMRI (108 trials/person). After viewing each message, participants rated current alcohol craving.

RESULTS: Results suggest that neural value-related signals (in ventral striatum and ventromedial prefrontal cortex) are useful in quantifying and understanding the integration of competing messages. This neural indicator encoded message type more reliably than self-report, predicted alcohol craving differentially across message types, and encoded context-dependency. Specifically, neural responses to messages were partially dependent on the message type of previous trials.

CONCLUSIONS: Improving predictions of the effectiveness of persuasive messages requires an understanding of how these messages interact with their direct competitors. It is thus crucial to examine decision-making processes in complex information environments. Functional neuroimaging offers a useful, unobtrusive tool to further develop our understanding of persuasion in complex, ambiguous information environments.

ACKNOWLEDGEMENTS AND FUNDING: VI.Veni.191G.034, Dutch Science Foundation (NWO)

P2-A-5 - Do digital media habits impact the ability to distinguish between human and AI materials?

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BACKGROUND AND AIMS: Emerging generative artificial intelligence (AI) models, like ChatGPT, are capable of producing outputs that can be indistinguishable from human-generated products.

METHODS: We examined individual differences in the ability to differentiate between human- and AI-generated content, and explored whether smartphone and social media (SSM) habits affect this ability. In an online study, participants (N=134, ages 18-34; M = 28.7 years) were presented with human- and AI-generated texts and social-media-style comments, and were asked to identify the origin of the content (human vs. AI). Judgement accuracy and signal sensitivity (D') measures were used to assess individuals' ability to differentiate human/AI materials. SSM habits were indexed using an updated version of the self-report Mobile Technology Engagement Scale (Wilmer and Chein; 2016; Wilmer et al., 2019). We focused on a composite measure that centers on three dimensions to broadly characterize SSM habits: 1) time-based social media use; 2) frequency of sharing; and 3) phone-checking behaviors. We also considered styles of social media use, such as the tendency to consume content versus post content, and whether this impacted human/AI differentiation.

RESULTS: On average, people could successfully differentiate between human and AI texts (M = 57%) and social media style comments (M = 77%), though judgement accuracy ranged considerably across participants. While SSM habits were not related to overall signal sensitivity scores for texts (b = -0.06, p = .23) or average accuracy for comments (b = -0.0139, p = .53), heavier SSM use predicted a significantly higher rate of mistaking AI content for human (b = 2.096, p = .032). Styles of SSM use also affected the ability to differentiate between human/AI materials, such that the tendency to consume content was significantly

associated with better human/AI differentiation ($b = 0.00495$, $p = .013$), whereas the tendency to post content was significantly associated with poorer differentiation ($b = -0.00801$, $p = .014$). This dissociation may be driven by the likelihood of mistaking AI content for human content. Indeed, the tendency to consume content was significantly associated with accurate attribution of AI content ($b = -0.0613$, $p = .046$), while the tendency to post content was significantly associated with greater misattribution ($b = 0.1099$, $p = .029$).

CONCLUSIONS: These findings demonstrate that some people can differentiate between human and AI materials, but that SSM habits moderate this ability. SSM habits were related to a greater likelihood of mistaking AI content as human, and the relationship between SSM habits and human/AI differentiation was further clarified when considering styles of SSM use, such that the tendency to consume content was related to enhanced differentiation, and the tendency to post content was related to impaired differentiation.

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P2-A-6 - Neural Mechanisms of Positive Social Sharing

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BACKGROUND: Positive social sharing facilitates social interactions, leading to an increase in positive affect and strengthening of social belonging. A potential mechanism supporting sharing positive experiences with others is the feedback received (e.g. praise), which is encoded in corticostriatal circuitry as a highly rewarding outcome. This type of social feedback is thought to influence social behavior via reinforcement learning mechanisms, allowing us to incorporate information about the value of social partners during decision making. The present study sought to understand how neural mechanisms of reward support positive social sharing and promote social connection.

METHODS: Participants ($N=32$) were instructed that they would be sharing positive, personal social media (i.e. Instagram) photos with three same-sex, anonymous peers. On each trial, participants were presented with a personal positive or unfamiliar neutral photo. Participants then decided whether to share the photo with one of three peers. Participants received feedback from the peer ('thumbs up' for positive or 'thumbs down' for negative feedback) or a neutral symbol for no share trials. Feedback from the peers was designed so that one peer provided primarily positive feedback, one provided primarily negative feedback and one peer provided equal amounts of each. Following the task, participants completed a short trust game and closeness ratings to examine the influence of positive social sharing on social connection. This design allowed us to measure the extent to which social feedback is incorporated into positive sharing decisions and test the involvement of reward neural circuitry.

RESULTS: Repeated measures ANOVA showed a main effect of peer valence on sharing behavior ($F(2, 30)=16.66$, $p < .001$, $n_2=.10$) as participants shared more overall with the peer who provided positive feedback. Additionally, peer valence exhibited main effects on measures of social bonding as participants invested more with the positive peer in the trust game ($F(2,30)=15.70$, $p < .001$, $n_2=.25$) and felt closest to them at the end of the task ($F(2,30)=12.85$, $p < .001$, $n_2=.11$). Preliminary neuroimaging analyses revealed significant differences in activity in the nucleus accumbens ($z=5.33$; $p < .001$) and ventromedial prefrontal cortex ($z=1.91$; $p < .01$) during presentations of positive versus negative social feedback. We similarly examined the degree to which participants' corticostriatal activity in response to social feedback (positive minus negative) predicted subjective ratings of social closeness. We observed greater activity in the left caudate in response to positive feedback predicted post-task closeness ratings ($b=4.01$, $p < .05$).

CONCLUSION: Preliminary results highlight the role of corticostriatal reward circuitry in positive social sharing and how it may promote social closeness amongst individuals. **FUNDING:** This study was funded by the National Institutes of Health (R01DA053311).

P2-A-7 - Promoting Healthy and Eco-Friendly Food Choices: Mechanisms Underlying the Impact of Color-Coded Food Labels and Attentional Instructions

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BACKGROUND: Nutritional food labels can help make better choices. Color-coded food labels (traffic lights) that classify foods as green, yellow, or red according to their overall healthiness have been shown to encourage purchases of healthier foods. Likewise, color-coded labels on foods' environmental impact (e.g., carbon footprint) have been proposed to increase eco-friendly consumption.

METHODS: In two laboratory studies, we examined how color-coded labels signaling food's health or ecological impact alter food choices. Moreover, we tested the added benefit of directing attention to color-coded information on dietary choices. Participants ($N=160$) completed two versions of an established computerized food task, requiring 300 food choices under different conditions: with/without color-coded labels and with/without additional instructions to deliberate food healthiness/eco-impact. In color-coded conditions, visual cues (green, yellow, orange, red) signaled foods' healthiness (health frame) or ecological impact (eco frame).

RESULTS: Color-coded cues promoted healthy (health frame) and ecologically friendly (eco frame) food choices. Directing attention to color labels was significantly more effective in promoting healthy/eco-friendly choices than color label cues alone. Motion-tracking data (computer mouse trajectories during computerized food choices) suggest that changes in choice conflict (as captured in AUC, Area Under the Curve) might mediate color-label-induced changes in 'good' behavior. Results of a

computational model of choice (drift-diffusion model) allowed examining changes in starting bias and evidence accumulation underlying altered choice behaviors.

CONCLUSION: Our results shed light on how color-coded labels can change dietary patterns that impact personal health and the environment. These findings might help develop new interventions to address the obesity crisis and climate change.

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P2-A-8 - Learning to leave: Computational modeling of individual differences in persistence and termination of social partnerships

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BACKGROUND AND AIMS: The decision to abandon a social partnership can be difficult and loaded with ambivalence. When and why do people choose to stay or leave? Here, we apply a computational approach, grounded in reinforcement learning models, to identify the parameters involved in such decisions, and to tie those to real-world social and psychological outcomes. Our models assume the importance of several key parameters: 1) the speed of learning about a social partner's characteristics (e.g., their positive/negative intentions, as well as, independently, the realized material outcomes they produce); 2) the weight they place on these considerations; and 3) a default bias towards staying or leaving. We use computational model fitting methods to select among possible models and to identify individual differences in model parameters. We then relate these model parameters to individual differences in survey measures of social outcomes (e.g., relationship stability, attachment styles, and mental health). Across two studies (one completed, one in progress), we provide preliminary evidence that model parameters related to the speed of learning and the default bias towards staying predict distinct social outcomes.

METHOD: In both studies, participants play a modified dictator game in which they interact with different partners varying in both intended generosity and the material outcomes they produce. Participants learn about these characteristics via feedback on a trial-wise basis regarding a partner's choices and resulting outcomes. In Study 1, outcomes were dissociated from intention via a random implementation of partner choice. In Study 2, they were dissociated via the introduction of a separate "cognitive performance" task that could alter outcomes independently from a partner's generous choice. In both studies, participants then decide whether they wish to continue interacting with the same partner or leave to find a new partner. To enable better assessment of learning and model fitting, the decision to leave is implemented 50% of the time, up to a maximum of 20 interaction trials with a single partner, and 200 trials total.

ANALYSIS: To examine how generous intentions and material outcomes affect stay/leave decisions, we compare a variety of reinforcement learning models with different assumptions about the learning and valuation of intention and outcome. We then correlate these parameters with survey measures of individual differences.

RESULTS: In Study 1, we predicted, and found support for, the hypothesis that models incorporating sensitivity to both intention and material outcome, as well as a default bias towards continued interactions, capture behavior better. We also found preliminary evidence that faster learning of social partners' intentions predicts higher secure attachment and a stronger default bias to stay predicts better mental health. We are currently working to replicate and extend these results through Study 2, where data collection is ongoing.

CONCLUSIONS: Our findings reveal how people balance a partner's generous intentions and ability to deliver material outcomes while making the difficult decision of abandoning a partnership. In addition, our study offers intriguing insights into how individual variations in computational strategies predict stable social and psychological outcomes.

P2-A-9 - Neural signature approaches to predict behavior change: Evidence from two interventions to reduce alcohol consumption and promote healthy eating

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BACKGROUND AND AIMS: How can we help people make healthier choices like reducing alcohol consumption and eating more healthfully? A range of cognitive strategies—including reappraisal and mindful attention—show promise for reducing craving and consumption of both alcohol and food. Identifying the mechanisms, and having sensitive and specific indicators of the targeted mechanisms, are necessary for understanding why, how, and for whom a given health intervention works.

Across two studies we use a "neural signature" approach to test mechanisms of change and individual differences in intervention efficacy in the context of health interventions to reduce alcohol consumption (Study 1; N = 37) and promote healthy eating (Study 2; N = 172). A neural signature is a predictive model generated from multivariate activation patterns that is a sensitive and specific indicator of a target psychological process. Applying a neural signature gives a continuous prediction for how strongly a given person is engaging in the target psychological process in any given moment while undergoing functional neuroimaging.

METHODS AND RESULTS: In Study 1, we developed a neural signature of mindful attention while participants completed an alcohol craving regulation task. We then applied it to assess the degree to which individual differences in mindful attention while in the scanner predicted subsequent intervention success during a 4-week experience sampling intervention to reduce alcohol consumption. Using this brain-as-predictor approach, we found that people who were more effective at mindfully attending to alcohol at baseline also showed the strongest intervention-related increases in mindful attention to alcohol and decreases in alcohol consumption in daily life.

In Study 2, we applied an existing neural signature of craving reappraisal while participants completed two tasks: a craving reappraisal task, in which they were instructed to regulate their cravings, and an incentive-compatible food valuation task, in which they bid on snack foods without any instruction to regulate. Here, we used a pre-post design to test the degree to which a 4-week reappraisal-based healthy eating intervention enhanced craving regulation. Compared to an active control group, we found that the intervention not only increased participants' ability to regulate their cravings when instructed (i.e., while regulating during the reappraisal task) but also their propensity to spontaneously regulate their cravings during uninstructed contexts (i.e., while bidding on craved foods).

CONCLUSIONS: Together these results highlight the value of multivariate neural signatures of the evaluation of interventions that promote healthy decision making.

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P2-A-10 - Adolescent neurodevelopment supports the emergence of adaptive generalization during value-based decision-making

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Adolescence is a phase of the lifespan that is accompanied by increasing independence. As adolescents navigate this newfound independence, they encounter many new experiences that allow them to develop a richer understanding of the world around them. How do adolescents integrate this expanding knowledge to make good and bad decisions? Here, we hypothesized that even when adolescents know the right and wrong decision to make, they might still make maladaptive decisions that are misaligned with their general knowledge. We tasked participants (N=83) aged 11-25 with making value-based decisions while undergoing fMRI scanning. Participants chose between pairs of every-day objects for the chance to receive a monetary reward. Objects were sampled from 33 distinct categories which were, on average, worth different amounts of reward (e.g., balloons = ~80¢, masks = ~20¢). This design created a latent structure of values, allowing participants to learn which categories yielded high-value and low-value payouts. We tested whether individuals generalized category value to guide decisions when they were presented with novel objects from previously learned categories. To index explicit awareness of the category value structure, participants self-reported category values after learning. We found that younger adolescents were less likely to use category values to guide trial-by-trial decision making. However, adaptive decision-making emerged with age, and older adolescents and adults were more likely to generalize category value to guide choice. Even though younger adolescents did not apply category values during decision-making, they still reported explicit awareness of the category values following the task. This reveals that younger participants knew the category values, but they did not generalize this knowledge to make adaptive decisions. Therefore, adolescents exhibited a knowledge-behavior gap, which decreased with age. Because retrieving and updating category knowledge relies on cortical systems that continue to mature during adolescence, we examined how functional activity tracked category value signals during the choice phase of the task. For adults, vmPFC activity parametrically tracked choice value, but this was not the case for adolescents. Together, these findings demonstrate that younger adolescents experience a knowledge-behavior gap: they can explicitly express value knowledge but do not apply it to guide value-based decision. Thus, even when adolescents know the best course of action to take, their decisions can deviate from their knowledge about the world. This developmental difference may reflect the late maturation of cortical circuitry, which supports the emergence of adaptive decision-making during adolescence.

P2-A-11 - Neurocomputational mechanisms underlying the subjective cost of exercising self-control

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BACKGROUND & AIMS: Failures of self-control continue to be a major challenge across a number of economic, health and social domains and can contribute to affective dysfunction. Converging work across cognitive and decision neuroscience has shown that exerting control is registered as cognitively costly. We previously demonstrated that the subjective cost of self-control can be measured behaviorally using a willingness-to-pay mechanism, and further, that these costs scale with increasing levels of temptation. Here, we sought to identify the neural circuits underlying these costs and characterize the underlying algorithmic process through which control costs grow with higher temptation. Specifically, we tested whether control cost estimates are encoded in more anterior prefrontal regions consistent with past precommitment work [e.g. frontopolar cortex, orbitofrontal cortex (OFC)] as well as regions implicated in encoding the cognitive cost of control [dorsal anterior cingulate cortex (dACC)], rather than traditional regions known to actively deploy control (e.g., DIPFC).

METHODS: Healthy dieters completed a self-control decision task outside (Study 1: N=60) or inside (Study 2: N=25) the fMRI scanner. Participants first rated snack-foods on health and taste in order to identify a low, medium and high-tempting food for each individual. Participants then completed the self-control decision task during which they viewed food images that varied on temptation level (low, medium, high), quantity (small, medium, large) and exposure time (1-60 min). Participants reported trial-by-trial willingness-to-pay (from a \$10 study endowment) to avoid the food depicted on each trial. A realization phase followed the scanning session, during which one trial (bid) was randomly selected and entered into a standard economic auction procedure, which determined whether the food was successfully avoided or not.

RESULTS: In Study 1, computational modeling revealed that multiplicative scaling best accounted for the observed increase in self-control costs with growing temptation, pointing to a computational mechanism through which increased temptation

renders it disproportionately costlier to exert control over longer periods of time. In Study 2, brain activity was modeled with a parametric modulator of bid value during the decision period. Higher bids yielded increased activation in lateral OFC and dACC, pointing to a central role in these brain regions in estimating the perceived cost of self-control. Activation extracted from the dlPFC did not differ from zero during bid decisions.

CONCLUSIONS: Our findings reveal a computational mechanism through which temptation intensity amplifies the cognitive cost of exercising control and further suggests that estimating these costs engages a distinct neural circuit than those traditionally involved in implementing self-regulatory behavior. Understanding the neurocomputational basis of these cost estimates may provide neural targets to help improve the success of prospective self-control strategies in the future.

P2-A-86 - Social Support and Risk for Financial Exploitation Modulate Age-Related Differences in Reward Processing

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Positive social interactions (e.g., praise from a peer) can often elicit neural responses similar to those of more traditional monetary rewards, including activation of the ventral striatum (VS). However, social rewards can also evoke connectivity between these areas and other brain regions more commonly associated with social processing, including components of the default mode network (DMN), such as the temporoparietal junction (TPJ) and posterior cingulate cortex (PCC). While these findings have been well documented in young adults and adolescents, it remains unclear whether these relations vary as a function of age into older adulthood. Moreover, it could be the case that changes in these relations underly age-related vulnerability to maladaptive outcomes like risk for financial exploitation. To examine these relationships, the current study is leveraging matched monetary and social reward tasks in which participants (N = 58; age M = 43.05, SD = 16.80, range = 21-73 years) choose between two stimuli in search of a reward (Quarmlay et al., 2019, *Frontiers in Neuroscience*). In the monetary task, participants choose between two doors to find a monetary prize and avoid a monetary cost (win = \$1.00 gain; loss = \$0.50 loss). In the social task, participants choose between the faces of two peers who have purportedly indicated whether they like or dislike the participant (win = peer 'like'; loss = peer 'dislike'). Our pre-registered hypotheses aim to investigate how both neural reactivity and effective connectivity during experiences of social reward vary as a function of age and risk for financial exploitation, and the extent to which psychosocial factors moderate these relations (<https://osf.io/npgtv>). Our preliminary findings first show robust striatal activation for both social and monetary rewards, but no significant difference between domains. Second, results show that social support interacts with age in moderating VS-PCC connectivity during receipt of rewards: VS-PCC connectivity is enhanced in older adults with high social support but diminished in older adults with low social support. Next, our results show an age-related decrease in connectivity between the DMN and the frontal pole during receipt of rewards. Finally, we also find that vulnerability to financial exploitation interacts with age in moderating TPJ activation such that individuals with high vulnerability show increased TPJ activation with age, while individuals low in vulnerability show no relation between TPJ activation and age. These findings suggest that aging is associated with a variety of changes in brain responses to reward, and that these changes may be modulated by psychosocial factors like social support and vulnerability to financial exploitation. Taken together, these findings underscore the importance of considering social support and vulnerability to financial exploitation in understanding age-related variations in reward processing.

P2-B-12 - Differential brain activity patterns during experiencing of collective and individual emotions

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BACKGROUND AND AIMS: It is currently an open question whether emotions experienced individually vs. as a part of a collective differ in some ways from each other. Examples of individual emotions might include disappointment when getting an F in an exam, and of collective emotions a disappointment when watching with other fans a game where one's team loses a decisive game last minute. Here, we studied, using functional magnetic resonance imaging (fMRI) and multivoxel pattern analysis (MVPA) searchlight algorithm, whether there are differences in brain activity patterns during experiencing of individual vs. collective emotions. **METHODS:** 33 healthy experimental subjects self-induced discrete individual and collective emotions during functional magnetic resonance imaging of brain activity with the help of textual vignettes describing various emotional scenarios. The collective and individual emotional scenarios were written in pairs so that there were minimal differences across each pair in other dimensions than the individual vs. collective. **RESULTS:** When the individual vs. collective were compared across all discrete emotions that were studied, significant differences were noted in precuneus, medial prefrontal cortices, temporoparietal junctions, extensive temporal lobe areas, insulae, secondary visual areas, brainstem, and cerebellum (see Figure). When discrete individual vs. collective discrete emotions were contrasted one at a time, we noted that the differences were less robust, perhaps due to smaller number of samples, however, some additional results also emerged: differences were observed in striatal activity patterns during joy, in posterior cingulate during sadness, and middle cingulate gyrus during anger. **CONCLUSIONS:** Taken together our results tentatively suggest that there can be robust differences in the individual vs. collective emotional experiences.

P2-B-13 - Psychological and neurobiological mechanisms of gender differences in pain and pain treatment

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BACKGROUND: In both the clinical and experimental literatures females tend to both report more pain than males and, paradoxically, receive less pain treatment. We have conducted analyses across four data sets in our lab which together shed light on mechanisms underlying these disparities.

METHODS: The first data set was focused on pain report by the person in pain with 93 (48 f) participants experiencing and rating evoked pain while undergoing fMRI and completing a battery of self-report measures related to factors that may mediate gender differences in pain report. The other three data sets were focused on pain assessment. These included a laboratory (n = 50) and online (n = 200) sample of lay people, and a laboratory sample of medical trainees (n = 66) undergoing fMRI. In the first two samples, participants each watched videos of 25 male and female shoulder injury patients from the McMaster Shoulder Pain Database. In the third sample, clinicians watched videos of 36 male and female mock patients who were actually research participants experiencing evoked pain in a prior study.

RESULTS: In the study focused on pain report we found that female participants reported more pain than male participants and that this effect was mediated with higher catastrophizing about the pain experienced in the scanner. We also created whole-brain pain predictive patterns that classified participants by gender and predicted participant catastrophizing during painful heat in the scanner. The multivariate pattern weights predicting increased pain, increased catastrophizing, and female gender were in top-down multisensory integration areas, while the weights predicting increased pain, decreased catastrophizing, and male gender were primarily involved in bottom-up sensory processing. Across the three data sets focused on pain assessment, we found that female patients were assessed in more pain by both lay participants and medical students. Additionally, in all three data sets we found that these results changed dramatically when we controlled for pain facial expression intensity. While, in some cases, women had more intense pain facial expressions than men, controlling for those differences either eliminated differences in clinicians' assessments of male and female pain or reversed them (in the two non-clinician samples) such that men were actually perceived to be in more pain at the same level of pain expressivity. Clinicians' brain responses when observing patients in pain followed a similar pattern with a broad network of brain areas involved in social cognition more active when observing female compared to male patients in pain, but those differences largely being driven by pain facial expression intensity.

CONCLUSIONS: Overall, our findings suggest both possible gender differences in the experience and expression of pain and clinician biases that may magnify those differences to the detriment of female pain management.

P2-C-14 - Brain laterality and Pavlovian conditioning of thematic apperception

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Our Deutsche Forschungsgemeinschaft (DFG)-founded study explores the role of classical Pavlovian conditioning in shaping thematic apperception in a picture story exercise (PSE). In this context, it also examines the role of brain lateralization, specifically the right hemisphere hypothesis in the context of Pavlovian conditioning and implicit learning proposed by Hugdahl (1995). Our research tests the following preregistered hypotheses: (1) the effect of differential conditioning of 3 PSE pictures each as CS+ and CS- to erotic and non-erotic pictures with varying training intensity (12, 24, 36 pairings) on sexual imagery in picture stories written during testing; (2) the moderating effect on initial levels of sexual motivation on conditioning, with stronger conditioning effects for higher initial motivation; (3) the moderating effect of brain lateralization on conditioning, with stronger conditioning for more rightward lateralization; (4) the effect of differential conditioning on changes in subjective arousal ratings of CS+ and CS- PSE pictures.

To test these hypotheses, we employ a standard conditioning paradigm in which interindividual differences in sexual motivation are measured before CS+ and CS- training and testing is done. The dependent variables are assessed with a causally validated PSE measure of sexual motivation (Hinzmann et al., 2023) and measures of subjective affective responses to CS (pre- and post-conditioning) and US stimuli. Brain laterality as a moderator is assessed with measures of attention (line bisection), emotion processing (chimeric faces), language processing (dichotic listening), and motor output (finger tapping; Parker et al., 2021). We aim at testing 120 individuals, based on power analyses derived from pilot study findings. Data collection has just begun and is expected to be complete in January 2024.

By examining the role of classical Pavlovian conditioning shaping in thematic perception using Picture Story Exercises (PSE), our research contributes to a novel indicator of conditioned responses; that is, thematic imagery in picture stories (McClelland, 1987; Schultheiss & Brunstein, 2010). Building on cognitive-affective system theory (Mischel & Shoda, 1995) and its application to motive assessment (Schultheiss & Schultheiss, 2014), it is proposed that individual variations in thematic responses to ambiguous stimuli in the PSE reflect learned if-then contingencies (Schultheiss & Schultheiss, 2014).

Keywords: Pavlovian conditioning; thematic apperception; sexual motivation; subjective arousal; Laterality effects

P2-C-15 - Unveiling Affective Experience during Naturalistic Viewing through Spontaneous Facial Dynamics

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A recent report from YouTube disclosed that views of videos worldwide have reached 30 billion per day. The widespread use of video streaming platforms implied that, despite rapid technological changes, humans' passion for watching videos remained

unchanged. Notably, videos that achieve the highest click-through rates are those that quickly capture viewer attention and more importantly, resonate emotionally with the audience. Building on this observation, the present study investigates the potential of analyzing emotional resonance through the lens of individuals' spontaneous facial dynamics during naturalistic video viewing, utilizing intersubject similarity analysis for data analysis. We recruited 260 participants to watch an 80-minute video centered on a random murder case, which was adapted from a real-life event in Taiwan. During their viewing, participants' spontaneous facial dynamics were recorded using a head-mounted camera. Subsequently, we used ResMaskNet to extract six different dynamics of emotional expressions from the facial data of each participant. We then focused on the expressions of happiness and sadness, which are the most prevalent emotional expressions during daily life. To test the overall level of each emotional expression, we calculated the mean from each dynamic of emotional expression. Moreover, to assess whether the dynamics exhibited greater similarity in one emotional expression over another, we computed intersubject similarity for each dynamic. Our results revealed a significantly higher emotional intensity of sadness compared to happiness while participants watched this video, $t = 11.69$, $p < 0.001$, which was in line with the findings from self-reported ratings. Interestingly, this study found that participants not only exhibited stronger expressions of sadness but also demonstrated greater similarities in the emotional dynamics of sadness compared to happiness, $\beta = 0.66$, $p < 0.001$. Our findings suggest that the emotional expression of sadness elicited by the video was not idiosyncratic; rather, there was a shared pattern in the dynamics of sadness expression among the viewers. To conclude, this study provides a new perspective on examining affective experiences through the analysis of spontaneous facial behaviors during naturalistic viewing, which might be particularly important for a deeper understanding of emotional resonance and how it manifests in facial behaviors.

P2-C-16 - Within- and between-individual variability in neural representations of emotion during story-reading

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While there is a longstanding interest in identifying common principles of neural processes underlying various aspects of cognition and emotions, many recent studies have shifted focus to individual-specific features. Substantial individual variability has been found in functional network organization and representations of task-evoked activations. Uncovering the individual differences in brain representations is vital for a comprehensive understanding of neural processes informing potential personalized clinical interventions. In the current study, we used personal stories as stimuli to mimic everyday experiences in the fMRI to explore within- and between-individual variability in brain representations of emotion.

We used an fMRI dataset with 48 participants with three tasks: 1) a one-on-one interview to create personal stories, 2) fMRI scan with the story-reading task, and 3) post-scan emotion ratings on the stories. We compared the brain activation patterns from the story-reading task to the behavioral rating patterns to find the brain regions that preferentially track predefined behavioral models (i.e., nearest neighborhood (NN) model where a participant should always look most similar to their closest neighbors, or Anna Karenina (AK) model where participants with high scores are alike whereas those with low scores are different in their own way or vice versa). In both within- and between-individual analyses, valence ratings were binned into multiple levels based on either individual or population-level ratings. Bin-wise spatial similarity within each region within/across participants was then compared to within-/inter-individual behavioral models. The brain regions that had significantly similar patterns with NN or AK models were tested through permutation testing and predictive modeling.

The within-individual analysis showed that regions in the prefrontal area including the dorsomedial prefrontal cortex track the individual's valence ratings in patterns similar to the NN model. These regions were also better features for valence predictive modeling than other permuted regions. The between-individual analysis identified regions that preferentially track NN or AK model-like valence ratings. Multiple regions including the medial prefrontal cortex and posterior cingulate were shown to be more similar to NN models, while regions like the temporoparietal junction and anterior insula were following AK-like patterns.

Overall, we show separate brain regions that preferentially track NN or AK-like valence rating patterns in both within- and between-individual analyses. These results shed light on understanding inter-individual variability in emotion processing and show the possibility of using personal narratives to study individual differences.

P2-C-17 - Improved performance of within- and between-person pain prediction using multi-echo fMRI combined with multi-echo ICA

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BACKGROUND AND AIM: The development of objective measures for subjective pain experience has advanced pain assessment and management. While recent fMRI-based pain markers show promise in predicting subjective pain reports, inherent technical challenges in fMRI, particularly related to physiological and acquisition artifacts, are potential barriers to acquiring a stable brain representation of pain. Recently, multi-echo fMRI pulse sequence (ME-fMRI) has demonstrated enhanced signal sensitivity by identifying optimal T2* timing across voxels and multi-echo independent component analysis (ME-ICA) has proven effective in denoising non-neuronal artifacts. The current study demonstrates the impact of combining ME-fMRI with ME-ICA on the development of fMRI-based pain markers.

METHODS: Forty participants underwent a thermal pain induction task during fMRI with ME-fMRI sequence (TR: 1,000ms; TE1: 13.00ms, TE2: 31.26ms, TE3: 49.52ms; FOV: 210mm; voxels: 3mm³; flip angle: 57 °; 52 slices; in-plane acceleration factor: 2; and multi-band factor: 4). There are three experimental conditions: single-echo (SE), multi-echo optimally combined (OC), and OC denoised by ME-ICA (ME). Initially, the temporal signal-to-noise ratio (tSNR) was compared across experimental conditions. Then, two pain predictive models were estimated: 1) within-individual pain prediction using trial-by-trial pain ratings and

heat-evoked brain activities, and 2) between-individual pain prediction using individual-level averaged pain ratings and averaged heat-evoked brain activities. Models were evaluated by leave-one subject-out cross-validation.

RESULTS: The results showed that ME condition showed higher tSNR than OC and SE (Fig.1). The within-individual pain prediction model showed significant predictive performance across all experimental conditions (mean predictive performance $r=0.49$, 0.51 , and 0.53 for OC, SE, and ME respectively), with OC and ME conditions outperforming SE ($p=0.01$ and $p=0.01$ for OC vs. SE and ME vs SE, respectively; Fig 2). Furthermore, in the between-individual pain prediction, ME condition outperformed both SE and OC conditions (predictive performance $r=0.42$, 0.43 , and 0.50 for SE, OC, and ME, respectively; Fig 3). These findings suggest that ME-fMRI combined with ME-ICA enhances within- and between- pain prediction, heightening BOLD sensitivity and reducing the impact of individual-specific non-neuronal signals such as head motion.

CONCLUSIONS: The current results indicate that combining ME-fMRI and ME-ICA holds promise in capturing intra- and inter-individual variability in pain compared to single-echo fMRI. It represents a methodological advance for a comprehensive understanding of individual differences in pain. This technique has the potential to enhance personalized pain assessment and management strategies.

P2-C-18 - Avoidance Motivation, Emotion Regulation, and Trauma-Related Psychopathology

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BACKGROUND AND AIMS: Exposure to traumatic events can increase the likelihood of developing psychopathology such as depressive disorders, anxiety disorders, and PTSD. Young adulthood represents a critical window during which these disorders often develop following earlier traumatic experiences. Dysregulations in two affective processes might contribute to the development of trauma-related psychopathology: 1) emotion regulation (i.e., the ability to down-regulate negative affect to engage in goal-directed behaviors), which can be assessed using high-frequency heart rate variability (HF-HRV) via EKG; and 2) avoidance motivation (i.e., a drive to avoid aversive stimuli, often associated with negative affect), which can be assessed using frontal cortical asymmetry via EEG. Greater HF-HRV indexes greater emotion regulation ability and greater frontal cortical asymmetry indexes less avoidance motivation. The current study sought to test the relationships between psychopathology and both emotion regulation and avoidance motivation in response to a laboratory stressor in trauma-exposed undergraduates.

METHODS: One hundred eighteen (118) college students (59.3% women) were recruited, baseline HF-HRV was assessed, and frontal cortical asymmetry was assessed before and after a personally relevant stressful speaking task. Self-reported affect in response to the stressor and depressive, anxiety, and PTSD symptoms were assessed using self-report measures.

RESULTS: Contrary to our hypotheses, greater baseline HF-HRV predicted greater self-reported post-stressor negative affect, ($\beta = 0.172$, $t = 2.200$, $p = 0.030$, $sr^2 = 0.030$), but was not associated with psychopathology. However, somewhat consistent with our hypotheses, there was a marginally nonsignificant inverse relationship between frontal cortical asymmetry and depressive symptoms ($\beta = -0.224$, $t = -1.888$, $p = 0.063$, $sr^2 = 0.026$). There was no relationship between frontal cortical asymmetry and self-reported affect.

CONCLUSIONS: These findings raise questions regarding the roles of HF-HRV and frontal cortical asymmetry in trauma-related psychopathology. Limitations include use of a general stressor rather than specific mood inductions and limited generalizability of study results due to use of an undergraduate sample.

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P2-C-19 - The adaptive logic of envy: Evidence from two cultures.

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BACKGROUND AND AIMS: Envy is the source of bad blood, character assassinations, crime, and ruinous policy. Experiencing envy now is associated with worse health and well-being later (Smith et al., 2008; Mujcic & Oswald, 2018). We fear and dislike being the target of envy, and so we hide our hand as we envy others—envy is perhaps the emotion we are most reluctant to disclose. One might expect this poisonous emotion to cause its own demise, and yet it lives with us. Envy becomes less puzzling, however, if we assume that people have status rivals—individuals in key positions to deprive the actor of zero-sum status—and that envy targets those rivals for depowerment or elimination. If envy is a well-engineered system to depower status rivals, its operation should be cost-effective. Here, we derive and test a central prediction: the more your status rivals enjoy personal characteristics that are highly valued in the local community, the more intensely your envy will be aroused. Although the operation of envy is likely guided by the personal characteristics valued in one's local ecology (e.g., marksmanship in communities of hunters, plant knowledge in communities of gatherers), previous research suggests there are regularities, including cross-cultural regularities, in the actions and personal characteristics that people value in other people. Thus, a second prediction is that the intensity of envy will also track the evaluations of culturally foreign audiences.

METHODS: We collected data with Amazon Mechanical Turk from 65 participants (29 females) in the United States (age: $M = 41$, $SD = 11$) and 58 participants (16 females) in India (age: $M = 31$, $SD = 10$). Participants read 27 brief hypothetical scenarios, developed by Sznycer, Al-Shawaf, et al. (2017), in which someone's acts, traits, or circumstances might lead them to be viewed positively. The scenarios were designed to elicit reactions in a wide variety of evolutionarily relevant domains, such as social exchange, skills, aggressive contests, mating, parenting, and leadership. Participants either had to rate how much they would value a certain positive characteristic or how much envy they would feel if their rival possessed that positive characteristic.

RESULTS: We found support for both predictions. (1)The extent to which people value each of the 27 positive characteristics predicts the intensity of envy in the USA ($r = 48.9$) and in India ($r = 55.5$) if these characteristics were representative of a rival. (2) Furthermore, the intensity of envy in the United States tracked the social valuation in India ($r = 30.7$) and conversely, the intensity of envy in India tracked the social valuation in the United States ($r = 30.8$).

CONCLUSION: Envy may be poisonous, but there is method to its madness.

P2-C-20 - Daring Brains: Do Diminished P300 Amplitudes Explain Sensation Seekers' Positive Psychological Well-being?

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BACKGROUND AND AIMS: Sensation-seeking is a distinct facet of impulsivity that measures one's tendency to approach novel or intense stimuli. Compared to other impulsive traits, sensation-seeking is an adaptive trait associated with greater psychological well-being. Prior research examining the neural underpinnings of sensation-seeking found that high sensation-seeking was associated with reduced neurophysiological arousal, indexed by the P300 amplitudes. This research could point to reduced neurophysiological arousal as a neural mechanism behind the trait's positive psychological outcomes.

METHODS: The current study aimed to replicate the prior findings that sensation seekers showed diminished P300 amplitudes and further, examine whether neurophysiological arousal could explain positive socio-emotional outcomes associated with the sensation-seeking trait. Participants completed the passive auditory oddball task while recording neural activity using electroencephalography to measure neurophysiological arousal. Participants then completed the Short Version of the UPPS-P Impulsive Behavior Scale to measure their sensation seeking and the Screen for Child Anxiety-Related Disorders to measure social anxiety.

RESULTS: Those high in sensation seeking had reduced P300 amplitudes for infrequent tones; however, after adding the social anxiety variable to the regression, this effect disappeared. Counter to previous research, our results suggest that social anxiety is a confounding variable that explains the association between sensation-seeking and diminished P300 amplitudes.

CONCLUSIONS: These results cast doubt on the previous research that sensation-seeking is associated with diminished neurophysiological arousal. Despite a lack of brain-based mechanism found in the current study, sensation-seeking was negatively associated with anxiety, particularly social anxiety, thereby supporting the notion that sensation-seeking is an adaptive trait with positive psychological benefits.

P2-C-21 - A Variational Autoencoder-Based Method to Investigate Degeneracy in the Neural Correlates of Psychological Concepts

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BACKGROUND: A fundamental question in social and affective neuroscience is how psychological concepts (i.e. emotion, affect, theory of mind, etc.) map to the brain. To answer this question researchers typically run an experiment presumed to isolate their concept of interest, measure some physiological signals from the brain, then find the areas of the brain that statistically relate to their concept of interest, assuming a one to one mapping between the psychological concept and neural data. This approach overlooks the concept of degeneracy or multiple realizability, the idea that multiple configurations can produce the same functional output. In the context of neuroscience, degeneracy suggests the same psychological concept or behavior may be associated with multiple different sets of brain correlates. While there is growing empirical evidence of degeneracy in the brain, the ability to investigate degeneracy is hindered by current analytical approaches.

METHODS: To address this gap we introduce a novel methodological approach utilizing variational auto-encoders with a classification head.

RESULTS: With simulations we show, in contrast with traditional approaches (i.e. GLM, MVPA, etc), our approach can accurately reconstruct neural data associated with a psychological concept under both assumptions of degenerate and non degenerate brain states.

CONCLUSIONS: This capability crucially allows for data driven exploration of the neural degeneracy of a psychological concept and paves the way for more nuanced and comprehensive models of brain-behavior relationships in neuroscience.

P2-C-22 - Cultural variation in neural responses to social but not monetary reward outcomes

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BACKGROUND AND AIMS: European Americans view high intensity, open-mouthed "excited" smiles more positively than Chinese in part because they value excitement and other high arousal positive states more. This cultural difference is supported by reward-related neural activity, with European Americans showing greater Nucleus Accumbens (NAcc) activity to excited (vs. calm) smiles than Chinese. It remains unclear, however, whether these differences generalize to all rewards and whether they are related to meaningful behaviors in people's everyday lives.

METHODS: To probe these questions, European American (N = 26) and Chinese international (N = 27) students completed the Social Incentive Delay (SID) task while undergoing Functional Magnetic Resonance Imaging. In the SID task, participants were cued to anticipate and receive social rewards (i.e., smiling faces) that varied in magnitude (calm, excited) or avoid social losses (i.e., angry faces) that varied in magnitude (low, high). We examined the specificity of cultural differences in neural responses to smiles by examining participants' responses to angry faces, and we also administered the Monetary Incentive Delay (MID) task to

examine their responses to monetary rewards. After scanning, participants rated the emotional expressions of six friends in their social media profile photos on a scale ranging from -3 (most intense negative expression) to +3 (most intense smiling expression) as a measure of real-world social behavior.

RESULTS: The cultural groups did not differ in NAcc activity when anticipating social rewards. However, as predicted, European Americans showed greater NAcc activity than Chinese when viewing excited smiles during the receipt of the social reward outcomes, $t(39.06) = 2.47$, $p = .02$, 95% CI = [.02, .16], Cohen's $d = .68$. No cultural differences emerged when participants viewed angry faces ($ps > .14$) or received monetary outcomes ($ps > .53$). Moreover, across cultures, participants who showed increased NAcc activity to excited smiles during the outcome had friends with more intense "excited" smiles on social media, $B = 1.36$, $SE = .59$, $t = 2.29$, $p = .03$.

CONCLUSIONS: Together, these findings suggest that culturally-shaped affective values selectively shape neural responses to smiling faces and that these responses are associated with people's own social relationships.

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P2-C-23 - Inferring Appraisal Alignment from Dynamic Gaze Trajectories in Naturalistic Movie Viewing

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Appraisal theory posits that emotions arise from internal subjective evaluations of events and motivate behavioral actions. Appraisals have traditionally been described using a low number of dimensions (e.g., valence, certainty, agency, etc). However, these simple dimensions require accurate introspection and do not scale to more complex naturalistic viewing stimuli that dynamically change. Here, we present an objective measure for appraisal processes by combining eye-tracking (i.e., gaze and pupillometry), facial expressions, electrodermal activity (EDA), and survey responses with naturalistic movie viewing. Preliminary analyses using intersubject correlation (ISC) demonstrate reliability of shared gazed alignment in response to movie viewing (mean $isc=0.45$, $p < 0.001$). Moreover, we observe a correlation between gaze alignment and neural activity in regions such as the ventromedial prefrontal cortex (vmPFC) and dorsomedial prefrontal cortex (dmPFC), consistent with subjective interpretations. Consequently, we hypothesize to find structured variation in gaze activity, facial expressions, EDA, and survey responses reflecting subjective interpretations of stimuli. Using intersubject representational similarity analysis (IS-RSA), we aim to explore this variability. Subjects closer in distance within a multidimensional feature space (e.g., character preferences) are expected to exhibit alignment across modalities. In conclusion, our findings will offer a novel approach to identifying and validating appraisals during dynamic stimuli, and will provide strong supporting evidence for appraisal theory of emotions.

P2-C-24 - Exploring the Psychological and Neurobiological Impact of Animal Suffering on Humans

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BACKGROUND AND AIMS: Previous research has suggested that witnessing suffering can trigger stress responses. Nonhuman animal models reveal acute inflammatory responses and depressive behavior in rodents exposed to the suffering of their counterparts (Sial et al., 2015). In humans, observing others in pain activates brain regions associated with physical pain (Krishnan et al., 2016). However, the direct psychological and neurobiological impacts of observing animal distress, alongside the potential benefits of positive human-animal relationships, remain largely unexplored. This study aims to investigate the effects of witnessing animal suffering and positive animal-human connections on individual subjective perception of animals and meat foods, their neural representations, and physiological responses.

METHODS: We collected a comprehensive dataset from 88 participants over two days, using 3T Multiband Multi-echo fMRI and physiological measures. Each fMRI session included movie runs, short clip runs, and a resting state run. Participants viewed one of two 30-minute documentaries in a session: one showing animal suffering in the food industry, and the other depicting the intelligence of animals and their connections with humans. Short video clips featuring animals, humans, and food items were shown at the start of the first session and end of the last session. Additionally, participants completed a ranking task, evaluating animals based on likeability, perceived similarity to self, and sentience, and foods based on preference. This task was conducted before the first session and after the last session.

Our primary analysis involves Representational Similarity Analysis (RSA) of fMRI data from the short clip runs, generating neural similarity matrices from the beta images for each video clip. We will apply a General Linear Model to explore the relationship between neural responses and stimulus characteristics across the whole brain. By comparing neural similarity across sessions, we aim to assess the impact of documentary exposure on brain representations of animals and foods. Furthermore, linear regression modeling will be used to examine the correlation between changes in neural responses and shifting in ranking task results.

CONCLUSIONS: Through this investigation, we aim to contribute to the understanding of how observing animal suffering and positive human-animal interactions may influence human psychological and neurobiological responses.

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P2-C-25 - Generalizable Neural Representations of Emotional Arousal Across Individuals and Situational Contexts

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BACKGROUND AND AIMS: Human affective experience varies along the dimensions of valence and arousal. How are valence and arousal encoded in the brain? One possibility is that affective dimensions are encoded in a situation-general manner, such that there are common neural representations of valence and arousal across diverse contexts. To test this hypothesis, we utilized fMRI movie-watching datasets to build predictive models of moment-to-moment valence and arousal. We then assessed if the models generalized across individuals and datasets.

METHODS: We used open fMRI datasets of participants watching Sherlock (N=16) and Friday Night Lights (FNL;N=35). We collected continuous valence and arousal ratings of the two movie episodes in different individuals (N=120). Dynamic functional connectivity (FC) patterns were calculated from 122-ROI-based BOLD time courses using a tapered 45-sec sliding window. We built connectome-based predictive models (CPMs) with leave-one-subject-out cross-validation to predict group-average behavioral ratings from FC patterns. Prediction accuracy was measured as the average Pearson correlation between predicted time course and group-mean rating time course across cross-validation folds. Significance was assessed by comparing model accuracy to a null distribution generated by training and testing the model on phase-randomized behavioral ratings.

RESULTS: Subjective ratings of valence (Sherlock: $r=.49$, $p<.001$; FNL: $r=.43$, $p<.001$) and arousal (Sherlock: $r=.26$, $p<.001$; FNL: $r=.62$, $p<.001$) were synchronized across individuals (Fig. 1). CPMs significantly predicted arousal both within- (prediction accuracy $r>.56$, $p<.025$) and across-dataset (prediction accuracy $r>.22$, $p<.020$; Fig. 2A). We identified a generalizable neural representation of arousal encoded within DMN and between pairs of distributed networks (Fig. 3). This arousal model generalized to predict mean subjective ratings of arousal fluctuations in two novel datasets with an average accuracy of $r=0.62$, $p<.001$ (Fig. 4). However, CPMs failed to predict valence both within- ($|r|$ values $<.52$; $p>.09$) and across-datasets ($|r|$ values $<.05$; $p>.60$; Fig. 2B). Finally, models based on multivariate patterns of activity failed to generalize both for arousal ($|r|$ values $<.06$; $p>.13$) and valence ($|r|$ values $<.002$; $p>.57$).

CONCLUSIONS: Our findings reveal a situation-general representation of arousal, characterized by interactions between multiple large-scale functional networks. This suggests a common neural code for how arousal is represented across affective contexts. In contrast, valence may be encoded in a situation-specific manner. Our predictive models offer a novel tool to generate continuous predictions of arousal in fMRI movie-watching datasets with different participants.

P2-C-26 - Brain representational distinctiveness and fidelity supported long-term associative and affective memory for emotional stimuli

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BACKGROUND AND AIMS: Emotionally salient events are often remembered better than neutral ones, yet the nature of neural representations for individual emotional experiences remains elusive. Are these events remembered better because their neural representations are more distinct or more similar to other events? Does the maintenance of these representations over time influence memory?

METHODS: We used a multivariate voxelwise pattern approach to analyze fMRI data from an episodic encoding task (N=22, data collection ongoing). On each trial, participants were shown trial-unique scenes paired with either emotionally salient (alcohol-related) or neutral items (household objects) and were asked to rate how they felt. The next day, they were tested on their associative (i.e., identifying the specific scene paired with each item) and affective memory (i.e., how vividly they remembered their feelings). We assessed how neural representations of trials during encoding related to these memory measures. Mean representational distinctiveness was evaluated by Pearson correlations within pairs of emotional or neutral trials (more negative = more distinct). As representations may change over time, we examined fidelity, or how long presentations remain distinct, by computing changes in similarity to subsequent trials and quantifying when this value became positive. Linear mixed-effects models related neural distinctiveness and fidelity in the hippocampus and amygdala to subsequent memory.

RESULTS: While associative memory did not differ for emotional events ($p>.25$), participants reported remembering more vivid feelings during emotional events ($F(1,20)=4.93$; $p=0.04$). We found a dissociation whereby our different measures of neural representations had distinct consequences for memory. In the hippocampus, more similar brain representations predicted better emotional associative memory (distinctiveness x emotionality: $F(1,16)=6.66$; $p=0.02$). In the amygdala, keeping brain representations distinct for longer was related to better affective memory for emotional events (fidelity x emotionality: $F(1,16)=6.01$; $p=0.03$). Notably, these relationships were region specific. Hippocampal measures were not related to affective memory ($p>.05$). Amygdalar measures were not related to associative memory ($p>.05$).

CONCLUSIONS: We uncovered new trial-level brain mechanisms supporting later memory, with hippocampal similarity and amygdalar differentiation predicting what aspects of an event are retained. When shown emotional stimuli, a more integrated hippocampus may more efficiently capture surrounding contextual information, promoting better associative memory. Longer amygdala fidelity may limit affective spillover and misattribution, allowing individuals to remember their affect more vividly. Our results indicate that trial-level neural representations support how well individuals remember different features of emotional events.

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P2-C-27 - Cognitive-Behavioral Predictors of Individual Variability of Functional Connectivity in Healthy Young Adults

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BACKGROUND AND AIMS: While stable patterns of fMRI task-evoked brain activity and functional connectivity (FC) exist at the population level, a growing body of research emphasizes that variability exists across individuals. It is these differences which define the critical differences in cognition and behavior across individuals that make us unique. Here, we examined a range of cognitive-behavioral-emotional predictors of heterogeneity of FC in a large sample from the Human Connectome Project (HCP).

METHODS: Resting state fMRI data (4 runs of 15 minutes) was examined from the 987 participants with complete data and low motion from the HCP dataset of healthy young adults between the ages of 22 and 37. Functional connectivity was estimated between 360 regions, and variability defined using correlational distance between participants. The average correlational distance of one individual relative to all others represents a global variability score, a measure of how far each individual is from the 'average' brain activity pattern. Hierarchical regression was used to determine potential predictors of variability in FC, including demographic, cognitive, emotional processing, and personality variables. Each model was assessed for a significant change in adjusted R² to determine if the inclusion of those variables contributed to further variance explained.

RESULTS: Results are shown in Table 1. The base model explained 9.22% of variance in heterogeneity in functional connectivity. Increased variance was explained by Model 1 (cognition, $\Delta R^2 = 0.009$, $F = 5.8$, $p = 0.003$), Model 2 (cognition², $\Delta R^2 = 0.0055$, $F = 4.0$, $p = 0.018$), and Model 4 (Neo personality, $\Delta R^2 = 0.009$, $F = 3.1$, $p = 0.010$), while Model 3 (emotional valence) approached but did not pass significance ($\Delta R^2 = 0.003$, $F = 2.52$, $p = 0.08$) and Model 5 (fitness) explained no additional variance ($\Delta R^2 = -0.001$, $F = 0.2$, $p = 0.79$). As such Model 4 was adopted as the final model, explaining 11.8% of variance in FC variability. Low variability (i.e. being closer to average) was associated with higher BMI, greater crystallized cognitive scores, more positive emotional valence, and Neo Agreeableness. Greater variability was associated with age, brain volume, and Neo Extroversion. Interestingly, model residuals were non-normal, as the model underestimated variability in the most variable participants. This suggests additional unknown factors not included in the model may drive very high individual variability in some participants.

CONCLUSIONS: We examined behavioral and demographic predictors of global individual variability in FC in a healthy young adult sample. We found that greater variability, measured as deviation from the average pattern of FC, was associated with lower crystallized cognitive scores, less positive valence, and lower agreeableness, but greater extroversion. This suggested benefits for a connectivity pattern which is more similar to the group average, raising the possibility that the group average represented the 'optimal' connectivity pattern.

P2-C-28 - Hippocampal activity during emotional anticipation moderates the future reinstatement of distributed cortical activity states

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BACKGROUND AND AIMS: Emerging evidence suggests that sustained states of neural activity in the prefrontal cortex occur and reoccur during emotionally similar scenes in a television show (Chang et al., 2021), potentially reflecting generalized neural signatures of emotional experience. Yet, it is unclear if such generalized neural states also subserve naturalistic emotional experience, and what neural mechanisms support their recurrence over time. The present study uses neural event segmentation (Baldassano et al., 2017) to identify meaningful states of neural activity during a naturalistic and highly impactful emotional event: receiving a grade on a major University exam. We investigate whether neural states reoccur within and across different instances of this emotional event and evaluate the role of the hippocampus in the replay of neural states over time.

METHODS: 40 participants completed fMRI scans while anticipating (10 minutes), viewing (1 minute), and reacting to (19 minutes) their grades on major Chemistry exams (4 exams per participant; 160 exams total). We used neural event segmentation to parse continuous activity across the entire cortical surface into temporally discrete states. For each cortical state, we extracted a corresponding activity pattern and analyzed whether similar cortical states occurred at later timepoints, both during the same scan and in future scans (1 to 3 months later). In parallel, we extracted hippocampal activity timeseries and assessed whether momentary changes in hippocampal activity during a cortical state predicted the later recurrence of that state.

RESULTS: Whole-cortex activity states varied between 2 and 144 seconds in duration. Cortical states also varied in their likelihood of recurrence, with some states showing little to no similarity to future states and others displaying a high degree of similarity: 65% of cortical states had a correlation with a future state greater than $r = 0.5$. Relative to cortical states occurring outside of the anticipation phase, anticipatory cortical states bore a higher degree of similarity to future states ($B = 0.04$ [0.004], $p < 0.0001$), suggesting that cortical states occurring during emotionally charged moments were more likely to reoccur at later timepoints. Transient increases in hippocampal activity at the start of a given state also predicted a greater likelihood of future recurrence ($B = 0.004$ [0.001], $p < 0.0001$) - an effect that was notably amplified during the acute anticipation phase ($B = 0.007$ [0.003], $p < 0.05$).

CONCLUSIONS: Findings suggest that distributed cortical states underlying highly individualized emotional experiences reoccur over time, potentially reflecting recurrent emotional contents of one's experience, or generalized expectancies for the future. Results implicate the hippocampus in the recruitment of generalized anticipatory states during the simulation of uncertain and impactful outcomes.

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P2-C-39 - Anxiety and early stimulus processing: an ERP study analyzed with mass univariate statistics

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BACKGROUND AND AIMS: Event-Related Potentials (ERPs), such as the N2 and P3 components, have been extensively used to study cognitive control in attention tasks. The N2 is a negative deflection maximal at fronto-central regions around 200-400 ms after stimulus onset that reflects conflict processing. The P3 is a positive deflection at centro-parietal sites that occurs 300-500 ms post-stimulus and that reflects attention allocation. The N2 and P3 amplitudes are larger following incongruent relative to congruent stimuli, reflecting greater conflict monitoring and attentional engagement with the stimuli, respectively. Trait anxiety has been associated with more negative N2, but its association with P3 remains inconclusive. Further, prior work has examined anxiety modulations using stimuli that implies social threat, such as angry faces. It is unclear whether trait anxiety modulates cognitive control in response to non-social neutral stimuli such as arrows in a classic flanker task.

METHODS: The current study investigated anxiety modulation of the N2 and P3 in a classic flanker task with 50% congruency (N = 73). Stimulus-locked ERPs following congruent and incongruent arrow trials were subjected to a within-subjects comparison and then regressed on trait anxiety (STICSA) scores. Importantly, we used Mass Univariate statistics to examine the congruency effect across all electrodes and all time points (-100 to 600 ms), an approach which is known to reduce Type I and II error rates compared to classic ERP analyses.

RESULTS: Significant differences between congruency conditions started around 280-350 ms at frontal and fronto-central sites, showing more negative amplitudes for incongruent than congruent trials. This activation corresponds to the N2 component, reflecting conflict processing during incongruent trials. From 400-500 ms, right frontal, central, and parietal sites showed more positive amplitudes for incongruent than congruent trials, corresponding to the P3. Anxiety was correlated with more positive right fronto-central activation for congruent trials between 420-520 ms, which again mapped onto the P3 component. However, anxiety was not reliably associated with neural activations during incongruent trials at any time point or electrode.

CONCLUSION: The results suggest that trait anxiety might weakly enhance attentional engagement with non-social neutral stimuli. In particular, anxiety was associated with stronger attentional engagement during congruent trials, but only during later stages of processing around the P3 component. No correlation with anxiety was seen around the N2 timing. This study is the first to examine the anxiety modulation of N2 and P3 in a basic flanker task using Mass Univariate statistics, but replication of these findings is necessary.

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P2-D-29 - An Examination of Individual Differences on Negative Affect and Synergistic Strategy Selection During Emotion Polyregulation

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BACKGROUND AND AIMS: Emotion polyregulation is a vital aspect of responding to stressful events by influencing one's emotions through multiple strategies. Like single-strategy emotion regulation, effective emotion polyregulation relies on adaptive strategy choices given individual differences. There is no consensus on what strategies may be most adaptive within or across contexts. Despite the relevance of cognitive control and heart rate variability (HRV) in single-strategy emotion regulation, they have not been investigated in emotion polyregulation. The aim of this study was to identify adaptive profiles of daily emotion polyregulation to predict negative affect, considering individual differences in cognitive control ability and HRV.

METHODS: One hundred and six university students (64.2% female, M = 22.5, SD = 3.74) participated in two behavioral sessions separated by 7 days of ecological momentary assessment (EMA). During behavioral sessions, participants completed HRV and cognitive control assessments (e.g., Digit Span Task, Stroop Task, and Wisconsin Card Sorting Task). During the EMA, participants reported daily negative affect and if they had recently experienced a negative event. Then, participants either reported emotion regulation behaviors or completed a control questionnaire. Two a priori linear mixed models were investigated to 1) assess the impact of individual differences (cognitive control and HRV) and situational context (event intensity) on negative affect during emotion polyregulation, and to 2) assess how different strategy choices and implementation styles may differentially predict daily negative affect during emotion polyregulation.

RESULTS: The average number of strategies used per event was 1.5 (SD = 0.76) and emotion polyregulation was reported for 34.14% of negative events. Multiple strategies were implemented concurrently (58%), sequentially (36.1%), or ambiguously (5.9%). Model 1 showed an interaction between number of strategies endorsed and HRV, $F(1, 104) = 3.90, p = .051$. Specifically, participants with HRV levels 1 SD above the mean reported significantly lower negative affect during emotion polyregulation than those with average or below average HRV, $t(97) = -2.11, p < .05$. Model 2 showed significant main effects of situation selection, $F(1, 109) = 10.57, p < .01$, and reinterpretation, $F(1, 116) = 6.94, p < .01$, to predict lower daily negative affect. Situation intensity consistently predicted higher negative affect for both models, $p < .001$.

CONCLUSIONS: These findings suggest that during daily emotion polyregulation, situation selection and reinterpretation are adaptive strategy choices and HRV may support successful implementation of multiple strategies. Implications extend to current psychotherapeutic approaches that frequently involve heterogeneous methods.

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P2-D-30 - Comparing the Neural Bases of Self and Social Reappraisal

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BACKGROUND AND AIMS. Reappraisal is a common emotion regulation (ER) strategy that involves reframing the meaning of a negative emotional experience to reduce its affective potency. In daily life, this manifests in two ways: we help others reframe their negative emotional experiences (i.e. social ER) and/or we reframe our own negative emotional experiences (i.e. self ER). While decades of work has reliably delineated the neural bases of self ER, less is known about the neural bases of providing social ER. How might we understand the processes that underlie social ER by comparing its neural bases to self ER?

HYPOTHESES: Prior neuroscience work on cognitive control and mentalizing informed our hypotheses. First, we hypothesized that both types of reappraisal would recruit common control regions (e.g. dorsomedial prefrontal cortex (dmPFC), dorsolateral prefrontal cortex (dlPFC), and ventrolateral prefrontal cortex (vlPFC)). Second, we predicted that social ER may differ both quantitatively and qualitatively from self ER, such as by taxing common control regions more and/or recruiting other control and mentalizing regions (e.g. temporoparietal junction (TPJ) and temporal pole (TP)).

METHOD. To address our questions, we developed a novel autobiographical memory task. In a prescan behavioral session, participants provided 8 negative autobiographical memories. In a subsequent fMRI session, participants (N = 34) were tasked to either reframe or immerse themselves in their own negative memories (i.e. self condition), or reframe and immerse in a stranger's negative memories (i.e. social condition). To test what is common between self and social ER, we conducted a conjunction analysis of the Reframe Neg > Immerse Neg contrasts from both self and social conditions. To examine quantitative differences between self and social ER, we identified brain regions that (i) showed increased activity during self and social ER and (ii) showed activity specific to social ER as determined by a planned contrast (Social Reframe Neg > (Social Immerse Neg + Self Reframe Neg + Self Immerse Neg)). To examine qualitative differences between self and social ER, we identified regions in the planned contrast that lay outside of the regions identified by the conjunction analysis.

RESULTS. We found that both self and social ER recruited dmPFC, dlPFC, vlPFC, TPJ, TP and the middle temporal gyrus in the left hemisphere. Importantly, social ER was associated with increased activity in all of the aforementioned regions in addition to recruiting left posterior mPFC, right dmPFC, right vlPFC, right TP and visual areas (all FDR corrected, $p < .05$).

CONCLUSION. We found that while self and social reappraisal rely on a common set of control regions, social reappraisal taxed these common regions more and additionally recruited other control and mentalizing regions. These results raise new questions about the nature of providing social ER.

P2-D-31 - Longitudinal Examination of Multifaceted Early-life Adversity, Cortico-Limbic Connectivity, and Emotion Regulation Development in Youth

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BACKGROUND: Exposure to early-life adversity (ELA) affects youth's emotion regulation (ER), but understanding the specific dimensions of adversity, such as family conflict, parent psychopathology, maltreatment, and neighborhood safety, influencing ER and the underlying neural mechanisms is lacking (Callaghan & Tottenham, 2017; Miu et al., 2022). Cortico-limbic connectivity at rest is proposed as a key mechanism implicated in ER (Briant, Sisk, Gee, 2021), but its longitudinal development and interplay with ELA and ER remain unexplored. Investigating this relationship would provide insight into how ELA may be biologically embedded and associated with the maturation of cortico-limbic circuitry and ER abilities.

AIMS:

1. Examine the development of cortico-limbic connectivity at rest longitudinally, hypothesizing there will be individual differences in the initial (intercept) and rates of changes (slope) among youth.
2. Investigate the association between cortico-limbic connectivity and parent-reported youth ER abilities, hypothesizing a more negative cortico-limbic connectivity, implicated in more mature ER, will be associated with better ER among youth.
3. Explore how different ELA dimensions relates to cortico-limbic connectivity development, hypothesizing that different ELA dimensions would be associated with cortico-limbic connectivity development.
4. Explore the complex association between ELA dimensions, the development of cortico-limbic connectivity and emotion regulation abilities.

METHODS: Using Adolescent Brain Cognitive Development Study data (N = 1512, 9-10 years old), ELA will be assessed across ten dimensions (caregiver psychopathology, socioeconomic disadvantage and lack of neighborhood safety, secondary caregiver lack of support, primary caregiver lack of support, child report of family conflict, caregiver substance use and separation from biological caregivers, family anger and arguments, family aggression, physical trauma exposure, and caregiver lack of supervision). Cortico-limbic resting-state functional connectivity (CON-hippocampus, CON-amygdala) at baseline (B0), two-year (T2), and four-year (T4) follow-ups will be measured via fMRI. Parent-reported Difficulty in Emotion Regulation Scale will assess youth's ER abilities.

ANALYSIS PLANNED: Utilizing Mplus 8.9, latent growth curve models for cortico-limbic connectivity changes over four years will be conducted. Associations between baseline/connectivity changes and ER at T4 will be examined. ELA's association with connectivity development will be explored. Structural equation modeling will unravel the complex association between ELA, cortico-limbic connectivity, and T4 ER abilities.

IMPLICATIONS: Maladaptive ER from early-life adversity is linked to psychopathology development (Mennin, 2007; Cicchetti, 2009). Understanding these mechanisms is crucial for preventive measures. Identifying neural pathways may inform mechanistic-driven interventions.

P2-D-32 - Validation of a Naturalistic Interpersonal Emotion Regulation Paradigm for use in an fMRI study with Older Adults

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BACKGROUND & AIMS: Interpersonal emotion regulation often entails other people regulating our emotions. For example, other people can reduce our negative emotions by helping us reassess our situation or feelings, a strategy known as interpersonal reappraisal. Prior work in young adults suggests that close partners are more effective at reducing negative emotions compared to strangers using interpersonal reappraisal. However, the effectiveness of interpersonal reappraisal for older adults remains understudied. Given that older adults' are susceptible to the loss of close partner's as their social networks shrink with age, it is important understand how effectively strangers vs. close partners regulate older adults' emotions. Additionally, existing studies primarily use static images and text-based stimuli, which does not reflect the way emotions are regulated in the real world, thereby prompting the need for naturalistic paradigms. The present study aims to validate a more naturalistic interpersonal emotion regulation paradigm in older and younger adults for future use in an fMRI study. This paradigm is intended to examine how the closeness of a regulator impacts the effectiveness of interpersonal emotion regulation success at the neural level for older versus younger adults.

METHODS & ANALYSIS PLAN: An "older" group (ages 65-85) and a "younger" group (ages 20-40) of participants will be asked to participate with a close partner with whom they interact with regularly. In regulation trials of the paradigm, participants will be presented with a short video clip intended to elicit negative emotions (e.g., sadness, fear, disgust). Next, they will rate their emotional valence from "Very Negative" (1) to "Very Positive" (5). Participants will then view a video of either their close partner or a stranger delivering a short message intended to regulate the participant's emotions using reappraisal. After, participants will rate their emotional valence again. The difference in emotional valence ratings before and after the regulation video will reflect the effectiveness of interpersonal emotion regulation. We will contrast regulation trials with regulation control trials in which the regulator provides a neutral statement. To validate the task, first, we will confirm that older and younger adults have similarly valenced emotional responses to the film clips. Then, we will confirm that a reduction of negative affect occurs for both younger and older adults in regulation trials more so than non-regulation trials.

IMPLICATIONS: Validation of this paradigm will confirm that we are eliciting the expected emotions from the stimulus videos in both groups, and that the delivery of the regulation videos reduces negative affect compared to the regulation control condition. We will then use the paradigm in an fMRI setting to investigate the neural underpinnings of effective regulation across age in a more naturalistic manner.

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P2-D-33 - Examining connections between emotion regulation, menstrual cycle phase, and hormonal contraceptive use

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BACKGROUND AND AIMS: Around 65% of women use contraceptives, with oral hormonal pills being most popular. Yet, their impact on affective processes is understudied. Previous work shows hormonal contraceptive users may perceive emotions more intensely, such as viewing negative images more negatively than naturally cycling women. Additionally, previous research suggests that women's ability to suppress the processing of negative emotional information diminishes during the luteal phase of their menstrual cycle. Considering this, it's vital to understand hormonal effects on affective processes such as emotion regulation. Emotion regulation strategies, especially cognitive reappraisal, are adaptive and effective in reducing negative affect, but their interaction with menstrual cycle phase and hormonal contraceptive use remains unexplored. This study will investigate how emotion regulation training efficacy is predicted by menstrual cycle phase and contraceptive use.

METHODS: We will recruit 150 women (ages 18-35): 75 naturally cycling (NC) and 75 on hormonal contraceptives (HC). Power analyses indicate that with our sample size, an ANOVA can detect medium-sized effects considering two groups and covariates with 80% power. In a single session, participants will view negative and neutral images and be randomly assigned to apply psychological distancing (i.e., taking the perspective of an impartial observer) or reinterpretation (i.e., imagining a better outcome than what was initially apparent) in addition to control trials where participants will be asked to respond naturally. They will then be asked to rate how they feel after each image.

HYPOTHESES: (1) We hypothesize that HC users will exhibit higher negative affect and that cognitive reappraisal will be less effective for HC compared to NC women. (2) NC women during the luteal phase will be less effective in reducing negative affect than during the follicular and ovulation phases. (3) We will also look at the effects of reappraisal tactic type (distancing vs. reinterpretation), and we predict that distancing, compared with reinterpretation training, will yield a greater diminishment of self-reported negative affect.

CONCLUSIONS: This study connects hormonal cycle changes and contraceptive use with emotion regulation and may help develop future interventions that could mitigate mood-related side effects, bolster reproductive health choices, and enhance the overall well-being of women.

P2-D-34 - Rumination on the Feeling of Loneliness Explains the Loneliness-Depression Relationship: A Network Analysis

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BACKGROUND AND AIMS: Previous literature has suggested an association between loneliness and depression. As such, it is important to understand the mechanism behind the relationship between loneliness and depression. One way to delineate this link is through exploring the role of rumination. Studies have shown that rumination can modulate the relationship between loneliness and depression. However, existing literature only treated the three concepts as unitary constructs. Given the heterogeneity of depression and the multidimensionality of loneliness and rumination, the present study aims to achieve two goals. First, we will confirm the relationship between loneliness, rumination, and depression using their total scores. Second, we aim to construct a network of loneliness and depressive symptoms and a network of loneliness, rumination, and depressive symptoms using more specific items of the three variables.

METHODS: In a large community adult sample (N = 900), we examined the effects of rumination on the loneliness-depression relationship and constructed the Loneliness-Depression and Loneliness-Rumination-Depression network. UCLA Loneliness Scale was used to measure loneliness. Rumination Response Scale was used to measure specific ruminative thoughts. Patient Health Questionnaire was used to capture specific depressive symptoms.

RESULTS: The results suggest that rumination indeed mediated the loneliness-depression relationship using the total scores (bootstrapped indirect effect = .081, 95% CI [0.061, 0.104]). However, when considering variables at an item level, loneliness has no robust association with depression. Instead, a connection between a specific ruminative thought (“think about how alone you are”) and a specific loneliness item (“how often do you feel alone”, partial $r = .307$) plays an essential role in bridging and maintaining the Loneliness-Rumination-Depression network. Our findings indicated that rumination, especially ruminating on the loneliness feeling, was the key underlying factor that can modulate the loneliness-depressive symptom relationship.

CONCLUSIONS: The finding emphasized the importance of considering the heterogeneity of depression, loneliness, and rumination. Understanding the interconnection between individual items of the three constructs can contribute to the knowledge of the development of depressive symptoms and the identification of specific intervention targets for the treatment and intervention of loneliness and depression. Future studies are recommended to further replicate the current study and focus on ameliorating ruminative thoughts, especially on loneliness feelings, to alleviate the effects of loneliness on depressive symptoms.

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P2-D-35 - Effects of Emotion Regulation of Racially Discriminatory Experiences on Negative Emotion and Civic Action

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BACKGROUND AND AIMS: Racism is a pervasive issue creating and maintaining inequitable access to resources, opportunities, and power, leading to deleterious effects (Borrell et al., 2010). In some contexts, emotion regulation may be adaptive in managing responses to experiences of racial discrimination. There is little consensus on strategy efficacy for managing race-related stress. However, expressive suppression, distraction, and avoidance may be unhelpful, whereas cognitive strategies may be helpful in certain circumstances (Duker et al., 2022; Green et al., 2023). Cognitive strategies may not always be adaptive because they may impact individuals' propensity to combat racism through civic action (Green et al., 2023). Evidence is mixed on whether or not hedonic emotion regulation impedes civic action. Further research is needed to examine the usage and efficacy of emotion regulation strategies to cope with experiences of racial discrimination. I predict that usage of cognitive emotion regulation strategies, like cognitive reappraisal, may be effective in reducing negative affect, but may also reduce civic engagement.

METHODS: I will measure emotion regulation strategy usage in the context of the most recent experience of racism as well as change in perceived stress after using the strategy, and propensity for civic engagement. I will perform a linear regression to examine the relationship between different strategies and stress reduction to identify whether specific strategies are associated with increased efficacy. I will also conduct independent t-tests on civic engagement scores between the most efficacious strategy and the other strategies to determine whether certain strategies are associated with decreased civic engagement.

IMPLICATIONS: This study may add to an emerging dialogue on the contexts in which emotion regulation may be adaptive in coping with experiences of racial discrimination and in how the usage of different strategies may impact civic engagement. These results may be useful in future translational work and additional investigations of the impact of racial discrimination. New lines of inquiry may focus on measuring the impact of emotion regulation strategies for racial discrimination via physiological stress or fMRI firing pattern measures.

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P2-D-36 - Effects of a brief mindful-attention induction on EEG oscillations with and without naturalistic animations

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Mindfulness and meditation practice are associated with a number of potential cognitive and emotion-regulation benefits, yet reports of the potential neural correlates of these states are inconsistent. The potential influence of the testing environment, such as natural imagery, on these states has not been well-characterized. We aimed to measure the amplitude of ongoing oscillations in a mindful-attention compared to a mind-wandering condition, with and without accompanying naturalistic visual projections. Participants were 20 healthy young adults who listened to 5 minutes of either mindful-attention induction or mind-wandering verbal instructions, with dispersed periods of silence during which they followed the instructions (i.e., “focus on the feeling of your breath”, or “allow your mind to wander”). This manipulation occurred with and without naturalistic animations projected onto a large screen. The design was blocked and counterbalanced. Measurements were 64-channel EEG scalp recordings (Biosemi). Using a schema defined a priori, spectral power will be measured within bandwidths defined relative to each participant’s individualized alpha peak (IAP) frequency, identified from posterior EEG channels. We will define two low-alpha bands (each a 2 Hz increment ranging from 4 Hz below IAP to IAP), one high alpha band (IAP - 2 Hz above IAP), theta (4 - 6 Hz below IAP), delta (1 Hz - 6Hz below IAP), and beta bands (13 - 30 Hz). Planned statistical analyses will include a 2 x 2 x 2 ANCOVA (Instructions On/Off, x Induction Mindful/Mind-Wandering x Animation On/Off) for each band to characterize the spectral correlates of mindful-attention, and naturalistic imagery. This analysis will provide estimates of the extent to which mindfulness instructions alter the amplitude of ongoing oscillations under the influence of different visual environments, clarifying the neural mechanisms supporting states of mindful-attention.

P2-E-37 - Relations between loneliness and neural dissimilarity in autistic and neurotypical youth

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BACKGROUND AND AIM: Loneliness has profound consequences on mental well-being. Autistic adolescents are more likely to experience loneliness and associated mental health challenges, making it crucial to understand the factors that predict loneliness for autistic people. One candidate factor is neural dissimilarity, as college students who are lonelier are more neurally idiosyncratic (Baek et al., 2023), and autistic youth are more neurally idiosyncratic than neurotypical peers (Lyons et al., 2020). However, the relation between loneliness and neural similarity has not yet been tested in samples including autistic adolescents. Here, we test whether lonely autistic and non-autistic individuals are more neurally idiosyncratic than their non-lonely peers.

METHODS AND ANALYSIS PLAN: Data analysis will reflect the sample collected at the time of the conference; at present, autistic (n=19) and non-autistic (n=42) youth aged 11-14 have completed MRI scans. Youth will complete a self-report of loneliness and social dissatisfaction adapted from the Loneliness and Social Dissatisfaction Scale (Parker & Asher, 1993). Participants will also watch six 3-6 minute video clips containing social and nonsocial content during an MRI scan. fMRI data will be preprocessed, and participant-level neural time series will be extracted for each of the 268 regions of interest (ROIs) of the Shen (2013) parcellation atlas. Intersubject correlation (ISC) matrices will be constructed with the pairwise ISC for each ROI. A pairwise similarity matrix for self-reported loneliness will be constructed using the Anna Karenina principle to test the hypothesis that non-lonely individuals all have similar neural time series, while lonely individuals all have dissimilar neural time series (Finn et al., 2020). First, relations between the ISC matrix and self-report matrix will be tested across the entire sample for each ROI, with FDR correction for multiple comparisons. These analyses will be repeated within the non-autistic sample, to compare more directly with previous work in general population samples (i.e. Baek et al., 2023) and will also be repeated within the autistic sample to identify regions that are associated with loneliness specifically for autistic individuals. Significant fit between the matrices in specific regions will indicate that individuals who have more idiosyncratic neural activity in those regions are lonelier.

IMPLICATIONS: These analyses will present the first test of relations between neural dissimilarity and loneliness for autistic adolescents at the whole-brain level. The findings will explore whether neural idiosyncrasy in different brain regions may differentially contribute to loneliness in autistic and non-autistic adolescents, extending understanding of the neural underpinnings of loneliness in autistic adolescents.

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P2-E-38 - Neural Correlates of Social Cognition across Autism and Schizophrenia Spectrum Disorders

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BACKGROUND AND AIMS: Social cognitive impairments are central features of autism and schizophrenia spectrum disorders (SSDs). Despite evidence for comparable group-level deficits in lower-level emotion processing and higher-level mentalizing, limited research has examined the neural basis of social cognition across autism and SSDs. Our goal was to compare the neural correlates of social cognition within and across autism, SSDs, and typically developing controls (TDCs) using two functional magnetic resonance imaging (fMRI) tasks. We hypothesized that the neural correlates of social cognition would differ between both autism and SSD versus TDC groups, and that neural activity during social processing would relate to social cognitive performance across groups.

METHODS: Data came from two harmonized studies in individuals diagnosed with autism or SSDs and TDCs aged 16-35 years, including fMRI and behavioral social cognitive metrics. During fMRI scanning, participants performed a social mirroring imitate/observe (ImObs) task and the empathic accuracy (EA) task to probe lower- and higher-level social processes. Subject-level fMRI data were analyzed, including an imitate-observe contrast and brain activity modulated by EA performance. Group-level comparisons, and transdiagnostic analyses incorporating social cognitive performance, were conducted with FSL's PALM, covarying for age and sex, using 1000 permutations (thresholded at $p < 0.05$ FWE-corrected).

RESULTS: Analyses included 164 participants with usable ImObs data and 174 with usable EA data (autism $N=56/59$, SSD $N=50/56$, TDC $N=58/59$). EA and both lower- and higher-level social cognition scores differed across groups. However, there were no significant group-level differences in neural correlates for either the ImObs or EA tasks, even when separated by stimulus valence. During the ImObs task, bilateral activity within the frontoparietal mirror neuron system was observed across groups. Widespread activity in the right hemisphere, including regions implicated in social cognition, were positively related to EA across groups. Transdiagnostically, neural activity during the EA task, but not the ImObs task, was associated with lower- and higher-level social cognitive performance.

CONCLUSIONS: We found no significant differences in neural activation elicited by two fMRI tasks probing lower- and higher-level social cognition between autism, SSD, and TDC groups. The absence of group-level differences, and the continuous relationship found between brain activity during the EA task and social cognitive performance across our sample, emphasizes the need to move beyond group-wise analyses to better understand and guide development of novel interventions targeting social cognitive deficits across SSDs and autism.

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P2-E-40 - The Role of Cingulate Cortex Volumes in Dissecting Mood and Anxiety Comorbidities in Autism Spectrum Disorder

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BACKGROUND AND OBJECTIVES: Autism Spectrum Disorder (ASD) is often accompanied by mood and anxiety disorders, but the neural correlates of these comorbidities remain elusive. The cingulate cortex (CC), integral for emotional and social processing, may hold insights. Our study tested the hypothesis that ASD is related to volume reduction in CC compared with typical development (TD) individuals. We also examined CC volume in relation to clinical symptoms in ASD.

METHODS: We utilized 7T MRI and FreeSurfer analysis to quantify CC volume in participants with high-functioning ASD ($n=59$; m. age = 27.7 (SD = 8.7); 47.5% male) and TD ($n=74$; m. age = 29.4 (SD = 8.7); 33.8% male). We assessed Group differences in CC volume and its correlation with symptoms using regression models that accounted for age, sex, socioeconomic status, IQ, and intracranial volume. Participants engaged in a dynamic social interaction task reflecting power dynamics. Exploratory analyses were conducted to examine 1) the relationship between power and posterior cingulate cortex (PCC)—an area previously identified in social navigation, and 2) the relationship between power and mood and anxiety disorders in ASD.

RESULTS: The ASD group exhibits significantly reduced CC volume ($F = 5.22$, $p = 0.024$) compared to TD (Fig.1). Yet, higher self-reported autism symptoms in ASD are paradoxically associated with larger CC ($F = 6.20$, $p = 0.016$; Fig. 2). Pronounced links between CC and depression (Chi-square = 5.56, $p = 0.018$) and between CC and generalized anxiety disorder (Chi-square = 5.11, $p = 0.024$) are observed in ASD. Interestingly, ASD individuals with comorbid mood and anxiety disorders present cingulate volume comparable to the healthy TD control group. In addition, self-reported autism symptoms mediate CC volume relation to depression, which explains 17% variance of the relation. Social interaction task analysis reveals a significant interaction between PCC volume and Group in power behaviors ($p = 0.008$; Fig. 3), with larger PCC in ASD associated with granting more power to others. Within the ASD group, granting more power to others is related to a lower chance of depression (Chi-square = 4.54, $p = 0.033$).

CONCLUSIONS: We contribute to the literature by confirming cingulate cortex reduction in ASD. We showed that in autism, less reduction in the CC appears to be correlated with comorbid mood and anxiety disorders. Moreover, self-reported autism symptoms can potentially explain the link between the CC volume and depression. Those ASD individuals with relatively larger CC exhibit higher self-reported autism symptoms, which in turn, is associated with a higher chance of depression. Exploratory analysis suggested that social power behavior involves nuanced neural underpinnings of PCC in ASD. These findings underscore the potential of using structural neuroimaging to delineate the heterogeneity of ASD with mood and anxiety comorbidities and social behavior.

P2-E-41 - Autonomic dysregulation in major depressive disorder during increasing cognitive load

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BACKGROUND AND AIMS: Autonomic dysregulation at rest and during task performance has been observed in individuals with major depressive disorder (MDD), most often with cardiac variables such as interbeat interval (IBI), a measurement of heart rate variability defined as the time between successive heartbeats. Literature suggests that this dysregulation may be negatively correlated with cognitive performance. This study sought to expand and develop on the existing literature by measuring changes in IBI for individuals with MDD compared to controls when under low, moderate, and high cognitive load. We hypothesized that individuals with MDD would perform worse than controls under moderate and high cognitive load, would display autonomic

dysregulation with increasing task difficulty, and that autonomic dysregulation would be associated with poorer cognitive performance.

METHODS: Baseline data was collected from 64 individuals with MDD and 26 controls. Participants completed a computerized N-back task with increasing cognitive load (1-, 2-, and 3-back) while continuous electrocardiogram recordings were taken.

RESULTS: A two-way mixed effects ANOVA found that individuals with MDD performed worse than controls on the N-back task, $p=.010$, and increasing task difficulty led to poorer performance for both groups, $p<.001$; there was no interaction between diagnosis and difficulty level, $p=.398$. A repeated measures mixed effects model of IBI with diagnosis and difficulty level entered as factors and age as a covariate found a significant interaction between difficulty and diagnosis, $p=.004$. Post hoc tests found a statistically significant effect of task difficulty on IBI for the control group, $p<.001$, but not for the MDD group, $p=.416$. Pairwise comparisons for the control group found that there was no statistically significant difference between IBI in the 1- and 2-back conditions, $p=1$, while there was a statistically significant difference in the comparison between 1- and 3-back, $p=.003$, and 2- and 3-back conditions, $p<.001$. In the MDD group the only significant comparison was between the the 1- and 2-back condition, $p=.007$. Repeated measures correlation identified a moderate negative correlation between task performance and IBI for the MDD group, such that poorer performance was associated with longer IBI and thus lower autonomic arousal, $p<.001$. This correlation was not observed for control participants, $p=.377$.

CONCLUSIONS: These results support previous research indicating that there is autonomic dysregulation in MDD. It further suggests that this dysregulation may be associated with poor cognitive performance. Further research into the association between autonomic dysregulation and cognition may support potential treatment targets for MDD.

P2-E-42 - Learning impairments to socially triggered sounds in Misophonia

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Misophonia, a disorder characterized by heightened emotional responses to certain trigger sounds, especially in social contexts (such as chewing, sniffing, and coughing), might involve dysfunctions in learning mechanisms. In this work, we tested associative and reversal learning in people with misophonia and studied how their observed behavior and its neural correlates differ from those in neurotypical participants.

To examine this, we used a reversal-learning task where neutral visual cues were associated with neutral sounds or misophonia triggers. The association was reversed halfway through the task. Participants reported the unpleasantness ratings of the visual cues before the task, halfway through the task before the association was reversed, and at the end of the task. Higher ratings for the cue associated with misophonia triggers would indicate successful learning.

To study the neural correlates of behavior, we recorded EEG during the task and explored its temporal and spectral aspects. Temporally, we measured the amplitudes and latency of P1, N1, and P2 peaks of event-related potentials (ERP). These features denote pre-attention, cued attention, and perceptual processing and memory, respectively. Spectrally, we measured the power and inter-trial coherence of different frequency bands during the first 500 ms after the presentation of the visual stimulus. The theta (4-8 Hz) and beta (12-30 Hz) bands are associated with learning and visual processing and were particularly of interest.

We found that misophonia participants ($n=30$) rated both misophonia and neutral sounds unpleasant after reversal. Neurotypical participants ($n=22$) rated only the misophonia sounds as unpleasant. The behavior of both subject groups was identical before the reversal. Furthermore, we found both temporal and spectral correlates of behavior in EEG of the parietal and occipital regions. Misophonia participants had lower P1 and N1 peak amplitudes than neurotypical subjects. Spectrally, misophonia participants had lower power in theta and beta bands than neurotypical participants.

These findings indicate that associative learning is intact in misophonia participants, but reversal learning is compromised: people with misophonia persist in responding to cues previously associated with misophonic triggers, even when they were now associated with neutral or positive cues. This behavior is accompanied by lower activity in the parietal and occipital regions. This work brings us closer to understanding the mechanisms of misophonia and provides new avenues for treatment approaches.

P2-E-43 - Neural Underpinnings of Empathy in Psychopathy: The Effect on Loneliness

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Social isolation, loneliness and associated emotional pain may facilitate antisocial behavior in psychopathy (Çelikkaleli et al., 2022; Masui, 2019; Martens, 2002, 2000, 1999, 1997; Zhang et al., 2015). Recent work suggests that the characteristic lack of empathy in psychopathy may mediate the relationship between psychopathy and loneliness (Çelikkaleli et al., 2022). In this study, we propose that shared neural representations in empathic brain regions like the Anterior Insula (AI) and the Anterior/Mid Cingulate Cortex (ACC/AMCC) will mediate the relationship between psychopathic traits and loneliness. To test this, 110 participants were randomized to either a 4-week long Loving Kindness Meditation or a control intervention, while 54 participants of these will also undergo fMRI scanning. During the scan, participants observe a confederate receiving painful stimulation to their hand. Using multivoxel pattern analysis (MVPA) and analysis of behavioral measures of psychopathic traits, loneliness, and trait empathy, we hypothesize that 1) individuals higher in psychopathic traits will be more lonely, 2) individuals with higher psychopathic traits will feel more lonely due to lower shared neural representations and that 3) the change in trait-level empathy over time will mediate the relationship between psychopathic traits and the change in loneliness. Altogether, this study will allow for a more comprehensive understanding of why and how the lack of empathy in psychopathy facilitates loneliness.

P2-F-44 - Social interaction in the context of Sexual Objectification: the impairment of emotional mimicry responses towards objectified women

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BACKGROUND AND AIMS: Social interactions are the building blocks of our society through which we create social bonds. Among the many non-verbal communication used in social interactions, mimicry is a necessary process in making sense of people's emotional facial expressions. Mimicry refers to the unconscious and unintentional imitation of other people's postures, gestures, mannerisms, moods and emotions that allow people to understand other's emotions and intentions through the simulation of their emotional states. While this behavior has been widely connected to relationship goals, liking and is sensitive to the social context, only a few studies have tried to investigate it in the context of sexual objectification. Sexual objectification is a Western phenomenon in which a woman is primarily seen as a body or a collection of body parts, stripped from her personality and humanity. To date, research has mainly focused on explicit sexual harassment and aggression as the main behavioural consequences of sexual objectification, while more subtle consequences towards objectified targets that might impair social interaction were often ignored.

METHODS: Across two experiments, we aimed to investigate spontaneous mimicry behavior during interaction with objectified and non-objectified women. Videos of objectified (scarcely dressed) and non-objectified (fully dressed) women expressing happiness and anger were presented in both studies while assessing participants' electrophysiological facial movements of zygomaticus major (cheek) and corrugator supercilii (brow).

RESULTS: Results of both studies clearly confirm that regardless of participants' gender, objectified targets elicited less spontaneous mimicry responses specifically in the zygomaticus muscle when they expressed happiness. Indeed, while a main effect of objectification emerged in Study 1 that only interacted with target emotion, in Study 2 we were able to replicate this effect for a specific channel and a specific emotion, the emotion of happiness.

CONCLUSION: These studies can show first a more subtle and spontaneous consequence of sexual objectification that is harder to control and that might influence social interactions more generally. Investigating more unconscious and spontaneous behavior, adds to the impression that sexual objectification is more widespread and pervasive than previously assumed, impacting the recognition and perception of emotions. At the same time, these results highlight and confirm the regulatory function of mimicry in different social contexts providing a first confirmation of the idea that interacting with objectified women can negatively affect facial mimicry reactions, potentially affecting the affiliative function of social interactions compromising future relations.

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P2-F-45 - Neuroanatomical correlates of theory of mind and empathy for pain in neglected adolescents

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BACKGROUND AND AIMS: Neglect, the most prevalent form of maltreatment, involves caregivers failing to meet essential needs for a child's optimal development and can impact multiple aspects of social cognition. However, research on neglect's effects on Theory of Mind (ToM) and empathy for pain and their neuroanatomical correlates in neglected adolescents is scarce. Here, we assessed these domains, alongside their structural brain correlates, in neglected adolescents (n = 27) within family-based care settings and controls (n = 25).

METHODS: First, we compare the group's performance in ToM and empathy for pain assessed using the Reading the Mind in the Eyes Test (RMET) and a task featuring naturalistic stimuli to measure empathy for pain in intentional and accidental harm contexts, respectively. Additionally, we explored the grey matter correlates of these domains in both groups separately through voxel-based morphometry.

RESULTS: Neglected adolescents exhibited lower ToM performance, reduced empathic concern and discomfort ratings in intentional and accidental scenarios, and a more lenient judgment of the perpetrator's behavior in intentional situations than controls. These findings remained consistent after controlling for executive function and IQ. In neglected adolescents, positive associations emerged between ToM performance and temporal (middle and inferior temporal gyri) and anterior cingulate areas. Empathic concern and discomfort ratings in both intentional and accidental scenarios and judgments of perpetrator behavior in intentional situations were mainly associated with parietal (superior parietal) and frontal regions (orbitofrontal, precentral, and middle frontal gyri). Conversely, in control adolescents, positive associations emerged between ToM and frontal regions (precentral and supplementary motor area). Empathic concern in intentional and accidental situations and judgments of perpetrator behavior in intentional situations were predominantly linked to occipital regions (middle occipital gyrus, cuneus). Discomfort ratings in accidental situations were associated with temporal (middle and inferior temporal gyri) and anterior cingulate cortices, while no significant associations emerged for discomfort ratings in intentional situations.

CONCLUSIONS: These findings underscore the adverse impact of neglect on ToM and empathy for pain during adolescence, emphasizing the necessity for preventative and intervention strategies to address socio-cognitive deficits in this population.

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P2-F-46 - Hostile attribution bias shapes neural synchrony in the left ventromedial prefrontal cortex during ambiguous social narratives

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BACKGROUND: Hostile attribution bias refers to the tendency to interpret ambiguous social situations as intentionally hostile. Previous research has found hostile attribution bias to be related to aggressive and maladaptive behaviors. Structural differences in the prefrontal cortex have been found to be associated with the tendency to make hostile attributions. Building on this past work, we propose that prefrontal regions are engaged during the ongoing processing of social information that ultimately gives rise to hostile attributions. We test this hypothesis using functional near-infrared spectroscopy (fNIRS) to measure activity in the prefrontal cortex as participants listened to social scenarios used to measure hostile attribution bias in clinical settings.

METHODS: Participants (n = 58) listened to 21 narrated scenarios while undergoing fNIRS. Prior work shows that the scenarios elicit hostile, benign, or ambiguous attributions of a character's intentions. Following each scenario, participants rated the degree they thought the character's actions were hostile. The ratings were summed across scenarios as a measure of hostile attribution bias for each participant. We ran inter-subject representational similarity analyses (IS-RSA) to identify brain regions where activity time courses were more similar between participants with similar levels of hostile attribution. Using a leave-one-out cross-validation procedure, we tested how well we could classify participants into high or low hostile attribution based on the levels of neural similarity to the average high or low hostile attribution bias participant.

RESULTS: Pairwise neural synchrony in the left ventromedial prefrontal cortex (VMPFC) was higher between participants with similar levels of hostile attribution bias ($r = 0.10$, $p = 0.001$, $q = 0.024$; Fig.1). When the IS-RSA was performed separately for hostile, ambiguous, and benign narratives, this effect was observed only for ambiguous narratives ($r = 0.11$, $p < 0.001$, $q = 0.014$). A similarity-based classifier trained on the neural data classified participants as having high or low bias with 75.9% accuracy ($p < 0.001$, $q = 0.004$; Fig.2), indicating that the neural time courses at the left VMPFC were systematically different between the two groups during story listening.

CONCLUSIONS: These results indicate that temporal dynamics of left VMPFC activity were more synchronous between individuals with similar levels of hostile attribution bias, and the effect was particularly strong during narratives where the intention of the social other was ambiguous. Taken together, our results suggest that hostile attribution bias influences subjective interpretations of social situations via differential responses in the left VMPFC. Our study sheds light on the neural mechanisms underlying hostile attribution bias and highlights the potential of using fNIRS to develop neural markers of this socio-cognitive bias.

P2-F-47 - Empathy is associated with patterns of resting-state functional connectivity in presymptomatic genetic frontotemporal dementia: A GENFI study

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BACKGROUND AND AIMS: A robust feature characterizing frontotemporal dementia from other dementias are early deficits in social cognition. The salience and default networks, comprising groups of brain regions studied using resting-state functional connectivity (RSFC), are linked to the processing of emotionally salient stimuli and inferring others' mental states, respectively. Recently, differences across presymptomatic frontotemporal dementia groups have been detected in RSFC and empathy separately. The present study evaluates the relationship between RSFC and empathy in presymptomatic frontotemporal dementia. We hypothesize that empathy-associated patterns of RSFC may be sensitive to group differences in the presymptomatic phase of frontotemporal dementia.

METHODS: The GENFI cohort recruited 840 presymptomatic adults (Mage=44y±13; 59%F, 41%M) including pathogenic mutation carriers C9orf72 (n=180), GRN (n=178), MAPT (n=72) and non-mutation carriers (NMC, n=410). RSFC data was processed using CONN and divided into networks using a parcellation method based on the Yeo 17 network solution. A subsample completed the modified Interpersonal Reactivity Index, a measure of empathy comprising the emotional concern and perspective-taking subscales. Partial least squares, a multivariate analysis, was conducted to evaluate group differences in patterns of RSFC as well as empathy-RSFC relationships.

RESULTS: A distributed pattern of RSFC dissociated NMC from the mutation carrier groups, revealing a number of edge-level differences (20.08% covariance explained, $p=.02$). The salience and default networks emerged as part of the broad pattern of RSFC differences. Additionally, stronger within salience network RSFC contrasted C9orf72 from GRN (31.08% covariance explained, $p=0.04$). As hypothesized, empathy-related patterns of RSFC revealed group differences (23.95% covariance explained, $p=.04$). Specifically, GRN exhibited a positive relationship between empathy and RSFC in both salience and default networks.

CONCLUSIONS: We provide evidence that networks associated with social cognition revealed group differences among presymptomatic frontotemporal dementia groups and that the GRN genetic group may show stronger empathy-related associations with these networks. Early between group differences among presymptomatic mutation carriers allude to variability in disease progression and trajectory prior to onset of clinical frontotemporal dementia. Future longitudinal work examining the relationship between social cognition and RSFC change over time may provide greater sensitivity for identifying at-risk individuals converting to early stage frontotemporal dementia.

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P2-F-48 - Neurocognitive mechanisms of news credibility evaluation measured by fMRI

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BACKGROUND: In information searching processes e.g., as a part of informal learning, the distinction between reliable and less reliable news is essential. As the use of online media as a source for news is rising, a particular challenge is that these media are highly infiltrated by fake news (i.e., news intentionally created to deceive or manipulate the recipient). To examine factors that influence the processing of news and group feedback, we investigated the relationship between the news presentation and its effect on credibility.

METHODS: In a functional magnetic resonance imaging (fMRI) experiment, using a three-factorial within-subject design 24 adolescents evaluated news of three news topics (based on the emotions of fear, disgust and surprise), in two different writing styles (emotional and neutral) and in three contexts (a national newspaper, a regional newspaper and a private blog). They further were confronted with feedback that was either supportive or opposing and given by a random person, friend or expert.

RESULTS: Analyzing the data using general linear modeling, we found specific brain activity patterns for the evaluation of credibility. Interestingly, news rated as not credible evoked widespread activity e.g., in the middle and inferior frontal gyrus, ventral and dorsal medial prefrontal cortex (DMPFC) and anterior and posterior cingulum. Emotionally written news elicited activation in respective areas (amygdala, putamen, insula) and medial cortical areas as DMPFC and Precuneus. The different forms of feedback led to specific brain activity patterns and induced activation in medial frontal and lateral parietal cortices. Analyses of retrospective verbalizations showed that the publishing source was taken as an important criterium for the news' reliability with the newspaper stated as most credible, however the ratings in the scanner show the opposite: the blog was rated as most credible in the scanner directly after reading the news.

CONCLUSION: The evaluation of news' credibility activated specific brain activity patterns e.g., in prefrontal, temporal and parietal cortices. Further, while differences in brain activity for distinct topics and sources were less pronounced, emotionally written news impacted news credibility strongly with eliciting specific activity patterns for neutral vs. emotional news. Our results suggest that the affective and social aspect of news evaluation potentially associated with functions such as reflecting the own self, processing emotions, mentalizing, taking perspective or feeling empathy and reward is of major importance for rating the perceived credibility. Consequently, instructing learning processes regarding news evaluation as well as research for the underlying mechanisms should not be limited solely to cognitive processes but should also include social and affective neurocognitive aspects.

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P2-F-49 - Social experience makes unique contributions to conceptual knowledge

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BACKGROUND AND AIMS: Social concepts, like FRIENDSHIP, TRUSTWORTHY, and DISCUSS, imbue meaning into the personal and interpersonal interactions that characterize our everyday lives, thereby shaping our comprehension of others' thoughts and actions, and guiding our social behaviours. This study adopts a psycholinguistic approach to explore the mental representation of social concepts. Recent influential proposals argue for a pivotal role of information derived from social experience, termed socialness, in conceptual knowledge representation. However, the empirical support for these claims is limited by 1) inconsistencies in the way socialness has been defined and measured, and 2) a lack of behavioural evidence. If social information contributes to conceptual representations, then socialness should be related to behavioural indices of lexical-semantic processing in a similar vein as other established dimensions of meaning, such as sensorimotor features and emotional valence. However, this prediction has not been formally tested.

METHODS: To address this gap, we first quantified the socialness of 8388 English words using an inclusive definition designed to capture a diverse range of socially relevant concepts. Participants (N=605) used a 7-point Likert scale to rate concepts based on their association with social roles, behaviours, places, institutions, values, ideologies, or any other social construct. We then explored the influence of socialness on concept processing through a series of multiple regression analyses leveraging openly available behavioural mega-studies (e.g., Calgary Semantic Decision Project, English Lexicon Project), and two pre-registered experiments in which participants (N=146) were asked to make syntactic decisions on social and non-social words.

RESULTS: The resulting socialness ratings demonstrated good reliability and validity, confirming the meaningfulness of socialness as a broad construct. We found that words with higher mean socialness ratings were associated with higher accuracy and faster reaction times across lexical, semantic, syntactic and memory tasks. Importantly, socialness accounted for unique variance in behavioural performance, which could not be explained by basic lexical properties or established semantic dimensions. This suggests that socialness captures a distinct aspect of meaning.

CONCLUSIONS: The facilitatory nature of the socialness effect suggests that socialness might make conceptual representations richer, by, for example, providing them with additional features or thematic associations that enable more efficient processing. These findings highlight the special status of social concepts and provide novel empirical evidence in support of proposals that social experience makes unique contributions to semantic representation.

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P2-F-50 - Social Cognition and Individual Variability as Measured by Fractional Amplitude of Low-Frequency Fluctuation in a Transdiagnostic Group of Schizophrenia and Autism Spectrum Disorders

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BACKGROUND AND AIMS: Findings of resting-state spontaneous brain activity such as fractional amplitude of low frequency fluctuation (fALFF) in autism and schizophrenia spectrum disorders (ASDs and SSDs) have been highly heterogeneous. This represents a challenge in understanding the neurobiology of these disorders. Therefore, the purpose of our study was to use fALFF in a large sample of ASD, SSD and typically developing control (TDC) participants to explore group differences, individual variability and the relationship with social cognition.

METHODS: fALFF from 495 participants (185 controls, 68 ASD, and 242 SSD) was computed using resting-state functional magnetic resonance imaging as signal power within slow-4 (0.027 – 0.073 Hz) and slow-5 (0.01 – 0.027 Hz), normalized by the power in the remaining frequency spectrum. Permutation analysis of linear models were employed to investigate the relationship of cortical fALFF with the group, The Awareness of Social Inference Test-Revised score (sarcasm subsection; TASIT-3 Sar), and Penn Emotion Recognition Task score (ER40). Each participant's average distance of fALFF map to all others was defined as a variability score with higher score indicating less typical maps.

RESULTS: Lower slow-4 and slow-5 fALFF in visual regions were found in both SSD and ASD compared to controls. Further, TDC showed lower frontal fALFF compared with ASD and higher sensorimotor fALFF compared with SSD. Additionally, higher slow-4 fALFF in SSD compared with ASD was observed in the cuneus and precuneus regions. There were associations between slow-4 fALFF values and TASIT-3 Sar scores across the whole sample in the lateral occipital regions and temporoparietal junction. Moreover, individual variability within the ASD and SSD groups was significantly higher compared with TDC. Lastly, greater individual variability in fALFF maps was significantly negatively associated with TASIT-3 Sar scores.

CONCLUSIONS: Similar patterns of fALFF and individual variability in ASD and SSD suggests shared neurobiological mechanisms between the two groups with social cognitive deficits in ASD and SSD sharing a common pattern with poor performers in the control group.

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P2-F-51 - Electrophysiological correlates of altered emotional face perception by face masks

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BACKGROUND AND AIMS: While face masks are important for disease prevention, they occlude face features needed for facial emotion recognition. There is mounting evidence indicating severe emotion recognition impairments for masked faces, but the neural correlates of such altered face processing remain unknown.

METHODS: In one of the first electroencephalography (EEG) studies of masked faces, we asked 29 participants to recognize emotions from images of masked and unmasked faces displaying fear, happy, surprise, sadness, anger, disgust, and neutral facial expressions. Event-related potentials were time-locked to the onset of each face and analyzed using a mass univariate analysis with cluster-based permutations.

RESULTS: Replicating past work, accuracy in emotion recognition was lower for masked faces, with this behavioral impairment most pronounced for faces displaying emotions with diagnostic lower face features (e.g., wrinkled nose in disgust). Neurally, processing of faces with face masks was marked by a profound and widespread impact on typical markers of face perception and emotional processing, including the N170, the Enhanced Posterior Negativity (EPN), and the Late Positive Potential (LPP).

CONCLUSIONS: These results demonstrate that the neural time-course of emotional face perception is disrupted by visual occlusion from masks by the first face-selective component and continues into the downstream markers of attentional allocation and cognitive appraisal of emotional stimuli. Thus, wearing faces masks severely disrupts typical face perception in both brain and behavior.

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P2-F-52 - Interpersonal heart rate synchrony predicts effective information processing in a naturalistic group decision-making task

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BACKGROUND AND AIMS: Groups often outperform individuals in problem-solving. However, failure to critically evaluate ideas risks sub-optimal outcomes, e.g. in groupthink. Prior attempts to characterize what makes some groups more effective than others have largely relied on qualitative, survey-based assessments. An objective, quantitative account of effective collective decision making—especially in real-world contexts—is, therefore, an important priority for research in psychology, management, and leadership. While interpersonal heart rate synchrony has been associated with shared attention, cooperation and group cohesion before, whether it can track group efficacy in critical evaluation of alternatives in an objectively quantifiable manner remains controversial.

METHODS & RESULTS: To address this gap, we collected heart rate data from 58 groups (n = 271) performing a discussion task based on the hidden profile paradigm, requiring active consideration and critical examination of all available information to override any inferior, default options. Using multi-dimensional recurrence quantification analysis (MdrQA) and machine learning, we found that heart rate synchrony predicted the probability of groups reaching correct outcome with more than 70% cross-validation accuracy—significantly higher than that predicted by subjective assessment of team function or baseline heart rates alone.

CONCLUSIONS: These findings demonstrate that heart rate synchrony during a naturalistic group discussion could be a biomarker of effective information processing in collective decision-making.

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P2-F-53 - Brain-Behavior Participant Similarity Networks Among Youth and Adults with Schizophrenia Spectrum, Autism Spectrum, or Typically Developing Controls

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BACKGROUND AND AIMS: Autism spectrum disorder (ASD) and schizophrenia spectrum disorder (SSD) display heterogeneity in brain function, and exhibit social cognitive deficits which strongly predict functional outcomes. The objective of the present study was to integrate multiple brain imaging phenotypes and behavioral measures to identify new brain-behavior subgroups across these disorders.

METHODS: Multi modal structural MRI, functional MRI, social cognitive and neurocognitive data from 106 SSD, 59 ASD, and 118 controls were examined using meta-similarity network fusion (metaSNF). Meta SNF identifies common patterns of similarity across data types and applies spectral clustering to identify biotypes, iterating models with differing parameters (e.g. including different data types). Left-out Birchwood Social Functioning Scale (BSFS) and Interpersonal Reactivity Index (IRI) were used to identify biotypes with clinically meaningful differences in social function and outcomes.

RESULTS: The top clustering solution identified four transdiagnostic data-driven groups, with between-cluster separation on both BSFS (p=0.00165) and IRI (p=0.00643), driven by social cognition and cortical surface area. Social cognitive scores and surface area (precuneus, superior frontal, insula, superior temporal, and medial orbitofrontal) comprised the top ten contributing model features driving participant similarity and differences between the groups. A post-hoc analysis revealed between-network resting-state functional connectivity differences in the default mode, dorsal attention, somatomotor, salience, limbic, and visual networks.

CONCLUSION: Our findings open the possibility of studying new data-driven groups that represent individuals with SSD and ASD more similar to each other than compared to traditional diagnostic groups. This has the potential to progress disease subtyping to target specific neural circuitry among participant subgroups for treatment innovation and support current efforts which aim to expand beyond DSM-based diagnostic groups into transdiagnostic biologically based diagnoses.

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P2-F-54 - Social bonding shapes hierarchical interaction and neural alignment in human groups

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BACKGROUND AND AIMS: Social groups in various social species are organized with hierarchical structures that shape group dynamics and the nature of within-group interactions. In-group social bonding, exemplified by grooming behaviors among animals and collective rituals and team-building activities in human societies, is recognized as a practical adaptive strategy

to foster group harmony and stabilize hierarchical structures in both human and non-human animal groups. However, the neurocognitive mechanisms underlying the effects of social bonding on hierarchical groups remain largely unexplored.

METHODS: Here, we conducted simultaneous neural recordings on human participants engaged in-group communications within small hierarchical groups (n = 528, organized into 176 three-person groups) to investigate how social bonding influenced hierarchical interactions and neural synchronizations.

RESULTS: We differentiated interpersonal interactions between individuals of different (inter-status) or same (intra-status) social status and observed distinct effects of social bonding on inter-status and intra-status interactions. Specifically, social bonding selectively increased frequent and rapid information exchange and prefrontal neural synchronization for inter-status dyads but not intra-status dyads. Furthermore, social bonding facilitated unidirectional neural alignment from group leader to followers, enabling group leaders to predictively align their prefrontal activity with that of followers.

CONCLUSIONS: These findings provide insights into how social bonding influences hierarchical dynamics and neural synchronization while highlighting the role of social status in shaping the strength and nature of social bonding experiences in human groups.

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P2-F-55 - Social Impressions of Characters Predicts Similarities in Neural Synchrony during Subsequent Natural Viewing

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When two people experience a narrative they may arrive at different impressions of the characters. Prior research has demonstrated that neural synchrony during naturalistic impression formation predicts similarity in subsequent impression formation. However, what happens when people are already familiar with the characters of a narrative? Do their prior impressions shape their perception of subsequent social events? In the present study, we examine this question by familiarizing participants with a set of characters by watching an episode of the reality show “The Mole” and then, in a later session, have them watch edited excerpts from later portions of the show. Prior to fMRI scanning, participants rated their impressions of the characters’ personalities as well as their affective responses to these characters. Using Inter-Subject Representational Similarity (IS-RSA) we find that similarities in prior impressions of the character predict similarity during natural viewing for personality impressions but, unexpectedly, not for affective ones. This suggests that our prior impressions of characters influenced our interpretation of subsequent social events such that those with more similar impressions show similar neural synchrony when watching these characters interact.

P2-F-56 - Neural self-partner representation overlap is associated with support, relationship satisfaction, and well-being

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BACKGROUND AND AIMS: In the context of romantic relationships, the self-expansion model posits that romantic partners are perceived as an extension of the self. A large body of behavioral research has shown that the degree of perceived overlap between oneself and one’s partner relates to important relationship outcomes. Accompanying this behavioral work, however, is a relative paucity of neuroscientific research investigating self-partner overlap in romantic relationships.

METHODS: Here we use functional MRI (fMRI) to evaluate self-partner representation overlap during positive and negative social feedback in relation to a comprehensive set of outcomes among romantic partners. Fifty-one heterosexual romantic couples (N = 102) completed fMRI scans while processing positive and negative social feedback directed to themselves and their partners. Representational similarity analysis was used to quantify self-partner overlap (measured from both partners, separately) in brain regions linked to personal significance and affective salience. Actor-partner interdependence modeling was used not only to examine individual differences relationships between self-partner neural representational similarity and participants’ own well-being and relationship satisfaction, but also the well-being and relationship satisfaction of participants’ partners, and as well as partner-rated support assessed with a week-long daily diary.

RESULTS: A number of divergent findings emerged based on gender. For example, during positive feedback, the self-partner representation overlap in the ventral medial prefrontal cortex (VMPFC) of participants identifying as men was positively associated with the degree of daily support they provided to their partner and both partners’ reports of relationship satisfaction. During negative feedback, the self-partner representation overlap in the anterior insula (AI) of men was positively correlated with their partner’s relationship satisfaction. A different set of findings emerged in participants identifying as women. During positive feedback, the self-partner representation overlap in the amygdala of women was positively associated with their partner’s self-reported symptoms of depression. During negative feedback, self-partner representation overlap in the amygdala also predicted higher partner depression as well as lower partner relationship satisfaction.

CONCLUSIONS: These findings unveil gender-specific associations that can be further examined in future research and suggest that neural representational overlap may serve as a marker of support, relationship satisfaction, and well-being in close relationships.

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P2-F-57 - The neural basis of social categorization and individuation

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BACKGROUND AND AIMS: Social cognitive theories have long recognized the dominant tendency to socially categorize others, with the readiness to individuate depending on cognitive and motivational factors. However, surprisingly little is known about how categorical vs. individuated neural representations relate to biased behavior.

METHODS: In an fMRI experiment involving the Memory Confusion Protocol (Taylor et al., 1978), we isolate neural response patterns related to incidentally encoded racial categories while participants encounter individuals saying various phrases. The pairings of individuals and the phrases they spoke must subsequently be recalled. Classically, this paradigm demonstrates greater within-category vs. between-category errors, namely a tendency to confuse one Black target for another. In the encoding phase, participants viewed isolated images of Black and White male targets, followed by the image paired with a statement. Participants must recall "Who Said What?" by matching the displayed sentence to the correct target. We predict that the spontaneous reinstatement of category-related neural response patterns, as opposed to response patterns related to individual targets, will be associated with greater within-category memory confusions. Category-related template patterns will be created by using beta values from first-level contrasts during a category localizer task, wherein subjects view independent Black and White male faces. Individual target response patterns will be created by using beta values at the time when the participants were exposed to a target during the encoding phase. Regions of interest (ROIs) will be defined as any regions that reliably distinguish between Black and White targets via an MVPA searchlight classification analysis from the category localizer task ($p < .05$, TFCE corrected). We will conduct a correlation of the multivariate response patterns between the initial encoding and subsequent recall of a target, and between the average category pattern and the recall of the target.

RESULTS: Using the difference score between the two correlations, we predict that stronger reinstatements of the race category, relative to reinstatements of the specific target, will be associated with more within-category memory confusions. These difference scores will be tested at the group level in all ROIs ($p < .05$, FDR corrected), as well as in exploratory whole-brain searchlight analyses ($p < .05$, TFCE corrected). We predict that spontaneous activations of race categories will be found in regions involved in implicit categorization and social semantic activation, such as the anterior temporal lobe, the inferior frontal gyrus, and the middle temporal gyrus.

CONCLUSIONS: The findings will yield novel insights into how biased behavior in memory can be traced to the ways in which certain neural regions represent others as individual entities or as a mere set of category memberships.

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P2-F-58 - Probing into Communicative Challenges in Autism Spectrum Condition

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BACKGROUND AND AIMS: Autism Spectrum Condition (ASC) presents distinct challenges in everyday communication, yet the cognitive sources of these challenges remain largely enigmatic. Recent research has highlighted that individuals with autism are less inclined to reference communicative context derived from past interactions with a partner (Wadge et al., Cortex 2019). This raises the question of whether autistic individuals face difficulties in constructing communicative context or challenges in organizing it in a manner that supports effective referencing.

METHODS: To investigate these possibilities, we conducted a quantitative analysis of interactions between autistic and neurotypical pairs ($n=28$ in each group) immersed in the Tacit Communication Game. Within this game, pairs collaboratively develop communicative strategies through a series of interactive challenges centered around recreating specific target configurations using their two given shapes on a digital grid. Designed to mimic the fleeting ambiguities of real-life communication, the game presents players with diverse shapes and target configurations across various trial types, varying in (1) communicative difficulty in resolving the ambiguities; and (2) the timing when the type is introduced to the communicative context. Our analysis focused on evaluating pairs' communicative success, their pace in developing shared strategies (i.e., Context Construction), and their tendencies in referencing previously established strategies (i.e., Context Referencing).

RESULTS: During Construction, both groups exhibited comparable proficiency in developing effective shared communicative strategies, demonstrating similar success rates across various trial types. However, autistic pairs exhibited challenges when a new trial type was introduced and previously effective strategies became ambiguous (ASC success: 74.29%, NT success: 85.94%, $p=0.035$). For Referencing, ASC and neurotypical groups displayed similar levels of success, where most pairs converged on similar strategies (ASC success: 96.7%, NT success: 96.11%, $p=0.55$). However, a regression analysis of referenced strategies revealed a distinct pattern between the two groups. Whereas neurotypical pairs tended to employ strategies previously used with success in a given problem type, ASC pairs employed previously successful strategies from across all problem types (i.e., trial type explained 52.15% of the variance in strategy-referencing patterns for NT but 39.7% for ASC, $p = 0.05$).

CONCLUSIONS: These findings provide initial evidence that autistic individuals are capable of constructing a communicative context. However, challenges may arise when referencing previously constructed context in the face of ambiguity introduced by an evolving communicative setting. This difficulty in context referencing may contribute to the daily communication challenges experienced by many individuals with ASC.

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P2-F-59 - The Brain on Social Judgment: Neural Signatures of Evaluating and Predicting in a Peer Network

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BACKGROUND AND AIMS: Social evaluation and predicting others' evaluations are both essential to navigating the social world. Research has shown that positive social evaluations consistently engage the medial prefrontal cortex (mPFC) and reward-processing areas such as the medial orbitofrontal cortex (mOFC) and striatal areas (Cunningham et al., 2003; Peter Mende-Siedlecki et al., 2013). Positive predictions of social evaluation engage similar areas, including the ventral mPFC and striatum (Moor et al. 2010; Van de Groep et al., 2021).

However, it remains unclear (1) if positive social evaluation and prediction are represented by a stable, yet different brain signature, (2) how the expression of these brain signatures may be influenced by interpersonal factors, such as the level of closeness to and the perceived popularity of an individual, and (3) whether individual differences in signature expression may reflect psychosocial traits such as interpersonal emotional regulation and sociality. This study hopes to develop a clear neural signature for positive social evaluation and prediction, and examine how this signature might be mediated by an individual's traits and position in a defined social network (a dormitory setting).

METHODS: 105 first-year college students completed a pre-scan social network/trait survey, responding to various trait measures and rating the popularity of and their closeness to their dormitory peers. This was followed by an fMRI scan, where participants were shown faces of their peers and made direct social evaluation (e.g., judging peers' traits), evaluative prediction (anticipating peers' judgments about oneself), and evaluative choice (deciding whether to view peers' evaluations post-scan) (Fig. 1). The task included 150 trials, each involving one of ten dormitory peers, varying in closeness to the participant. The fMRI data will be pre-processed in fMRIPrep and analyzed using nilearn.

HYPOTHESES: We hypothesize that distinct neural signatures can be identified for positive social evaluation and prediction. The signature should involve brain regions traditionally associated with value judgments (mPFC), emotional processing (amygdala, anterior cingulate cortex), and reward processing (mOFC, nucleus accumbens, caudate). Social prediction, compared to evaluation, may further engage regions involved in theory of mind such as the temporo-parietal junction (TPJ) (Dufour et al., 2013). Second, we hypothesize that expression of the positive evaluation signature will be stronger when evaluating individuals who are higher in closeness and popularity, as research has shown that they mediate neural activity in face-viewing tasks (Gobbini et al., 2004; Morelli et al., 2018).

CONTRIBUTION: We anticipate that this study will contribute to the understanding of the neural basis of social evaluation and prediction, and shed light on how real-world interpersonal factors such as closeness and popularity might influence these neural mechanisms.

P2-F-60 - Instrumental learning of traits versus rewards: Culture teaches us what to learn

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How does culture shape social reinforcement learning? Prior work found that when observing another's one-time behavior from a distance, independent cultures (e.g., North America) more readily attribute it to others' traits [vs. situations] compared to interdependent cultures (e.g., East Asia). Yet, whether culture shapes people's learning of others' traits over the course of repeated interactions with them has not been examined. We addressed this question by employing instrumental learning, wherein people directly interacted with targets multiple times to learn about target characteristics. In two studies, White Americans [WA] and Koreans [KR] (total N = 520) learned about different targets who repeatedly shared points with them from a given "point pool". The targets varied in generosity (the proportion of points shared) and the reward they produced (the actual number of points shared). Thus, even if a target was very generous and shared a large proportion of their point pool, this target might end up producing a small reward because of a limited pool. Similarly, even if a target was ungenerous and shared only a small proportion, this target might end up producing a large reward because of a large pool. Reinforcement learning models consistently showed that KR [vs. WA] learned less about target generosity and more about the reward they produced. In a new task with the same targets, KR [vs. WA] based their interaction styles less on the previously learned generosity but more on the task-specific features. These findings highlight the critical role of culture in shaping individuals' learning of others' traits and their subsequent application in new situations.

P2-F-61 - Shared memory representations in real-world social interactions

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In our daily lives, numerous social interactions shape shared memories among individuals, whether directly participating in the same social events or engaging in similar scenarios. The posterior medial cortex (PMC) has previously been identified as a crucial region for encoding and recalling shared memories arising from these events¹. These representations extend to schematic levels during the recollection of events with different yet analogous scenarios². However, understanding shared memory representations encounters challenges when considering the dynamic context of real-life social interactions involving different individuals. This study explores the level of abstraction in shared memory representations among participants who interacted together and those engaged in similar social scenarios with different individuals.

To facilitate natural social interactions, participants engaged in interactive social tasks in groups of three over three days. The initial day involved a behavioral session with real-world social interactions within each group, recorded by head-mounted

cameras. On the following day, participants recounted their experiences and viewed first-person perspective video replays in an fMRI scanner (3 Tesla, 3mm³ voxels, TR=1sec). Participants segmented events from their video transcripts and recalls on the third day. To investigate event representations shared within and across groups, we utilized the large language model SBERT3, generating semantic embeddings for events in the replays and recalls. Embedding similarities for different types of event pairs were computed: 1) recall-replay pairs within the same participants, 2) the same recall event pairs from participants within the same group, and 3) recall event pairs from participants across groups. We divided event pairs into high and low content similarity groups, comparing neural pattern similarities across them for each type of event pair.

Higher neural pattern similarities were found in the PMC for recall-replay pairs with high content similarity, indicating shared event representations across recall and replay within participants. Neural patterns in the PMC also showed increased similarity among the same group participants when recalling events with similar content. Notably, neural pattern similarities in the PMC, retrosplenial cortex, and angular gyrus were heightened for recall event pairs with high content similarity across participants from different groups. These results revealed abstract event representations shared among individuals who experienced analogous social events, transcending specific episodic details. This study explores the extent of shared memory representations through real-world social experiences, suggesting that both shared social experiences among the same individuals and abstract social event representations from similar scenarios, albeit in distinct idiosyncratic episodic experiences, are comparably represented within posterior medial regions.

P2-F-62 - 'Eye' can see your relationships: The neurocomputational mechanisms in social relationship perception

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Humans possess an impressive ability to understand social relationships. We can form a stable judgment even with a brief glance of people interacting. During this short period, individuals not only collect simple social features like intimacy but also engage in top-down social inference based on prior relational knowledge. An important unanswered question is how and why this intricate mental process affects the way people perceive human relationships. Here, we conducted 3 studies that aims to investigate the neurocomputational of basic social features and higher-level conceptual knowledge of individuals' perceptual processes. In the study 1 (N = 50), each participant completed four tasks while watching social images: free-viewing task, relationship judgment task, closeness and equality evaluating task. Eye-tracking data and relational knowledge data were also collected. The results demonstrate that both the social features and knowledge of human relationships impact individuals' perceptual patterns. The influence of social features on perception is automatic and intuitive, whereas knowledge affects perception only when individuals actively engage with it. In study 2 (N = 40), fMRI and eye-tracking data were collected simultaneously using a similar paradigm to study 1. Using representational similarity analysis (RSA), we demonstrate that the social brain network accurately represents relational features. The anterior temporal lobe (ATL) is identified as representing relational knowledge. The lateral occipital complex (LOC) characterizes perceptual patterns. Additionally, outcomes from information connectivity, psychophysiological interaction (PPI), and dynamic causal modeling (DCM) revealed that the influence of social features and knowledge on social perception stems from specific connections between various regions and visual cortices. Our conclusions were further corroborated through the decoding method using multivariate pattern analysis (MVPA). In study 3 (Autism Spectrum Disorder(ASD) N = 50, typically development N = 50), we employed a similar paradigm to study 1. We found 6-years-old children's perception of human relationships is already influenced by social features. This influence is modulated by the strength of children's social functioning, with children exhibiting weaker social functioning (ASD) demonstrating a weaker connection between social features and perception. In summary, our results offer insights into whether, how, and why social features and conceptual knowledge jointly shape perception. Past research focused on physical features, basic cognitive abilities (such as attention), or simple social attributes (like faces) influencing eye peception. Our study not only shows that social cognition in human relationships significantly influences perceptual patterns but also investigates its neurocomputational mechanisms, exploring associated developmental and pathological implications.

P2-F-63 - Prosocial Adaptation in Autism Spectrum Disorder

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BACKGROUND AND AIMS: Over the years, various theories have emerged to explain the social communication difficulties observed in Autism Spectrum Conditions (ASC). These difficulties have been linked to potential impairments in perspective taking, prosocial motivation, or cognitive flexibility. However, a few studies have quantitatively tested these hypotheses in live social interactions. Here we employ a computer-based communication game to examine how individuals, both with and without ASC, differ in their ability and readiness to adapt their communicative behavior based on inferred partner needs derived from stereotyped characteristics and from ongoing interactions.

METHODS: We enrolled 46 individuals with ASC (26 females) and 73 neurotypical controls (46 females) to participate in an online version of the Tacit Communication Game. Participants were tasked to inform their interaction partner about the location of an object on a digital game board, by moving a token. They interacted with partners presumed to be an adult and a child, unaware that a role-blind experimenter played both roles, differing only in the participants' perceived communicative needs. Our previous research using this task found that participants initially emphasized communicative aspects of their behavior more strongly when addressing the presumed child partner, by spending more time on the location where the object is located. This emphasis gradually balanced out over time as evidence accumulated against the presumption of differing understanding between the two partners (Koch et al., under review). We considered these stereotype- and interaction-driven communicative adjustments as measures of participants' prosocial adaptation.

RESULTS: Replicating previous findings, participants initially emphasized communicative aspects more with the presumed child partner ($p < .001$). Crucially, both ASC ($p = .001$) and control participants ($p = .003$) adjusted their behavior according to inferred partner needs from their characteristics, exhibiting comparable adjustments across both groups ($p = .944$). As the interaction progressed and evidence pointed toward a similar understanding between partners, these adjustments converged toward parity ($p = .011$). Notably, there were no significant group differences in their convergence toward the matched understanding of both partners ($p = .481$).

CONCLUSION: Our findings provide evidence that ASC individuals show equal motivation and adaptability in tailoring their communication to meet partners' needs, regardless of whether these needs are inferred from characteristics or ongoing communicative behavior. This highlights a societal concern: despite encountering challenges in daily interactions, individuals with ASC demonstrate an equal drive to engage socially within these interactions.

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P2-F-64 - Get out of my head: social evaluative brain states carry over into post-feedback rest and influence remembering how others view us

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BACKGROUND AND AIMS: Learning how others perceive us helps us tune our behavior to form adaptive relationships. But which perceptions stick with us? And when in the learning process are they codified in memory? A large body of research suggests new information is consolidated in memory during post-encoding rest, but it is not known whether this extends to self-relevant stimuli, such as social evaluative feedback. To address this, we aimed to 1) assess whether feedback inconsistent vs. consistent with our self-views is well-remembered compared to our views of others and 2) test whether and how this phenomenon plays out during post-encoding rest. We leveraged a popular television series – The Office – to answer these questions.

METHODS: Viewers of The Office 1) reported which characters they identified with and 2) underwent neuroimaging while finding out which characters other people thought they were like. Participants also observed another supposed participant receive consistent and inconsistent feedback. Resting state scans directly followed the self feedback and other feedback runs, respectively. Doing so allowed us to characterize the role of consistency in remembering feedback for the self (vs. other), as well as how the brain optimally commits this new information to memory during post-encoding rest. Directly after the scan, participants completed a surprise associative memory task.

We employed reinstatement analysis — a method that counts how many times templates (i.e., multivariate patterns of activity during encoding) are carried over into resting state scan — to assess whether people preferentially return to the state they were in when they encoded inconsistent feedback during post-encoding rest to help commit it to memory.

RESULTS: We found that feedback inconsistent with our own self-views is preserved in memory and this phenomenon occurs, at least in part, through neural processes during rest occurring after receiving the feedback. Specifically, brain states emerging in the dorsomedial prefrontal cortex (DMPFC) and to a lesser extent right anterior insula/inferior temporal gyrus (AI/IFG) while receiving self-inconsistent feedback are carried over into post-encoding rest. Moreover, greater right AI/IFG self-inconsistent reinstatements linearly predict better memory for self-inconsistent feedback, whereas self-inconsistent reinstatements within the DMPFC demonstrate a quadratic relationship with subsequent self-inconsistent memory, indicating reinstatements in these regions are functionally relevant to forming memories about the self.

CONCLUSIONS: In summary, we provide the first evidence that brain states involved in receiving self-inconsistent feedback are carried over into rest to facilitate learning what others think of us. These results are not only important for our basic science understanding of memory consolidation processes, but they also have mental health relevance given that rumination: 1) frequently occurs in response to social evaluation, 2) interferes with memory consolidation and 3) is associated with the DMPFC. The quadratic relationship between DMPFC pattern reinstatement and subsequent memory may better capture the kinds of post-event processing engaged in rumination than findings from prior consolidation paradigms using stimuli unrelated to participants' self-concept and social life.

ACKNOWLEDGEMENTS AND FUNDING: This work was supported by NIMH R01MH125406.

P2-G-65 - Examining the Effects of Real-World Experience on Lab-Based Scene Memory

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BACKGROUND AND AIMS: Boundary extension (BE) is as an error in scene memory, such that participants retrieve details beyond the given boundaries of a scene image. Boundary contraction (BC) is the opposite effect, whereby participants retrieve less context within the boundaries of a given scene image. In the BE literature, there is variability in the types of stimuli that are used, how BE is tested, and the proposed mechanisms underlying the phenomenon. Some research supports the view that BE reflects (re)construction of the scene from an internal representation that was formed, whereas other research supports the view that BE (and BC) emerge from image-based properties, including the number of central objects and whether an object is pictured in close range or from a wider angle. Assessing the effects of prior knowledge and experience of a scene on this bias can help disentangle the role of visual perception and scene construction. The current study tested the influence of familiarity on scene recognition through the comparison of lab-based encoding of images of pre-experimentally familiar (real-world) places with images of unfamiliar places.

METHODS: Participants viewed 40 scene images in a rapid serial presentation recognition task. Each image was presented twice, and participants were asked to compare the view of the initial and successive presentation of the same scene image. Participants used a continuous rating scale to indicate how they perceived the boundaries of a test image relative to a previously studied image and rated their familiarity with each scene.

RESULTS: There was a tendency for BC across both image conditions, with evidence of maintained, and an instance of greater, BC for familiar than unfamiliar scene images. **CONCLUSIONS:** The lack of evidence for increased BE with greater familiarity favours an image-based theoretical account of BE and BC. This supports the idea that visual properties of scene images do impact biases in scene memory. However, this study also shows that it is not visual properties alone that account for the bias, but rather that prior experience may interact with those visual properties. Understanding these biases requires consideration of the complex interplay between prior experience and stimulus properties.

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P2-G-67 - How Do Self-Referencing and Social Information Affect Associative Memory with Age?

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Associative memory, or the ability to remember relationships between two distinct pieces of information, declines with age. Although age-related changes to the prefrontal cortex and the medial temporal lobes may underlie poor associative memory, social framing may lessen memory deficits. Such effects could reflect the reliance on different neural circuits, which are less affected by aging, or the prioritization of social information in memory. Objective: Because older adults prioritize social information, and mnemonic benefits from referencing the self (as opposed to other-referencing) are maintained with age, it may be possible to reduce associative memory deficits by using self and social information. We investigated this question in the present study. Methods: We extended a recent study that compared the memory of healthy Taiwanese older and younger adults for object-scene pairs that contained varying levels of social information (none, low, and high) across self-referencing and other person-referencing encoding conditions. Because Taiwanese culture is collectivistic, endorsing an interdependent view of the self through which the self is defined by one's relationships with others, it is unclear whether these results will extend to an individualistic culture, which conceptualizes of the self as independent and distinct from others, perhaps making self-referencing more effective in individualistic cultures. The present study extends this memory paradigm to an American sample of healthy older (ages 63-81) and younger (ages 18-21) adults. Results: Contrary to our predictions, preliminary results suggest that self-referencing does not benefit American older adults' associative memory to the same extent as younger adults'. Furthermore, the benefits from self-referencing (relative to other-referencing) may not enhance associative memory as broadly for Americans, with the most salient effects for low social information but not high or non-social information. Future research will allow for direct comparisons with the Taiwanese, while evaluating the role of cognitive resources between groups. Conclusions: Although self-referencing and social information can enhance associative memory with age, those manipulations may vary in their effectiveness across cultures. Our work informs current frameworks on aging about how socio-cultural factors interact with the self to shape cognition.

P2-G-68 - Rewards Bias Self-Evaluations of Ability

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BACKGROUND AND AIMS: How do people learn about their own abilities? Often, the rewards they receive may hold information about their performance level. Yet, even when two people perform equivalently on a task, they may receive disparate rewards. In these cases, could rewards still influence self-evaluations of ability? The ventral striatum is a key area involved in reward processing and has also been shown to encode self-confidence in task performance (Rouault & Fleming, 2020). Given that reward and perceived accuracy can both serve as markers of success, and given that the same area in the brain encodes both reward information and estimates of one's own ability, it could be possible that rewards become conflated with expectations of success.

METHODS: In two behavioral experiments, we asked whether people feel more capable and confident when they receive larger rewards, even when they know how they performed objectively. Participants played perceptual games on which they received trial-by-trial accuracy feedback, and a staircase procedure held their objective performance constant. In a between-subjects design, participants were assigned to either a high or low reward condition, which varied the probability of receiving a token for a correct answer.

RESULTS: In Experiment 1 (N = 400), we find evidence that rewards bias overall self-evaluations of ability after the task, particularly estimations of objective accuracy. Next, in Experiment 2, we adapted models of reinforcement learning to fit participant's predictions of their own accuracy before each round of the game. Specifically, we compared a baseline model using only prior accuracy feedback against one that adds a reward bias on the learning rate and found that the latter model including this reward bias provided a better fit of participants' accuracy predictions.

CONCLUSIONS: These findings suggest that reward enhances how much people integrate accuracy feedback into their dynamic self-concept. More generally, this work contributes to our understanding of how rewards can shape learning about the self.

P2-H-69 - Influences of positive reinforcement on learned threat associations across development

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BACKGROUND AND AIMS: Anxiety in response to potential threats in one's environment can be adaptive; however, persistent fear responses are characteristic of anxiety disorders, which typically emerge during development. Popular treatments for anxiety disorders involve exposing individuals to threat-associated stimuli without the negative outcomes (extinction). Procedures that aim to modify negative associations using positive reinforcement (counterconditioning) have been underutilized, particularly in children and adolescents, for whom extinction-based therapies are often less effective. The few existing counterconditioning (CC) studies in human adults, and even fewer in children, indicate that this approach may be more effective than extinction (EXT) for reducing fear and strengthening memory. CC could be especially effective during adolescence when individuals demonstrate a heightened sensitivity to rewards. In this study, we examine (1) how CC versus EXT modify learned threat associations throughout adolescence, and (2) how these learning processes modulate memory formation across development.

METHODS: Participants ages 10-25 will undergo a two-day category conditioning experiment. Participants will engage in Pavlovian threat learning with images from three object categories. During a conditioning phase, stimuli from two object categories are paired with an aversive sound while the third category is not associated with any sound. Participants will then undergo EXT, where one of the conditioned categories is presented in absence of a sound, and CC, where the other conditioned category is paired with an appetitive sound. Twenty-four hours later, participants complete a surprise recognition memory test including old images from Day 1, similar images, and new images. Skin conductance (SCR) and heart-rate variability (HRV) will be collected during Day 1 and threat recovery to measure physiological arousal as an index of learning. Mixed-effects models will be used to investigate potential differences in learning and memory measures as a function of stimulus type, phase of learning, and age.

EXPECTED RESULTS: We predict that CC will be more effective than EXT at reducing threat associations across all ages. Moreover, we anticipate observing the most significant effect during adolescence, as compared to childhood and adulthood. Consistent with the learning outcomes, we expect enhanced memory for CC over EXT. However, while we expect similar memory patterns in children and adults, adolescents might show better memory for stimuli from CC.

CONCLUSIONS: The threat learning and memory mechanisms examined in this study have potential implications for the treatment and prevention of anxiety disorders in children and adolescents. By understanding how CC and EXT affect threat learning and memory formation across development, interventions can better account for age-related differences in these mechanisms to effectively reduce fear responses.

P2-H-70 - Identifying the computational signatures of BPD and PTSD in social trust learning and appraisal.

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Knowing, evaluating, and reevaluating who is trustworthy is an essential social cognitive capacity in humans and its impairment can have devastating consequences. Two mental health disorders with partially overlapping features that exhibit impairments in trustworthiness appraisal are Borderline Personality Disorder (BPD) and Post-Traumatic Stress Disorder (PTSD). Both are high-risk disorders associated with severe functional impairments and high rates of suicide. Most previous work on trustworthiness appraisal in BPD and PTSD has focused on static, one-time judgments. However, evaluating others' trustworthiness is a dynamic process that involves incorporating new information and adjusting our predictions. Model-based analysis of learning and decision-making (LDM) tasks can facilitate the decomposition of complex behaviors into their component processes. We investigated whether specific impairments of social LDM may be reliably associated with features of BPD and PTSD.

Across 2 blocks, participants ($n = 418$; recruited via prolific; 203m, 211f, 4o; aged 18-52) learned about the trustworthiness of partners in a multishot trust game. Each round, participants saw a picture of their current partner (neutral expression) and decided how many points (1-5; self-paced) to send to their partner. The amount they sent quadrupled in value (i.e., 2 points sent \rightarrow 8 points received). Participants then saw whether their partner "shared" back half of the proceeds or "kept" it all for themselves. There were 22 interactions per partner (66 rounds per block), each partner varied in their share/keep response contingencies (% share = 80%, 65%,

35%, and 20%), and those contingencies shifted once (by bias towards share/keep, level of certainty, or both; i.e. 35% \rightarrow 80%) between rounds 8 and 14 (random; uniformly distributed). Participants played six partners with distinct response contingency profiles. To incentivize participants, earned points served as raffle tickets for a \$50 bonus. In a computationally-matched control condition, participants learned the win/loss rates of six lotteries. We also assessed BPD (Structured Clinical Interview for DSM-IV Axis II Personality Disorders; SCID-II) and PTSD (PTSD Checklist for DSM-5; PCL-5) feature severity, as well as other dimensions of psychological functioning.

The data are collected and their quality has been assessed, but no hypotheses have been tested. Preliminary confirmatory analyses will test whether learning rates are greater than chance and are higher in the partner (vs. lottery) condition.

We hypothesize that 1) initial trust game offers will have a negative relationship with BPD severity and a positive relationship with PTSD severity, and 2) both BPD and PTSD severity will have a negative relationship with partner learning rates. Additional analyses will examine biases in outcome weighting. These data will inform diagnosis, treatment, and basic research studies of social cognition deficits in BPD and PTSD.

P2-H-71 - The Memory Remains: Effect of Monetary and Social Reward on Retroactive Enhancement of Memory

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Retroactive memory enhancement (RME) occurs when previously seemingly irrelevant memories are enhanced later due to strong stimulation, such as a salient event (e.g., rewards). While there has been an increase in the number of studies examining RME, the findings have been largely mixed. The mixed findings from previous studies make it difficult to delineate the conditions in which RME might be elicited. Delineating the conditions under which RME occurs will allow for a clearer understanding of memory processes.

This study examined the influence of extrinsic (monetary and social) and intrinsic rewards on RME. Participants (N = 104) were randomly assigned to one of the three reward conditions and viewed 144 images of animals and tools across three phases, with unique sets of 24 animals and 24 tools in each phase. In phase 1, participants categorized images as animals or tools. Phase 2 introduced the rewards in an operant conditioning paradigm. After viewing an image, participants were presented with the target and a foil. When participants correctly identified the image, they were presented with a monetary reward, social reward, or feedback cue for intrinsic reward. Phase 3 was similar to Phase 1. At the end of Phase 3, participants rated the pleasantness of the reward. Participants returned to the lab 24 hours later for a recognition test to identify images they saw the previous day out of a pool of 240 images.

A one-way ANOVA indicated no significant difference between mean reward ratings across all three conditions [$F(2,101) = 2.50$, $p = .088$, $\eta^2 = .047$]. There was a significant main effect of phase [$F(2,210) = 148.02$, $p > .001$, $\eta^2 = .59$] but no phase x condition interaction effect [$F(4,210) = .89$, $p = .47$, $\eta^2 = .02$]. There was, however, a significant main effect of reward [$F(2,105) = 5.36$, $p = .006$, $\eta^2 = .09$]. Simple main effects analysis revealed that recall was significantly higher in monetary and social reward conditions ($ps < .05$) than intrinsic reward condition for all three phases. There was, however, no significant difference in recall between monetary and social reward conditions for all three phases ($ps > .05$). The significant difference in recall between extrinsic reward conditions and intrinsic reward condition in Phase 1 indicates that RME was elicited in at least the monetary and social reward conditions.

The findings of this study illustrate a pattern of recall across reward types before, during, and after a reward was presented. Our findings suggest that monetary and social rewards exert a similar influence on memory. More importantly, both monetary and social rewards are salient enough to elicit RME in an operant conditioning paradigm. Our findings contribute to the extant literature in clarifying the conditions under which RME might be elicited.

P2-I-72 - Investigating the neural mechanisms underlying positive autobiographical memory retrieval across adolescence

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BACKGROUND/AIMS: Recalling salient autobiographical memories (AM) can inform future behavior and impact wellbeing across the lifespan¹. Recent studies in adults found that recalling positive AM, as compared to neutral AM, elicited positive emotion and increased activation in brain regions implicated in reward and emotion processing (e.g., ventral striatum (VS), insula, medial prefrontal cortex (mPFC)). These findings suggest that positive AM are rewarding stimuli²⁻⁴. Substantial research indicates that adolescents are highly reward sensitive, likely due to developmental changes in reward-related brain circuitry⁵. Although developmental studies have not specifically examined neural correlates of positive AM recall, AM recall has been investigated more broadly. Increased functional connectivity of default mode network (DMN) brain areas (e.g., mPFC) associated with self-reflection and intrinsic valuation has been observed in adults relative to children during AM recall.⁶ Developmental changes in brain function associated with both reward processing and AM retrieval between childhood and adulthood suggest that there may also be developmental differences in the neural mechanisms underlying positive AM retrieval. The present study will investigate these mechanisms across adolescence.

METHODS: Participants ages 10-25 (N = 120 planned) will complete a cued positive memory recall task during an fMRI scan². Participants are asked to identify 24 words from a list of 40 possible cues that pertain to a distinct, positive AM. Participants describe the memory and then rate their positive feelings (1-4; 1 = not good nor bad; 4 = very good) and intensity (1-4; 1 = not strong; 4 = very strong) for each memory. During the scan, they are shown each cue word for 10 secs and instructed to recall the associated AM as clearly as possible.

PROPOSED ANALYSIS: We will assess age-related differences in neural activations during positive AM retrieval and include each memory's intensity ratings as a parametric modulator. We predict to observe increased activation in the VS, insula, and DMN cortical regions, including mPFC, across all ages. We will also perform a functional connectivity analysis seeded in an a priori defined mPFC region of interest to examine changes in functional connectivity as a function of AM intensity and age. We hypothesize that greater intensity of positive feelings for discrete AMs will modulate increases in functional connectivity between mPFC and reward-related circuitries in children and adults. In adolescents, we predict strength of connectivity will be independent of rating intensity, reflecting increased sensitivity to reward and emotion elicited during the task.

CONCLUSION: This study builds on our understanding of neural and behavioral changes in reward sensitivity during adolescence to investigate how potential intrinsic reward value linked to positive AM influences brain function.

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P2-I-73 - Autobiographical memory in children: the role of hippocampal subfields

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Additional Information: This poster submission falls under the “pre-registration” category. Given I do not have any results or conclusions at this moment, I listed our planned analyses under the “RESULTS” section, and the general implications under “CONCLUSIONS”.

BACKGROUND AND AIMS: The development of autobiographical memory is critical to the formation of a self-identity as it allows individuals to establish a narrative of their life experiences. The hippocampus is known to play a central role in episodic memory, including the recall of autobiographical memories. However, there is disagreement regarding which hippocampal subfields are the most essential to autobiographical memory. In adults, the posterior CA3 and DG are suspected to play critical roles in the retention of remote memories (Bonnici et al., 2013). In accord with this idea, Palombo et al. (2017) found that dentate gyrus (DG), cornu ammonis 2 (CA2), and CA3 volume correlate with individual differences in autobiographical memory. However, Berry, Clark and Maguire (2020) found that only greater pre/parasubiculum volume was linked to enhanced memory persistence. Whether this is true in young children isn't known. Although there is work linking CA1, CA2/CA3 and DG volume to more traditional episodic memory tasks in children as young as 8 (Christian et al., 2013; Lee, Ekstrom, and Ghetti, 2014), to our knowledge, this line of work has not been extended to the recall of autobiographical content.

METHODS: The current study addresses the potential connection of hippocampal subfields to autobiographical memory in a sample of 57 typically developing children, ages 4 – 7 years. Children were asked to reminisce about particular life events that were rated by parents for their accuracy. We transcribed these events and used them to assess autobiographical recall. Hippocampal subfield volumes were calculated through a manual tracing protocol on T2 images, designed for developmental samples.

RESULTS: In our data analysis, total autobiographical details and recall accuracy will be correlated with hippocampal subfield volume, controlling for verbal intelligence and age.

CONCLUSIONS: We believe that this study provides a unique developmental perspective to the ongoing discussion of how different regions of the hippocampus mediate autobiographical memory.

ACKNOWLEDGEMENTS AND FUNDING: This project is part of an R01-funded study on the development of episodic memory at Temple University. Grant Number: 361689. Grant Name: Mapping the Development of Episodic Memory

P2-I-74 - Subtyping Environmental and Neurobiological Risk and Resilience Factors of Parental Mental Health During the Perinatal Period

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BACKGROUND AND AIMS: Transition into parenthood introduces profound changes in the birthing parent's brain. Despite the pivotal impact of the perinatal period on caregiving behaviors and the development of the offspring, research on the risk and resilience factors influencing maternal mental health on the parental brain remains limited. Given the increased experience-dependent neuroplasticity during this period, we aim to investigate environmental and neurobiological factors related to postpartum parental mental health.

METHODS: We hypothesize that parents at risk for postpartum depression or anxiety, compared to those who are not, are characterized by differences in environmental risks and neurobiological indicators. These group differences will be identified using a data clustering method, Similarity Network Fusion (SNF). We plan to analyze data from 1) survey responses on life stressors and overall risks, 2) regional gray matter volume, and 3) functional connectivity maps. Based on prior work, we expect to identify clusters that are differentiated based on the characteristics of the neural circuits that support functions associated with threat detection, socio-emotional processing, and parental motivation. To test these hypotheses, we will leverage a recently completed longitudinal dataset that includes comprehensive behavioral measures and multimodal neuroimaging scans acquired at 1-month postpartum.

ANALYSIS PLAN: We will conduct data clustering with the SNFtool R package to identify group differences in postpartum mental health outcomes, using accumulated environmental risk factor survey responses and neuroimaging metrics as inputs. Survey measures include environmental, psychological, and pregnancy-specific risks. Gray matter volume data will be analyzed using Freesurfer outputs. Whole-brain functional connectivity patterns will be extracted from an adult-face task fMRI paradigm. These three data types will be integrated into clustering. Clustering solutions will be evaluated using the silhouette scores and relative contributions of items in each data type will be estimated using normalized mutual information feature. Finally, differences between subgroups will be examined via appropriate statistical tests according to the characteristics of the data.

SIGNIFICANCE: As the perinatal period is both a window of vulnerability and opportunity, it is important to understand the environmental determinants and neurobiological bases of the parents' mental health outcomes. By profiling risk and resilience factors in this critical phase in life, we expect to gain insights for informing clinical interventions and social policies for creating a more protective early environment for both the parent and their offspring.

ACKNOWLEDGEMENTS AND FUNDING: This research was supported by the National Institutes of Health [R01HD090068; R21DA046556], NARSAD Independent Investigator Grant, and the National Research Foundation of Korea (NRF-2021R1F1A1045988).

P2-I-75 - Adolescent attention to their caregiver and friend

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BACKGROUND: With puberty, adolescents undergo a 'social re-orientation', during which adolescents will spend more time with their friends than their caregivers. This motivational and behavioural shift in adolescents' social re-orientation is thought to be modulated by puberty and is hypothesized to enhance the salience of peer social cues. Attending to social cues is the first step of processing social information, whereby attention is directed towards salient aspects of the environment. Although there is some evidence that peers become more salient than caregivers during adolescence, it is unknown whether puberty shifts attentional bias towards friends over caregivers.

AIMS: This study investigates whether friends or caregivers elicit greater attentional biases from 12- to 15-year-old adolescents. Additionally, we are interested in whether puberty moderates attentional bias between friends and caregivers. We expect that friends will elicit more attentional bias (indexed by looking patterns on eye-tracking) than caregivers, particularly at the later stages of puberty.

METHODS: 14 adolescents (64% female; ages 12-15, mean age = 13.2) were recruited for the study, with one of their friends and caregivers. We collected standardized pictures of the adolescent's friend and caregiver during their lab visit. We incorporated those pictures into a visual dot probe task, where the adolescent was exposed to paired images of their caregiver and friend's faces for 650ms. One of the images was replaced by a 1000ms probe, which adolescents were asked to locate (left or right, using keyboard). Using an eye-tracking device, we measured how long the adolescent held their gaze towards pictures of their caregiver's face versus their friend's face ('proportion of gaze'). Additionally, participants completed the Pubertal Development Scale questionnaire to assess their puberty level. A linear mixed-effects model examined the effect of relationship type (friend vs. caregiver) and puberty level on proportion of gaze.

RESULTS: There was a significant main effect of relationship type on proportion of gaze ($p = .005$), as adolescents held attention towards their friend ($M = 0.362$) for longer than they held attention towards their caregiver ($M = 0.306$), see fig. 1. We did not find a significant main effect of puberty status, nor interaction with relationship type, on proportion of gaze ($p = .754$).

CONCLUSION: Adolescents held their attention towards their friend for longer than their caregiver. Although, we did not find an interaction between puberty and relationship type on attention patterns, we still find support for friends being more salient during adolescence. Identifying what an adolescent finds important when encoding social information is important for understanding the next steps of social information processing, including the interpretation of social cues and the enactment of social behavior.

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P2-J-76 - Empathy as a predictor of neural sensitivity to fearful facial affect in preadolescent Latina youth

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BACKGROUND: Reduced affective empathy for others' distress in childhood is a known vulnerability factor for adolescent conduct problems (Blair et al., 2018). Functional magnetic resonance imaging (fMRI) investigations have revealed blunted amygdala activation in response to fearful faces (Marsh et al., 2008; Sebastian et al., 2021), suggesting dysfunction in neural regions engaged in emotion responsivity. However, much of this work has been conducted in predominantly white treatment-seeking boys. Whether observed associations extend to more ethnically diverse community-based populations

longitudinally is unknown. The current study therefore tests whether empathy predicts amygdala responsivity to fearful faces in a preadolescent Latina community sample.

METHODS: While undergoing an fMRI scan, 48 predominantly Mexican-identifying Latina girls ($M_{Age}=9.91$, $SD=1.75$) completed an implicit emotion processing task, during which they labeled the gender of fearful face stimuli at neutral, 30%, 54%, and 78% emotion intensities (Blair et al., 2001). Hemodynamic responding in bilateral amygdala was calculated for each participant and emotion intensity. Following the scan, participants self-reported their empathy via the Empathy Questionnaire for Children and Adolescents (Overgaauw et al., 2017). Approximately one year later, behavioral measures of empathy were assessed in a subset of participants who reported their perceived distress of an unknown, ostensibly suffering peer using a picture-based scale (Mullins et al., 2023).

RESULTS: First, an unconditional linear mixed effects model revealed amygdala response to fear linearly scaled with escalating fear intensity ($\beta=0.018$, $t(47)=2.043$, $p=0.047$), controlling for age. Next, a conditional linear mixed effects model tested self-reported empathy as a predictor of amygdala responsivity to fear, revealing a marginally significant interaction between fear intensity and empathy ($\beta=0.005$, $t(47)=1.974$, $p=0.054$). Whereas children higher in empathy exhibited linear increases in amygdala reactivity proportional to fear intensity, children lower in empathy exhibited heightened responsivity to all faces, suggesting possible disruptions in fear intensity-modulated responding. Finally, individual fixed effect coefficients extracted from the unconditional linear model were tested as longitudinal predictors of participants' behavioral empathy toward the distress of an unknown peer. Here, higher average baseline amygdala responsivity predicted reduced perceived distress one year later ($\beta=-0.507$, $t(29)=-2.432$, $p=0.022$).

CONCLUSIONS: The current findings extend work on neurological correlates of reduced empathy in previously studied youth to include community-based Latina youth using a longitudinal design and multiple measures of empathy. Characterizing traits

associated with amygdala functioning across healthy and subclinical samples provides a more complete understanding of vulnerability factors for conduct problems in youth.

P2-J-77 - Identifying direct subcortical pathways of the amygdala within the human auditory system using diffusion weighted imaging tractography

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BACKGROUND AND AIMS: Quick and efficient detection of threats is critical for survival. To serve this ability, a visual subcortical pathway, is believed to function in humans as a shortcut to the amygdala (a key structure for threat detection), with direct neural projections from the retina, superior colliculus and the pulvinar of the thalamus. Similarly, evidence from non-human animals suggests the existence of a homologous subcortical pathway in audition, but this pathway remains unknown in humans.

METHODS: To address this question, we applied probabilistic streamline tractography and Fixel Based Analysis to diffusion-weighted images (200 participants) obtained from the Human Connectome Project and reconstructed candidate auditory subcortical pathways, involving direct projections either from the medial geniculate body or the auditory-audiovisual pulvinar of the thalamus to the amygdala. We correlated their metrics (number of streamlines and fiber density) with behavioral data available. Similarly, we examined the existence of an additional subcortical pathway from the amygdala to the inferior colliculus, previously only described in bats. The number of streamlines of all reconstructed pathways was compared to the number of streamlines produced by a Null Distribution algorithm used to examine the stochasticity of the results.

RESULTS: Our findings suggest the existence of white matter tracks directly projecting to the amygdala from the medial geniculate body of the thalamus and the auditory and audiovisual portions of the pulvinar (i.e. anterior and medial) showing left-right asymmetries, with p -values < 0.001 . Left-right asymmetry was also present in the amygdala to inferior colliculus pathway (p -value < 0.001). Interestingly, individuals with greater fiber density in these pathways show a better hearing ability in noise with $r = -0.191$ and $r = -0.202$ for left and right medial geniculate body to amygdala respectively, $r = -0.167$ and $r = -0.142$ for left and right auditory-audiovisual pulvinar to amygdala respectively. Additionally, a higher number of streamlines correlated with stronger feelings of fear and anxiety in the left medial geniculate body to amygdala pathway with $r = 0.203$. All reconstructed pathways were significantly different from the Null Distribution algorithm results (p -values < 0.001), except for the right amygdala to inferior colliculus pathway.

CONCLUSIONS: These results provide sufficient evidence for the existence of a human auditory subcortical pathway for fast threat detection that may be homologous to that in the visual system. Finally, our evidence may suggest the existence of a subcortical pathway connecting the amygdala with the inferior colliculus, for the first time in humans, which may also impose emotional content into sensory stimulus processing.

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P2-J-78 - The Emotional Qualities of Intergenerational Memory Transmission

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Intergenerational transmission is the persistence of characteristics such as memories, experiences, and psychopathology in successive generations. Past research has probed the nature of memory transmission for public events, knowledge, etc., often within parent-child dyads. Although the events examined are often highly salient, the emotional qualities of these event memories are typically not investigated. These emotional qualities may be especially important for transmission during adolescence, when individuals show heightened sensitivity to emotional information and are establishing independence from their caregivers. Moreover, prior research has found that children's knowledge of family stories is related to emotional wellbeing, which in turn influences memory for the past and guides future decision-making.

The current research examines transmission of highly emotional personal memories in parent-teen dyads, focusing on how the key dimensions (i.e., valence, arousal) of emotional memories may influence memory transmission. Healthy parent-teen dyads with teens aged 13-18 ($n = 90$ planned) are completing an online study. Parents are presented with 20 event cues and asked to briefly describe highly emotional personal memories associated with these event cues that are well-known to their teens. Then, parents complete a modified Autobiographical Memory Questionnaire to rate the mnemonic and emotional properties of each event memory. They also rate their parent-child interactions, motivation to share event memories, and perceived social desirability of each event, and complete dimensional measures of depression and anxiety. After, the teen completes the same narrative reports and questionnaires about their parent's memories.

We predict that higher memory emotionality and greater parent-teen emotion concordance will be associated with higher fidelity memory transmission. We also predict that better emotional memory transmission is related to lower psychopathology scores in teens. To test these predictions, we will assess memory concordance across parent and teen recollections of the parent's emotional memories in two ways. Memory concordance will be calculated subjectively—as the difference of parent and teen composite scores of self-reported vividness and distinctiveness of the memories—and objectively—based on the semantic similarity of parent and teen memory descriptions. Using regressions and mixed-effects models, we will examine relations between these emotional and memory concordance measures and whether emotional memory transmission varies by valence (positive or negative). Additionally, we will test the extent to which the transmission of emotional memories relates to indices

of trait anxiety and depression in teens. This inquiry of the emotional aspects of transmitted memories may help us better understand how intergenerational transmission of emotional memories contributes to wellbeing and healthy development.

P2-J-79 - The neurobiology of emotion perception during language comprehension using naturalistic stimuli.

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INTRODUCTION: Emotion perception is an integral process for successful communication. We have a neurobiological understanding of how emotions portrayed through emotional prosody, facial expressions, and words are perceived in isolation, but we do not know much about how the brain uses these sources of information together in tandem. This study aims to better understand the underlying mechanisms for verbal emotion processing from the extraction and interpretation of cues to predicting upcoming information and how this could be modulated by the number and type of informative emotional cues. After all, not all cues are equally informative during any given verbal sentence (e.g., emotional words with an expressive face and flat prosody).

HYPOTHESES: We hypothesise that a distributed set of brain regions are dynamically engaged to process different emotional cues. We hypothesise that when one emotional cue is more informative (e.g., prosody), the perceiver may rely on prior memories and knowledge to interpret the emotion displayed resulting in increased activity in the amygdala and temporoparietal junction. Furthermore, the associated sensorimotor region (e.g., auditory region) would be relatively engaged in extracting the cue. Whereas, when processing multiple informative emotional cues (e.g., emotional faces, prosody, and semantics), this would result in a general reduction in sensorimotor regions as the intended input can be more accurately predicted by the emotions displayed. We hypothesise that activity in the dorsolateral prefrontal cortex and precuneus is modulated by the number of informative cues.

METHODS: Thirty-eight healthy adult participants watched '500 Days of Summer' or 'Citizenfour' during fMRI. A separate set of participants rated sentences from these movies on arousal and valence for the video with the audio removed ('face'), an audio-only version with flat prosody ('semantics'), and a low-pass filtered incomprehensible version ('prosody'). Based on the ratings, sentences were grouped into eight categories for arousal and valence independently, where each cue was considered either emotionally informative or neutral (e.g., 'emo-prosody, neutral-face, neutral-semantics' compared to 'emo-prosody, emo-face, emo-semantics'). We will use a general linear model, where each sentence category was convolved with a hemodynamic response function modulated by duration. A linear mixed effects model will be used to examine group-level effects.

IMPLICATIONS: Based on our predicted results, it should be consistent with a model of emotional language processing in which a distributed set of brain regions is dynamically engaged. These results will provide a neurobiological framework for understanding the processing of emotion perception during language comprehension as it naturally occurs, i.e., in situations where multiple contextual cues can aid in interpretation.

P2-K-80 - Functional Connectivity Patterns Reveal A Role for Interoceptive Processing in the Representation of Emotion Concepts

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Conceptual knowledge about emotions is inherently associated with sensation, particularly interoceptive signals regarding physiological states (e.g. high heart rate, accelerated breathing). It is unknown whether and to what extent individual differences in the ability to sense and interpret these interoceptive signals affect the long-term representations of emotion concepts. To test whether participant-specific semantic memory structure for emotion concepts is mediated by interoceptive sensibility, we administered an established version of a semantic relatedness judgment task using novel stimuli (i.e., emotion concepts) and constructed semantic networks based on the participant-specific relatedness judgment ratings. These semantic networks were statistically tested for differences based on participants' interoceptive sensibility as assessed by a self-report scale. We also obtained functional magnetic resonance imaging data as participants performed the relatedness judgments, allowing us to assess how patterns of functional connectivity may mediate differences in the emotion-specific semantic network structure. In line with increasing evidence for a constructionist approach to emotion, our results provide tentative evidence that emotion concepts exhibit some modality-specificity in their grounding, as participants draw on the same neural resources used to process interoceptive signals to access and evaluate generalized knowledge about emotions.

P2-L-81 - Differences in Oxytocin Response to Helping as a Function of Cultural Orientation and Helping Target

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BACKGROUND AND AIMS: Previous research has indicated that an individual's perception of fitness interdependence with others can induce oxytocin release, which further motivates prosocial behavior (Brown & Brown, 2015). Also, collectivism, which values interdependence with others (Markus & Kitayama, 1991), has been shown to predict prosocial behavior (Lampridis & Papastilianou, 2017; Marti-Vilar et al., 2019). We examined whether collectivism might also be related to oxytocin by testing whether it moderates the effect of relationship closeness on the oxytocin response to helping (Brown et al., 2023). This is important because oxytocin has a stress-coping function, which is a possible explanation for the health benefits of prosocial behavior (Carter et al., 2020). We predicted that the oxytocin response for individuals high in collectivism would not differ between helping a stranger and helping a close partner; but that individuals who were low in collectivism would show a stronger oxytocin response associated with helping a close partner compared to helping a stranger.

METHODS: We randomly assigned 39 young adult females to help a stranger (N = 16) or a close partner (N = 23). Participants completed the Self-Construal Scale (Singelis, 1994) a week before the experiment to measure their levels of collectivism. On the day of the experiment, participants in the helping a close partner condition completed a closeness induction task (Aron et al., 1997) with a female confederate. Then, participants in both conditions completed a helping task (Posner, 1980). Participants provided blood samples right before the helping task (T1) and right after the helping task (T2) for oxytocin analyses.

RESULTS: We performed a median split to make levels of collectivism a categorical variable (low vs. high). We ran a three-way mixed repeated measures ANOVA to test the hypothesis. Interestingly, among people with low levels of collectivism, oxytocin levels decreased significantly from T1 to T2 in helping a stranger condition, but oxytocin levels did not change significantly from T1 to T2 in helping a close partner condition (see Figure 1). By contrast, among people with high levels of collectivism, oxytocin levels did not change significantly from T1 to T2 in either helping a stranger condition or helping a close partner condition (see Figure 2), consistent with our prediction that individuals high in collectivism would not distinguish between helping a stranger and helping a close partner. The three-way interaction was marginally significant, $p = .051$.

CONCLUSIONS: The results from this study suggest that the health benefits a person could receive from helping behavior is dependent upon cultural and social contexts. **ACKNOWLEDGEMENTS AND FUNDING:** NSF Grant (#0820609) to Stephanie Brown.

P2-L-82 - Cognitive and Social Factors Shape Intentions to Take Action Against Climate Change

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BACKGROUND AND AIMS: What motivates individuals to engage in individual or collective actions to address climate change? In two studies, we investigated the cognitive and social factors that predict climate-related behavioral intentions.

METHODS: In Study 1, 60 participants identified actions to address climate change that they believed to be impactful, feasible, or socially-desirable. Participants tended to generate relatively ineffective actions (e.g., recycling), rarely generating ideas that experts have identified as more effective (e.g., voting, driving less, flying less). Expanding on these qualitative findings, in Study 2, we recruited 300 participants across the adult lifespan to rate 25 actions on several dimensions (e.g., intentions, ease, capability, impact, social approval) informed by the Theory of Planned Behavior. We compared perceived impact (in terms of climate change mitigation) of each action with objective impact (estimated reduction of greenhouse gas emissions).

RESULTS: Perceived impact was positively correlated with objective impact, but participants substantially overestimated the impact of reduce-reuse-recycle actions and underestimated the impact of actions related to transportation and green energy. Importantly, perceived impact was a stronger predictor of behavioral intentions than ratings of ease, capability, or social desirability, highlighting the critical role of correcting these misperceptions. We also examined beliefs about prosocial collective actions to mitigate climate change, including voting, petition-signing, volunteering, and donating. Participants associated all of these actions with moderately-high social approval, but voting and petition-signing were associated with higher ratings for ease, capability, and personal impact (benefits – costs). Lastly, we explored intentions to discuss climate change with close others; participants reported intending to discuss climate change with family, friends, neighbors, and peers more frequently in the future, particularly neighbors and peers.

CONCLUSIONS: Overall, we identified several promising targets for interventions to motivate climate action. Our results reveal that perceived impact is miscalibrated, yet predicts behavioral intentions. Furthermore, our results suggest that individuals are willing to vote, sign petitions, and talk to close others about climate change more frequently. In ongoing work, we are testing interventions to correct misperceptions of impact and promote these collective actions (e.g., by engaging neural systems for episodic simulation and learning from prediction error).

P2-L-83 - Shared Hearts and Minds: Physiological Synchrony During Empathy

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BACKGROUND AND AIMS: Empathy is a multidimensional construct that includes changes in cognitive, affective, and physiological processes. However, compared to cognitive and affective sharing, physiological sharing as a component of empathy has received comparatively less empirical attention. Here, we examined physiological synchrony and the moderating effect of empathy within the sympathetic and parasympathetic branches of the autonomic nervous system during an empathy-inducing task.

METHODS: We recruited N = 111 romantic couples to a lab study. Each member of the couple was assigned a role as either a discloser of suffering, where they shared a time in which they suffered or were upset or in distress, or a responder, where they provided support. Couples engaged in a structured 6-minute back-and-forth discussion, then switched roles so the other person could share their suffering. Throughout the study, we measured vagal activity, a parasympathetic measure; skin conductance, a sympathetic measure; and interbeat interval, innervated by both parasympathetic and sympathetic systems. We probed for synchrony using multi-level statistical modelling techniques.

RESULTS: We found evidence of synchrony of IBI and SCL reactivities, though the former was only the case when women disclosed their suffering. We found no evidence for synchrony of RSA reactivity. Physiological synchrony was not consistently associated with other well-established trait and state measures of empathy.

CONCLUSIONS: We offer initial support that physiological synchrony of certain measures may contribute to the broader construct of empathy. In line with past work (Murphy & Lilienfeld, 2019), we found no robust associations between our

self-report and performance-based measures of empathy, supporting concerns about the face validity of established measures of empathy (Hall & Schwartz, 2019). In conclusion, our results highlight the importance of studying physiological synchrony during empathy and offers insights into the complexities of conceptualizing and measuring the important, but broad, construct of empathy.

ACKNOWLEDGEMENTS & FUNDING: This work was supported by the Social Sciences and Humanities Research Council (#503200) and Canada Foundation for Innovation (#502426).

P2-O-84 - How interactions unfold: Detecting patterns in natural social behaviour

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Humans are expert social communicators, decoding and exchanging social cues rapidly and reliably over the course of their interactions. However, because of the diversity of people's behavioural repertoires, natural patterns in social behavioural exchange are difficult to identify unless these behaviours are highly similar, as in behavioural mimicry. Here, we apply an analysis model that treats social behaviour as a Markov process, in which the probability of any social behaviour is conditionally dependent on the preceding action of the social partner. This allows us to characterize social behaviour in terms of a matrix of transition probabilities – given that a social partner has done action X, the probability that a target will do action X, Y, or Z can be calculated. We apply this analysis on a set of naturalistic round-robin social interactions involving 258 participants in 40 groups. Within each group, participants completed dyadic interactions with all other group members in which they discussed both general topics (e.g., interest in sports, social media) and politically oriented topics (e.g., climate change, the role of women in government). They completed a short questionnaire after each interaction in which they rated liking of and similarity to that social partner along with their conversation quality. Interactions were video-recorded, and we used Noldus FaceReader 9.1 to decode facial behaviour on a frame-by-frame basis. We present data on the stability of natural behaviour patterns within participants over time and across different social partners. We also identify reliable patterns of behaviour across participants and link these to conversation ratings to make inferences about how participants themselves interpret the social behaviours they experience.

P2-P-85 - Artificial empathy: how we perceive empathic responses thought to be generated by humans vs AI

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BACKGROUND AND AIMS: AI-generated empathy is convincing and well received until recipients realize it is artificial. We test and try to explain this phenomenon by examining the three subcomponents of human empathy – cognitive, affective and motivational, and the gaps between each of them and AI, from the perspective of the empathy recipient.

METHODS: In a line of five studies (N = 3,710), we examined the perception of empathy thought to be generated by AI versus by humans, by controlling whether recipients thought the response was written by an AI or a human, while all responses were written by AI (Studies 1 and 2). We further examined how this affects the desire to keep conversing with the respondent and how much the response helped. We examined whether these differences are due to stressing different aspects of the empathic response (understanding, feeling with, caring; Study 3). Lastly, we measured how much people are willing to wait in order to have a clinical psychologist in-training respond to (Study 4), or even just read (Study 5) their emotional experience (compared to an immediate response from an empathic AI; in these studies a real psychologist in-training responded / just read).

RESULTS: Although responses were generated identically, participants viewed the response as more empathic when they believed the respondent was human versus AI. This effect was modified by what subcomponent of empathy was stressed, such that AI responses were perceived as less emotional or caring. Human responses were also perceived as more helpful, and participants wanted to converse with these respondents more. 40% of participants were willing to wait up to two years to receive a response from a clinician in training, with the most common reason being thinking that humans could understand their emotional state better than AI.

CONCLUSIONS: These findings suggest that empathy thought to be from a human source is valued more, perhaps due to our need for empathic care, and to humans' ability to relate to and feel the other's emotional state. As AI reshapes many aspects of life, empathy may persist as an area that is consistently cherished more in its human form. Implications for society, for technology and for social and affective neuroscience research will be discussed.

SANS Conference Abstracts



Poster Session 3
Saturday, April 13, 2024
14:45 - 16:00

P3-A-1 - Behavioral and neural signatures of social signal detection

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BACKGROUND & AIMS: Social information is highly salient for humans. Mounting evidence suggests that the human visual system is highly sensitive to composite “mid-level” features that suggest social interactions (McMahon & Isik, 2023, TiCS). We used one such feature, “chase subtlety” (Gao et al, 2009, Cog Psych; low subtlety: direct chase, high subtlety: indirect chase; Fig. 1a) to study (1) how social perception varies in a neurotypical population (e.g., are there participant-level “tuning curves?”) and (2) how the brain processes levels of social evidence.

METHODS: We conducted a series of online behavioral studies (6 batches; total n=1300; n=168 with a second session) and an fMRI study (n = 22; 2 sessions each) in which we varied chase subtlety, henceforth referred to as directness, from 0 (most direct) to 180 (least direct). We asked participants to rate perceived socialness on a continuous scale from Random to Follow. The experiments also included non-social controls and a second task to identify the chaser (results omitted here).

RESULTS: (1) Socialness ratings increased with directness in all the batches although individual differences prevailed (Fig. 1c). We observed moderate retest reliability using sigmoid curve-fit parameters computed for each participant (Fig. 1d).

(2) In univariate fMRI analyses, V5/MT covaried the most with subjective social ratings, even when controlled for low-level features like optic flow (Fig. 2a) and objective directness (Fig. 2b), extending our own past work contrasting subjective and objective stimulus labels (Varrier & Finn, 2023, J Neuro). Next, using multivariate patterns, we observed weak but significant Pearson correlations between predicted and actual socialness ratings ($r < .3$, $q < .05$) in 90/100 Schaefer parcels (Fig. 2c): here too, visual areas showed the most accurate prediction. Contrasting predictions of ratings (subjective) with predictions of directness (objective), we found weak effects such that visual regions tended to predict ratings better whereas right fronto-parietal regions predicted directness better ($p < .05$ unc., Fig. 2d). Thus, while motion-processing areas co-varied the most with subjective ratings, earlier visual regions also contained meaningful information about them.

CONCLUSIONS: Together, our results support emerging research that social perception begins in visual cortex and shows stable inter-individual differences. Neural activity is likely best characterized by participants' own behavioral responses (which show across-session robustness even after a month), and uni- and multivariate analyses make unique contributions to our understanding of social perception.

FUNDING: This work was supported by the National Institute of Mental Health Grant R01MH129648.

P3-A-2 - Unraveling the Neural Representations of Preference with a Naturalistic Neuroimaging Approach

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Our brains innately compare and contrast diverse stimuli in daily life, even when making preferences among similar stimuli presented concurrently. In contrast, when each stimulus is evaluated independently, the difficulty level of making preferences escalates. Therefore, this study aims to investigate the neural mechanism of preference and how preferences are represented in the brain. We examined 70 participants using functional magnetic resonance imaging (fMRI) as they viewed 18 varied videos. Without receiving prior notice, participants were then asked to rank their preferences for each video pair, totaling 153 pairs, and also to rate their liking for each video individually outside of the scanner. Using representational similarity analysis (RSA) across 100 brain regions of interest (ROIs), we examined the correlations between preferences and neural representations of those videos. Even after adjusting for the effect of subjective liking, our RSA results still revealed a number of significant associations between preferences and various brain regions, including regions involved in selective attention (e.g., dlPFC), memory formation (e.g., hippocampus), evaluation processing (e.g., NAcc), and regions engaged in the computation of psychological distances across dimensions, such as the inferior frontal gyrus (IFG), superior temporal sulcus (STS) and supplementary motor area (SMA). Our results indicate that preference formation in the brain is a natural and complex process, involving memory, evaluation, selective attention as well as the calculation of psychological distances between stimuli. In conclusion, our study adds to a deeper understanding of preference mechanisms, emphasizing the complexity of human evaluative processes.

P3-A-3 - The Role of Affiliations, Sex, and Status in Learning Social Hierarchies and Competitive Behaviors

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BACKGROUND: Social hierarchies are inherent across species, shaping power dynamics within groups. Understanding one's position within a social setting is pivotal for navigating interactions and avoiding detrimental social setbacks. Prior research has started to provide insights into the behavioral and neural aspects of social hierarchy learning through competitive interactions. Yet, there's a need for a more holistic approach that considers social contexts. For example, social hierarchies can vary across different affiliations. Understand how individuals learn hierarchies - and how it shapes behavior like competitiveness - in different groups is crucial. Moreover, prior work focused on males; research on the dynamics of female behavior in this context remains understudied. This study examines how social context (group affiliation and subjective social status) influences social learning and competitive behaviors.

METHODS: We applied computational modeling approaches (reinforcement learning) to explore the link between perceived social status and competitive behavior. Participants (Canadian hockey fans) engaged in a competitive social learning task with opponents whose skills they needed to learn. Participants interacted with members of two groups: an IN-group (fans of

their favorite hockey team) and an OUT-group (supporters of their least favored team). To capture individual differences in competitive behavior and social learning, we integrated modeling strategies of prior work and estimated variations in choice parameters as a function of affiliation (IN-/OUT-group), perceived social status (McArthur scale), and sex (female/male).

RESULTS: Results of the best-fitting computational model showed faster hierarchical learning when interacting with opponents from the IN-group compared to opponents from the OUT-group. These findings reveal how group affiliation modulates social learning. Furthermore, individuals exhibited heightened competitiveness when facing fans of their own team. Notably, the effect of group affiliation on competitiveness was modulated by participants' biological sex at birth and the perceived social status. Females displayed greater competitiveness than males when interacting with the OUT-group. Higher subjective social status correlated with increased competitive behaviors in both groups.

DISCUSSION: The findings reveal precise mechanisms underlying variance in competitive behaviors and the ability to learn about social hierarchies across settings. The interplay between group affiliations, gender dynamics, one's own perceived social status, and competitive tendencies highlights the need for a more nuanced understanding of how social contexts influence social behaviors and group dynamics. Understanding these dynamics has implications across psychology and organizational behavior. Further research can explore individual differences and cultural influences shaping learning and competitive behaviors within diverse group settings.

P3-A-4 - Differentiating neural responses to risky and non-risky rewards in a modified Balloon Analogue Risk Task

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BACKGROUND AND AIMS: Reward motivation and reward receipt facilitate learning and adaptation to the environment, and a specific context like risk affects those reward processes. However, few neuroimaging studies directly compare neural reward with and without risk in the same task. Therefore, we modified a Balloon Analogue Risk Task to include reward-only trials and modeled neural correlates of risky and non-risky rewards.

METHODS: During multi-echo fMRI scans of mesolimbic areas, 46 participants inflated balloons across three conditions: earn monetary reward but risk loss if a balloon pops (R); earn reward without risk (O); and no loss or gain (N). Multi-echo Data were preprocessed with AFNI and Tedana and analyzed with FSL GLM and permutation tests (TFCE, $n = 5000$, corrected $p < .05$), weighted by reward value.

RESULTS: During decision making, R>N estimated significant clusters in insula, striatum, and ventral tegmental area (VTA). O>N estimated clusters in the medial prefrontal cortex (mPFC) but not in striatum. R>O estimated stronger BOLD clusters in canonical reward (e.g., caudate and VTA, left insula, and mPFC). During positive feedback, R contrasts mostly estimated PFC clusters (e.g., R>N: lateral PFC, OFC; R>O: mPFC, dorsolateral PFC), though R > N also estimated a caudal cluster. O>N estimated clusters in medial temporal cortex.

CONCLUSIONS: Our results suggest greater neural recruitment of putative reward and executive areas in the risky reward context compared to less engagement with no-risk reward for both motivation and receipt phases. We will further discern risk vs no-risk reward encoding patterns via Multivoxel Pattern Analysis.

ACKNOWLEDGEMENTS AND FUNDING: We would like to thank Dr. Minwoo Lee and Dr. Elizabeth Riley for their thoughtful feedback and help. This work was supported by Cornell University.

P3-A-6 - Multimodal Imaging of Reward Processing in Major Depressive Disorder

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Anhedonia represents a deficit in reward processing in Major Depressive Disorder (MDD) that can manifest as diminished pleasure from reward and diminished motivation to seek reward, though these phenotypes are often conflated. In this study we use multimodal imaging to examine the neural correlates of the emotional, pleasure-related deficits of depressive anhedonia. Magnetoencephalography (MEG) and functional magnetic resonance imaging (fMRI) data were collected for 52 participants with MDD and 38 healthy controls. A principal components analysis (PCA) of depression and anxiety questionnaires was used to create composite symptom scores for each participant. Participants completed a probabilistic selection task during the MEG scan and a pseudorandomized doors task during the fMRI. PCA derived three symptom components, correlating with emotional and consummatory anhedonia, anxiety and diminished mood, and apathy/motivational deficits. Spatiotemporal permutation clustering tests of MEG source estimates found significant clusters in ventromedial prefrontal cortex (vmPFC), anterior midcingulate cortex, and bilateral insulae for reward activation greater than punishment. Of these three regions, only vmPFC showed significantly greater activation for healthy controls, compared to MDD individuals. Correlation of this region with composite anhedonia scores showed a significant positive correlation between anhedonia and vmPFC activation within MDD. fMRI showed a significantly larger response to reward, relative to punishment, in vmPFC and nucleus accumbens (NAcc), though this response was diminished in the MDD group. Again, vmPFC activation was positively correlated with anhedonia scores. These findings show convergent validity of complex neural deficits associated with the emotional component of anhedonia.

P3-A-7 - Heterogeneity in cognitive capacity and impulsivity predicts the subjective cost of self-control

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BACKGROUND: A growing body of work has demonstrated that the deployment of cognitive control is perceived as subjectively effortful to humans. We recently extended this work to the domain of self-control by measuring the monetary cost choosers were willing to pay in order to use precommitment strategies to avoid tempting rewards that may lead to self-control failures. This work suggests that the extent to which individuals value precommitment can be taken as a proxy for how costly they find exercising self-control to be. Here, we extended this work to examine how heterogeneity in cognitive capacity and impulsivity—two factors widely known to influence goal-directed behavior—shape the perceived cost of self-control.

METHODS: 65 healthy dieters completed a decision-making study in which they first completed a cognitive battery of tasks that included a working-memory measure (Automated Operating Span, or OSPAN) and an intertemporal choice task in which choosers made binary choices between smaller, sooner and larger, later monetary rewards. Participants returned a week later and completed our self-control decision task, during which they viewed images of low, medium and highly-tempting snack foods and reported how much they would be willing to pay to avoid each these food rewards across different amounts of time. OSPAN scores and proportion of immediate (vs. delayed) rewards chosen were used to index working-memory capacity and impulsivity, while average WTP at each level of temptation served as a metric of self-control costs.

RESULTS: Linear mixed-effects models revealed that greater working-memory capacity predicted higher WTP to avoid self-control across each temptation level, suggesting that higher working-memory may lead to a better capacity to prospectively estimate how costly self-control will be once temptations are encountered. In contrast, higher impulsivity predicted lower WTP to avoid temptation, suggesting that self-control costs are estimated to be lower in more impulsive individuals.

CONCLUSION: Our findings provide novel insight into individual variability underlying self-control costs by demonstrating that working-memory and impulsivity have distinct and inverse effects on the prospective estimation of these costs. This finding suggests that cognitive capacity and impulsivity may be predictive of the extent to which individuals perceive precommitment to be a valuable strategy and point to constructs often related to goal-directed control as impacting how subjective self-control costs are constructed. Future work may seek to determine the extent to which working memory and impulsivity not only predict the estimation of self-control costs but the subsequent success of such strategies.

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P3-A-8 - Neural and Behavioral Synchrony in Social and Non-Social Uncertainty using Video Stimuli

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BACKGROUND AND AIMS: The degree to which medical teams, work groups, or juries align in response to uncertain information has profound consequences, but our understanding of the cognitive mechanisms underlying uncertainty resolution in complex, dynamic contexts is incomplete. The explicit judgments we make about uncertainty may be rooted in implicit neural processing of key brain regions, like the dorsolateral prefrontal cortex (dlPFC), dorsal anterior cingulate cortex (dACC), and the anterior insula (AI), but a direct connection between neural and behavioral synchrony in such circumstances has not been tested. We hypothesized that intersubject synchrony in the patterns of activity of these neural regions predicts corresponding intersubject synchrony in global assessments of uncertainty. Such a link between brain and behavior could shed light on the underlying neural mechanisms that facilitate coordinated responses to uncertainty from social and non-social sources.

METHODS: To explore this, forty participants (21 Female, 18 Male, 1 Non-Binary; Age 18 -44) watched a popular crime drama while providing continuous behavioral assessments of certainty for specific social (e.g., a character's innocence or guilt) and non-social (e.g., frame luminance) outcomes, all while participants' neural responses were monitored using fMRI. Neural data was pre-processed with fMRIPrep, parcellated using the Schaefer Cortical Atlas, and functionally aligned using nItools. Behavioral data was detrended and HRF-convolved. Intersubject Spearman-rank correlations were applied to 50 second sliding windows of neural and behavioral data to minimize the effect of spontaneous fluctuations in neural activity. The subsequent Fisher's Z-scored correlative values will be used in multilevel models, regressing behavior upon neural activity with adjustments for random participant-specific intercepts.

RESULTS: Our analyses are not complete at the time of this submission. A preliminary univariate analysis using behavioral ratings as parametric modulators found significant positive associations between ratings during the social task and activity of the dlPFC, AI, precuneus, dACC, and inferior frontal gyrus - regions active in studies of social evaluation, ambiguity, or uncertainty - but additional tests are needed. Primary analyses will be completed before the conference and will follow the procedure outlined above.

CONCLUSIONS: Identifying regions whose activity predicts explicit, global representations of uncertainty in response to dynamic, complex social sources would extend extant research on ambiguity and uncertainty. Characterizing normative neural processing of uncertain information would have utility beyond medical teams or juries as it would provide comparison to vulnerable populations with atypical uncertainty responses like adolescents or individuals with anxiety and mood disorders.

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P3-A-9 - Overlapping yet distinct neural encoding of value and salience during risk decision-making: Insight from intracranial human recordings

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BACKGROUND AND AIMS: Individuals make decisions based on both the subjective desirability (expected value of options) and motivational strength (salience of options). The subjective value attributed to different options, coupled with the motivational strength toward accepting or rejecting each option, governs our decision-making process and guides the manner in which choices are made. Deciphering the neural mechanisms underlying value and salience encoding is a fundamental but challenging objective in neuroeconomics and social neuroscience, particularly for risky decision-making. However, there is ongoing debate regarding whether the value and salience signals are encoded by shared or distinct brain systems, fueled by conflicting evidence from human neuroimaging and animal electrophysiology studies. This study aimed to address these controversies and bridge gaps across species and methodologies.

METHODS: To these ends, we employed intracranial recordings in humans to capture the spatiotemporal profiles of neuronal population activity during decision-making under risk while independently manipulating value and salience.

RESULTS: We found that high-gamma activity in multiple brain regions encoded both value and salience signals within partially overlapping time windows. Notably, a critical anatomical dissociation was found, with certain regions (such as the lateral orbitofrontal cortex and dorsolateral frontal cortex) preferentially encoding value signals over a prolonged duration, while other regions (such as the anterior insula and posteromedial cortex) exhibited stronger encoding strength for salience signals during specific time windows. Furthermore, there was a spatial dissociation observed at the neuronal population level within each region, where distinct neuronal populations encoded value and salience signals, potentially minimizing interference between distributed value and salience signals.

CONCLUSIONS: These findings support overlapping yet distinct neural encodings of value and salience, shedding light on novel mechanisms by which various decision-related variables can be simultaneously and differentially encoded in the human brain.

ACKNOWLEDGEMENTS AND FUNDING: We are grateful to the 26 patients who participated, without whom this research would have not been possible. This work was supported by the National Natural Science Foundation of China (Project 32125019 to Y.M.).

P3-A-10 - The transdiagnostic effect of anhedonia on action decisions in social contexts.

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Anhedonia, the lack of interest or pleasure in hedonic experiences and a transdiagnostic condition in psychiatry, is associated with impairments in daily life, notably in social functioning. Anhedonia impacts every aspect of motivated behavior, namely reward anticipation, reward consumption and reward learning, and therefore it might alter decision making and learning in socioemotional contexts. In two separate studies, we investigated the impact of anhedonia on approach/avoidance decisions in social contexts in both depressive and autistic individuals. In a first study, depressed (n=48) and nondepressed (n= 23) participants were asked to spontaneously choose to approach or avoid individuals displaying angry or happy expressions, in a computer task. In some trials, participants had to make a further motor effort to obtain the desired socioemotional outcome. Our results supported that anhedonia diminished the tendency to approach happy individuals and decreased both approach of happy and avoidance of angry individuals in conditions of increased motor effort. In a second study, we investigated whether socio-emotional learning was atypical in autism, as predicted by the social motivation theory. We tested whether typically developing (TD; N = 290) and autistic (ASC; N = 274) participants, matched for gender, age and education, spontaneously learned from socioemotional outcomes (being seated close to or far from angry or happy individuals), in a social reinforcement learning task. Contrary to the predictions of the social motivation theory, participants, regardless of their diagnostic group, showed spontaneous learning from socioemotional outcomes. Yet, when accounting for dimensional variations in autistic traits, as well as depression and anxiety, two main findings emerged, specifically in females: 1) autism severity in ASC participants correlated with reduced spontaneous learning to approach happy individuals; 2) anxiety-depression severity across both ASC and TD participants correlated with reduced learning to approach/avoid happy/angry individuals, respectively. Overall, our results show the transdiagnostic importance of anhedonia to unravel atypicalities in socioemotional behavior.

P3-B-11 - Intergenerational social interactions: How do motor and neural synchrony develop over time?

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BACKGROUND AND AIMS: Repeated social interactions between generations can enhance social connectedness and wellbeing, but little is known about the behavioural and neural mechanisms that underpin these social outcomes or how these mechanisms develop as intergenerational relationships take shape. Subconscious coordination of body movements and shared patterns of brain activity are believed to underpin smooth social interactions, yet the evidence for this comes from one-off interactions between members of the same (young adult) generation. A deeper understanding of how motor coordination and neural synchrony support social interaction between generations will improve the evidence base for initiatives and programs fostering wellbeing across the lifespan.

METHODS: Our preregistered study examines changes in motor coordination and neural synchrony between members of the same and of different generations across repeated social interactions. Dyads comprising participants from the same

generation (both aged 18-35; n = 25) or different generations (one aged 18-35, other aged 70+; n = 25) completed six weekly collaborative art sessions together. At each session, participants drew alone and together with oil pastels while we measured motor coordination and neural synchrony using motion tracking and functional near-infrared spectroscopy (fNIRS), respectively. We also measured participants' appraisal of their generation and the other generation and loneliness at the beginning of each session, as well as participants' appraisals of how socially close they felt to their partner after the drawing activity. Our analysis plan includes assessing changes in inter-brain synchrony, motor coordination, and social wellbeing over time using Bayesian multi-level models.

RESULTS: Data collection is ongoing. We hypothesise that both motor coordination and neural synchrony will change across repeated collaborative interactions, with a trend for greater differences for intergenerational than same-generation dyads.

CONCLUSIONS: This research will shed light on whether relationships develop differently when those involved belong to the same or different generations, and how budding relationships are supported by the emergence of motor synchrony and inter-brain synchrony over time. Our findings will have implications for organisations and initiatives seeking to improve social wellbeing for members of all generations.

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P3-B-12 - Probing connections between social connectedness, mortality risk, and brain age: A preregistered study

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BACKGROUND AND AIMS: Many psychosocial factors are associated with longevity; central among them is social connectedness, or feelings of belongingness and identification as part of meaningful relationships. Social connectedness is related not only to better mental health (e.g., less depression) but also to improved physical health (e.g., decreased inflammation, lower blood pressure). Recent methodological advances allow for the investigation of a novel marker of biological health by deriving a predicted "age of the brain" from a structural neuroimaging scan. Discrepancies between a person's chronological age and algorithm-predicted brain-age (i.e., the brain-age gap) have been found to predict mortality and psychopathology risk with accuracy rivaling other known measures of aging. This preregistered study, accepted in principle at the Journal of Personality and Social Psychology, strives to understand the longevity-promoting associations of social connectedness from a novel biological vantage point.

METHODS: Data will be drawn from the Midlife in the United States (MIDUS) Longitudinal Study of Health and Well-being, a 30-year investigation of adults ages 35-85. Our sample will consist of participants who have neuroimaging scans and complete data on key measures for a sample of 123 participants. We will operationalize social connectedness through the Positive Relations with Others subscale of the Psychological Well-Being scale (Ryff, 1989; Ryff & Keyes, 1995). Brain Age will be calculated from raw T1-weighted MRI scans using an open-access algorithm (Cole et al., 2018). Mortality risk will be operationalized through a) the number of chronic conditions reported and b) ability to perform usual physical, social, and other role-related activities.

RESULTS: Our analyses will consider as covariates sample origin, age, time since MRI scan, race, income, and sex. We first hypothesize that more positive relations with others will predict a decrease in markers of mortality risk. We will test these associations using linear regression, reporting standardized and unstandardized beta coefficients and 95% confidence intervals for the coefficient estimates and p-values. We next hypothesize that more positive relations with others will be associated with a narrower brain-age gap, again using linear regression and reporting the same parameters as noted above. Lastly, we hypothesize that participants' brain-age gap will account for part of the association between positive relations with others and mortality risk. We will use linear regression models within an Indirect Effects Analysis framework and Monte Carlo simulation of the confidence intervals of the indirect effect.

CONCLUSIONS: "Brain age" is a predictive biomarker that may clarify associations between social connectedness and longevity in the brain. Results from our study will give insight into whether being socially connected is not only good for the mind, but for the brain, too.

P3-B-14 - The Color of Fear: Impact of Perceptual Deindividuation on Fear Generalization Towards Black Men

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Racial stereotyping, particularly the association of Black men with being a threat, is a pervasive phenomenon with significant societal implications. This stereotype manifests in various contexts, from everyday interactions to institutional decisions, impacting many aspects of life, including workplace dynamics and judicial processes. Although awareness of these issues is increasing, the specific psychological mechanisms that drive the generalization of fear towards Black men remain underexplored. This research gap impedes the development of effective strategies to counteract such biases. Our study aims to bridge this gap by applying theories of intergroup perception and fear learning models to examine the role of perceptual deindividuation in the generalization of fear towards Black men. Perceptual deindividuation, defined as the inability to distinguish individuals within a group, potentially exacerbates fear-based stereotypes towards Black men.

In our study, we involved 250 participants in a fear-conditioning task. This task paired a loud scream (the unconditioned stimulus) with images of Black and White faces (the conditioned stimuli, or CS+). To assess fear generalization, we presented

faces with varying degrees of perceptual similarity to the CS+ and asked participants to identify the ones associated with the scream. We used mixed-effects logistic regression to analyze the interaction between perceptual similarity of the CS+ and the racial identity of the CS+ on participants' identification responses. We included fixed effects for race and scaled similarity, as well as their interaction term. We also incorporated random intercepts for individual subjects and the stimuli presented to them, to account for intra-group correlation and repeated measures. This analysis is crucial to understand how perceptual similarity and racial identity of the CS+ influence fear responses, which is vital in unraveling the psychological processes behind racial bias. Our findings indicate that participants were more likely to incorrectly identify novel Black faces as the CS+, suggesting an amplification of negative bias towards Black racial identity. Additionally, we measured changes in skin conductance response (SCR) as a physiological indicator of fear. The analysis of SCR data is ongoing. Through exploring these processes, our study contributes to a more nuanced understanding of the factors influencing racial biases, essential for developing interventions and policies aimed at reducing racial prejudice.

P3-B-15 - Social learning is biased by targets' stereotype congruence

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BACKGROUND AND AIMS: Previous research suggests that stereotype confirmation is intrinsically rewarding. We propose that the reward value associated with stereotypical targets interferes with learning about other rewarding aspects of interacting with them (e.g., their generosity). If perceivers overestimate the value of interacting with stereotypical targets, this may increase the frequency or salience of such interactions and maintain stereotype beliefs over time. We aim to understand whether perceivers are indeed biased to interact with stereotypical targets, and whether this bias interferes with learning about targets' generosity.

METHODS: In two pre-registered experiments (total N=558), participants interacted with targets belonging to a novel social group and learned about their generosity in a point-sharing game. Across 80 trials, participants made repeated choices to interact with one of two targets; the chosen target would either share or not share a point. Targets varied in their stereotype congruence (either stereotypical or counter-stereotypical, learned by participants prior to the game) and in their generosity (the rate at which they shared points). Study 1 used stereotype content that was valenced and relevant to generosity, and Study 2 used stereotype content that was neutral and unrelated to generosity.

RESULTS: As expected, participants were more likely to choose to interact with stereotypical targets than equally-generous counter-stereotypical ones. This bias emerged both when the stereotype content was related (Study 1) and unrelated (Study 2) to the generosity behavior being learned. Computational modeling of participants' trial-by-trial choices in Study 2 revealed that stereotype congruence biased learning in multiple ways: participants held more positive priors about stereotypical (vs. counter-stereotypical) targets, and they also learned from feedback about stereotypical and counter-stereotypical targets at differing rates.

CONCLUSIONS: Participants' choices to interact with targets were biased by the targets' stereotype congruence. This occurred both when the stereotype was related and unrelated to the behavior being learned in interactions, suggesting that stereotype congruence may affect social learning across many contexts. Modeling results indicated that biased priors and learning rates both underlie participants' biased choice behavior. These findings elucidate reward as a mechanism that biases social learning and may support stereotype maintenance.

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P3-C-16 - Effects of Anxiety State on N400 Event-Related Brain Potential Response to Unexpected Semantic Stimuli

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BACKGROUND: Emotional states can influence how people use meaningful context to make predictions about what comes next. To measure whether state anxiety influences such prediction, we used the N400 event-related brain potential (ERP) response to semantic stimuli, whose amplitude is smaller (less negative) when the stimulus is more predicted based on preceding context.

METHODS: Participants (n=28) were randomized to one of two groups, who underwent either an "anxious-uncertainty" procedure previously shown to increase anxiety, or a control procedure. Both before and after this procedure, participants' ERPs were recorded while they viewed category definitions (e.g., "a type of fruit"), each followed by a target word that was either a high-typicality category exemplar ("apple"), low-typicality exemplar ("cherry"), or non-exemplar ("clamp") of the category. Participants' task was to respond by pressing one of two buttons to indicate whether the target represented a member of the category.

RESULTS: As expected, based on previous work, overall, N400 amplitudes were largest (most negative) in response to non-exemplars, intermediate to low-typicality exemplars, and smallest to high-typicality exemplars. N400 amplitudes were larger to non-exemplars after the anxious-uncertainty procedure than after the control procedure. N400 amplitudes to both types of exemplars did not differ after the anxious-uncertainty procedure versus the control procedure.

CONCLUSION: The results are consistent with participants devoting more neural resources to processing contextually unexpected items under anxious states, rather than anxiety facilitating processing of expected items.

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P3-C-17 - Translational Investigations of Cerebello-Midbrain Contributions to State and Trait Socio-Affective Functioning

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BACKGROUND: Emerging research has implicated cerebellar projections to the ventral tegmental area (VTA) as a critical hub for modulating socio-affective behavior in rodent models of autism spectrum disorders and depression. However, these circuits have not been characterized in humans. Our goal was to characterize the topographic organization of afferents from the cerebellum to the VTA and assess for microstructural associations between the areas of highest streamline density and measures of socio-affective functioning.

METHODS: In this study, we mapped the cerebello-VTA structural connectivity in 101 normative young adults by performing probabilistic tractography on diffusion weighted imaging data from the Human Connectome Project. We uncovered the organization of cerebello-VTA connections by separately tracking from parcels of cerebellar lobule VI, crus I/II, vermis, paravermis, and cerebrocerebellum. Next, we examined the role in these tracts in social and affective functions by taking the tracts with the highest density, computing microstructure, and correlating with measures of affect, social functioning, and personality traits. Finally, we performed a node-wise analysis wherein we examined which segments of each tract drove the effect of microstructure and socio-affective self-report.

RESULTS: The results revealed that afferents from the cerebellum to the VTA predominantly originate in medial aspects of the right cerebellum and terminate mostly in ipsilateral VTA. The paravermis of crus I, traveling through the interposed nucleus, sent the most connections to the VTA compared to the other lobules. Next, we identified relations between tract microstructure across multiple domains measured by multiple Achenbach Self Report subscales including anxiety/depression, internalizing symptoms, somatizing complaints, attention problems, and social withdrawal. Moreover, we found correlations between microstructure and trait neuroticism and agreeableness as measured by the NEO five factor inventory. Finally, we uncovered most of the brain-self-report effects being driven at the level of convergence in the deep cerebellar nuclei.

CONCLUSIONS: Taken together, we show that the areas of highest density in the cerebello-VTA circuit account for white matter microstructural contributions to numerous social and affective domains of functioning.

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P3-C-18 - Affective Working Memory: Is it Easier to Maintain Positive than Negative Emotions?

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BACKGROUND AND AIMS: Affective working memory (AWM) refers to the ability to maintain and work with an emotional feeling state in the absence of the eliciting stimulus. AWM can be measured with a delayed intensity-comparison task in which people view a briefly presented emotional image, feel the evoked emotional intensity, and maintain that feeling for subsequent comparison with the intensity evoked several seconds later by a second emotional image of similar valence. Accuracy judgments about which feeling is more intense are then scored based on individualized intensity ratings of each image obtained in a separate testing phase. Although valence conditions are closely matched, valence differences in maintenance accuracy have been found, with some reports indicating higher accuracy when maintaining negative versus positive emotional states, while others suggest the opposite pattern (Waugh et al., 2019, Emotion). Moreover, valence-dependent maintenance ability may interact with image order to the extent that "felt intensity" diminishes over the delay. Accordingly, trials in which the second image is rated as more intense than the first image (2>1 trials) should be easier than the opposite intensity order (1>2 trials), and this order effect may be more pronounced when an emotional valence is harder to maintain.

METHODS: To investigate these possibilities and in an effort to replicate Waugh et al. (2019), we re-analyzed data from four studies (total: 297 young adult participants aged 18-29) from our lab and conducted an internal meta-analysis using these data sets.

RESULTS: A two-way ANOVA indicated significantly better WM accuracy for (a) negative than positive images and (b) 2>1 than 1>2 intensity orders, as well as (c) an interaction indicating that the effect of intensity order was greater for negative than positive images. A meta-analysis confirmed these general patterns.

CONCLUSIONS: Finding better WM accuracy for negative than positive emotions is inconsistent with the claim that negative emotions are harder to maintain than positive ones. However, the finding that the order effect is more pronounced for negative than positive emotions partially aligns with the results of Waugh et al. (2019). Nevertheless, the details of this interaction may be informative. When the first image is more intense than the second (1>2 trials), accuracy is equally low for negative and positive images (0.74 and 0.73, respectively), whereas when the second image is more intense than the first (2>1 trials), accuracy is significantly better for negative (M = 0.83) than positive images (M = 0.77). Taken together, this pattern suggests the possibility that while negative and positive feelings can be equally maintained, the salience of a current emotional feeling state may be greater for negative than for positive emotions.

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P3-C-19 - Neural Dynamics Underlying Rapid Emotions

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BACKGROUND AND AIMS: The brain quickly encodes the emotional contents of the sensory input we perceive. In less than a second, emotional stimuli can elicit physiological changes that develop quickly, which makes neuroimaging techniques capable of observing such rapid changes particularly important in the understanding of emotional processing. Previous neuroimaging studies have identified numerous neural mechanisms, and results point to an interplay of faster and slower pathways. Fast processes refer to the automatic initial processing of sensory inputs, which can trigger rapid physiological responses. These inputs can be raw and immediate, providing the initial foundation for emotional experiences which are further enhanced through cognition, memories, and experiences. Given the strong, interconnectedness of emotion-involved processes, understanding the earliest differentiations of emotional responses has particular merit in the way they can inform the way in which emotional responses tend to develop and unfold. The objective of this study was to enhance our understanding of the spatiotemporal brain dynamics that underlie the rapid coding of emotions.

METHODS: We employed non-invasive electroencephalography (EEG) to record the electrical activity of the brain from the scalp with high temporal resolution and investigate how the brain encodes different emotional stimuli presented in rapid streams. Participants viewed 900 different emotional stimuli from the OASIS database (Kurdi et al., 2017) presented in random order 10 times each in 4 Hz rapid serial visual processing streams while EEG responses were recorded. Using multivariate analysis and representational similarity analysis, we compared behavioral ratings of valence and arousal with EEG data to investigate the unfolding neural representation of the emotional stimuli in the brain.

RESULTS: Our results show that the rapidly changing input presented to participants resulted in fast, dynamic, and transient coding of emotional valence and arousal evoked by the stimuli and that the coding of valence and arousal might have different temporal dynamics.

CONCLUSION: These findings highlight the important contribution of rapid perceptual processes to emerging emotional responses.

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P3-C-22 - Unmasking induced and posed emotions through EEG analysis

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BACKGROUND AND AIMS: Facial expressions are crucial in social interactions, but their accuracy in reflecting genuine emotions is often debatable. Previous studies have mainly focused on stereotypical posed expressions, limiting the true understanding of emotional expression perception. To address this challenge, our study aims to create a comprehensive database integrating facial expressions and corresponding physiological signals from both induced and posed emotional states.

METHOD: In a lab setting, 50 healthy participants (22 females, 28 males) had their facial expressions and 32-channel electroencephalography (EEG) recorded. Two sessions were conducted: one for induced emotions using various film clips to elicit six emotional responses (happiness, sadness, fear, anger, disgust, surprise), and another for posed emotions, where participants were instructed to display corresponding facial expressions in their own style while watching neutral movies.

RESULTS: Piloting analyzed data has been conducted on 15 participants using a deep neural network model based on one-dimensional convolutional operations. This model consists of a temporal layer that extracts multi-scale features from each EEG channel in the time dimension, and a spatial layer that utilizes one-dimensional convolution across all EEG channels to extract global spatial information. Preliminary results from a 6-fold cross-validation experiment on the binary classification of induced and posed emotions showed a mean accuracy of 72.95% (SD: 7.4%) and a mean F1-score of 68.87% (SD: 9.07%).

CONCLUSIONS AND ANALYSIS PLANS: The results support our hypothesis that EEG can reveal emotions hidden by facial expressions and differentiate between induced and posed emotional states using multimodal data. Future research will focus on establishing baseline classifications for these emotions and identifying discriminative features in temporal, spatial, and frequency domains. Given the scarcity of research in this area, our study will be data-driven. However, we hypothesize that posed emotions are mainly modulated by the left hemisphere and related to voluntary movement, while induced emotions should be predominantly modulated by the right hemisphere and regions related to emotion generation. The gamma band may be key in distinguishing these affective states. Once video annotations are complete, we plan to release the dataset for academic use and test classification results using single and multimodal data with fusion features.

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P3-C-23 - Individual Differences in Naturalistic Emotional Memory

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BACKGROUND AND AIMS: Autobiographical memory creates the scaffolding from which our schemas are formed. Emotional experiences and surprising events (i.e., prediction errors [PEs]) modulate the richness and content of our memory, as do

pre-existing individual differences in psychiatric risk (i.e., negative emotionality [NE]). Moreover, surprising events may modulate the content of memory via its impact of emotion. The present study tested the effects of emotion, surprise, and individual differences on autobiographical memory related to where and when someone was when they saw their university Chemistry midterm exam grades, a personally meaningful, emotionally salient, and ecologically valid event.

METHODS: Undergraduate students (N=378) predicted exam grades after completing exams but prior to receiving their grade. Participants provided frequent ecological momentary assessments (EMAs) of emotion immediately after viewing their grade. One week later, participants submitted an audio recording recalling the moment they saw their grade in as much detail as possible. We performed a sentiment analysis using language and prosody to determine affective tone during recall. We used mixed-effects models to test the impact of experienced emotion on sentiment of memory as a function of NE.

RESULTS: The emotional content of memory-its sentiment-was predicted by the intensity of emotion one experienced right after receiving their exam grade, such that high negative affect predicted highly negative memories ($t= 9.000, p<.001$) and high positive affect predicted highly positive memories ($t= 8.062, p<.001$). Interestingly, the PE similarly predicted the emotional content of memory such that positive PEs predicted positive memories ($t= 10.238, p<.001$) and negative PEs predicted negative ones ($t= -10.117, p<.001$). We further determined that the intensity of emotional response to seeing the grade mediated the effect of PE ($p<.001$) on emotional content of memory. Moreover, memory content was predicted by individual differences in NE. People higher in NE reported more negative memory sentiment overall ($t=3.104, p=.002$), and tended to report more negative memories even for similar levels of negative emotion immediately after seeing their grade ($t=2.210, p=.027$).

CONCLUSIONS: The mediating role of emotional response on the relationship between prediction error and emotional content of memory, suggests that the effect of surprise on memory content is largely accounted for by the immediate emotional responses to surprise. Further, the moderating effect of NE on negative emotional experience and negative content of memory indicates that increased negative sentiment of autobiographical memory may be one avenue in which negative emotionality puts individuals at risk for development of psychiatric disorders.

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P3-C-25 - Persistence of amygdala activation patterns following emotional pictures is associated with higher well-being, lower reactivity, and altered salience network connectivity.

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In this study, we will derive a new measure of amygdala persistence from an extant dataset to conceptually replicate and extend prior research linking persistence of amygdala activation patterns to real-world emotion and well-being (Puccetti et al, 2021). We will compute amygdala persistence from the representational similarity of the pattern of amygdala activation to affective (e.g., negative) pictures and neutral face pictures that follow, similar to the methods in prior work (Puccetti et al., 2021). We hypothesize that less amygdala persistence during an affective picture task may act as a marker for better emotion regulation, as evidenced by associations with higher self-reported positive mood, well-being, and non-reactivity. We further hypothesize that higher amygdala persistence on the affective picture task will be associated with higher within-network resting state functional connectivity (rsFC) of the salience network, and lower rsFC between nodes of the salience network and brain regions involved in cognitive control (e.g., frontoparietal control network, dorsal lateral and ventromedial prefrontal cortex). We will use linear regression to test the association between the representational similarity measure and each of the self-report measures, separately. We will conduct whole brain connectivity analysis of resting state fMRI data using the amygdala as a seed and with the representational similarity measure included as a covariate to reveal brain networks associated with amygdala persistence. We will also assess whether graph network metrics of the salience network, defined by the Gordon functional network atlas (Gordon et al., 2014; <https://doi.org/10.1093/cercor/bhu239>) are associated with amygdala persistence. We will examine the insula and hippocampus, separately, as seeds for whole brain connectivity associated with amygdala persistence in a secondary analysis. The maximum sample size is $n= 158$ for cross-sectional analysis, which includes 31 participants with prior meditation experience. We will run all analyses collapsed across the entire sample, and separately based on prior meditation experience, given the potential for pre-existing differences between these groups. This analysis plan was pre-registered on the Open Science Framework (<https://doi.org/10.17605/OSF.IO/836JC>).

P3-C-26 - Emotional reactions and prediction errors due to real-world events predict changes in longer-term affect

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BACKGROUND AND AIMS: Affective experiences, comprised of both positive and negative emotions and moods, color every-day life. Emotional responses, affective reactions arising from individual events, can impact one's long-term affective experiences (Eldar et al., 2016; Frijda, 1993). Evidence suggests that effects of negative events are more affectively impactful than positive ones (Baumeister et al., 2001). Moreover, events that differ from expectation have a longer impact on negative affect than positive affect (Villano et al., 2020). The current study aimed to understand if personally meaningful and surprising events drive changes in longer-term affective states, and if valence differences exist between positive and negative affect.

METHODS: We assessed 1058 undergraduate students' emotional response to chemistry exam grades. After receiving their exam grade, participants' affective states were assessed every 45 minutes for the remainder of the day. Emotion reactions to grade reveal were calculated as the mean of these scores. In the two weeks after seeing one's grade, we assessed participants' affective states on every other day. Changes in longer-term affect was computed as the change in a participant's mean affect between

exam periods. Grade prediction errors (PEs) were quantified as the difference between the grade participants predicted they would receive for an exam and the actual grade they received.

RESULTS: Emotional reactions to exam grades result in changes in subsequent affective experience for days following grade reveal. There was no interaction with valence, such that negative emotional reactions result in similar changes to ensuing negative affective states ($B = 0.18$ (95% CI [0.15, 0.22]) when compared to the impact of positive emotional reactions on changes positive affective reports ($B = 0.17$ (95% CI [0.13, 0.22]). However, grade PEs do have valence specific effects such that PEs predict a decrease in negative affect in the days following grade reveal ($B = -0.16$ (95% CI [-0.30, -0.02]), but they have no relation to changes in positive affect ($B = 0.12$ (95% CI [-0.02, 0.24]). Lastly, the relationship between PE and change in negative affect was mediated by the magnitude of the emotional reaction a participant had to viewing their exam grades.

CONCLUSIONS: The results suggest that single personally meaningful experiences cause enduring changes to one's affective state. Further, there may be meaningful differences in how enduring these changes are according to valence as PEs have an enduring impact on changes in negative but not positive affect. Lastly, the mediation findings suggest that PEs impact longstanding mood via their impact on immediate emotional reactivity.

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P3-D-28 - Emotion regulation – a new RDoC construct?

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BACKGROUND AND AIMS: Diverse psychopathologies share the element of emotion dysregulation. The National Institute of Mental Health introduced the Research Domain Criteria (RDoC) initiative to better understand the nature of mental disorders from a transdiagnostic perspective. Within the RDoC framework, six major domains of human functioning have been defined, including positive and negative valence systems, cognitive systems, social processes, arousal and regulatory systems, and sensorimotor systems. Considering the conceptual transdiagnostic features inherent in emotion regulation, there arises the question of whether it should be treated as an independent research domain. To be considered as a new domain, the concept of emotion regulation has to meet the empirically based criterion that it is not reducible to more basic and already existing RDoC domains. One strategy for assessing this criterion is to investigate if this concept is supported by a biologically distinct system of the brain.

METHODS: To examine whether emotion regulation could represent a new RDoC domain, we used coordinate-based meta-analyses to identify consensus across and differences between the existing RDoC domains and emotion regulation. Data from ten previously published meta-analyses representing the constructs of the existing RDoC domains were reanalyzed to examine the unique brain regions linked to the emotion regulation construct versus all other RDoC constructs. Whole-brain meta-analysis maps were generated for each RDoC construct; in addition, a whole-brain map was generated using the pooled coordinates of each construct and the emotion regulation construct. This allowed testing for differences between emotion regulation versus each RDoC domain and commonalities among them.

RESULTS: The analyses were based on a final meta-analytic dataset of 3,473 experimental contrasts (i.e., 46,418 reported foci) among a total of 78,521 healthy adults. Emotion regulation overlapped with each RDoC domain indicated by the Dice index, except for the arousal and regulatory systems: valence systems (6%), cognitive systems (attention: 2%; cognitive control: 11%; declarative memory: 3%; language: 14%; perception: 6%; working memory: 11%), social processes (13%), and sensorimotor systems (2%).

CONCLUSIONS: Given the relatively small overlap with other RDoC domains (7% on average), this work provides neural support for the idea of emotion regulation as a new RDoC domain.

P3-D-29 - Resting State Functional Connectivity of Emotion Regulation Flexibility

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BACKGROUND AND AIMS: Emotion regulation flexibility (ERF) is the ability to adjust regulatory strategies to differing circumstances. Although ERF was shown to be linked with individuals' well-being, the neural mechanisms underlying it are currently unknown. In this study, we set out to explore the neural correlates of ERF, and specifically test the hypothesis that more flexible connectivity between brain networks will be associated with more flexible emotion regulation.

METHODS: To test this, 40 participants underwent behavioral evaluation of ERF ability and resting-state fMRI scanning, as resting-state fMRI has been shown to represent trait-like aspects of network functional connectivity. The behavioral task included aversive words of high and low intensity, and participants were required to choose between two strategies to regulate their emotions: distraction or reappraisal.

RESULTS: Behavioral results revealed large variability in ERF scores ($M=20.13\pm 15.83$), which enabled the examination of individual differences in neural functional connectivity. Preliminary neuroimaging results revealed that ERF scores were negatively correlated with functional connectivity between the Control Network and Attention Networks, and the Default Mode Network (DMN), such that the stronger the connectivity between these networks, the lower the emotion regulation flexibility score.

CONCLUSIONS: These findings suggest that lower connectivity between neural networks involved in control, attention, and

theory of mind processes, may allow for more effective switching between emotion regulation strategies, which characterize individuals with high emotion flexibility capacity.

P3-D-30 - Thought patterns in daily life predict emotion regulation flexibility and well-being

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BACKGROUND AND AIMS: The ability to regulate emotions is essential to well-being. A growing body of evidence points to the importance of variability in emotion regulation (ER) for adaptive ER: the ability to flexibly match the use of ER strategies with changes in situational demands. Yet, we know little about the factors that drive differences in ER variability across people and contexts. Here, we tested whether features of ongoing cognition – naturally occurring patterns of thought experienced in daily life – predict people's ability to regulate emotions flexibly and their momentary well-being in the real world.

METHODS: In a seven-day experience sampling study, healthy participants (N=47; 1,285 observations) rated their momentary emotions and ER strategy usage in response to those emotions. These measures allowed computing indicators of emotion regulation flexibility (e.g., between-strategy variability, capturing an individual's tendency to prioritize specific strategies based on contextual demands). Experience sampling also assessed momentary well-being (experienced levels of loneliness, stress, anxiety, and support) as well as individuals' ongoing thoughts on 16 dimensions. Data of ongoing thoughts were decomposed to identify latent features of the data (by using principal components analysis, PCA), yielding four thought patterns. These thought patterns were used to predict individual differences in ER flexibility and well-being in daily settings.

RESULTS: We identified detrimental features of ongoing thoughts in daily life: people's tendency to express a particular thought pattern – characterized by intrusive, distractive, and negative thoughts – predicted lower ER flexibility. Second, this thought pattern predicted reduced well-being in daily settings (i.e., higher levels of loneliness, stress, and anxiety). Third, thought patterns moderated the previously reported link between ER variability and negative affect in the real world.

CONCLUSION: Our results demonstrate how thought patterns experienced in daily life shape people's ability to regulate emotions flexibly (to adapt to contextual demands) and their well-being. Understanding the impact of ongoing thought patterns on daily ER flexibility and well-being will contribute to theories on the role of adaptive cognition and can help develop targeted interventions. Incorporating tools of real-world momentary cognition could also provide a novel, cost-effective method for stakeholders (e.g., mental health professionals) to identify at-risk individuals through daily thought patterns via smartphones.

ACKNOWLEDGMENT AND FUNDING: This work was supported by the Social Sciences and Humanities Research Council of Canada, Insight Development Grant.

P3-D-31 - Beyond Valence and Arousal: Constructing a Comprehensive Normative Image Database for Emotion and Reappraisal Research

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BACKGROUND AND AIMS: Neuroscientific experiments on emotion and emotion regulation often employ evocative photographic stimuli sourced from various repositories such as the International Affective Picture System (IAPS). It is generally assumed that images normed with similar ratings of valence and arousal evoke similar emotional states in the participant. However, images can vary considerably with respect to the semantic space in which they are embedded. In a recent review, we argue that the high-level psychological stimulus properties have important implications for both emotion generation (appraisal) and regulation (reappraisal) processes. Further, these properties may relate to the mental construal and the neural representation of the stimulus. Recent research on reappraisal affordances suggests that the stimulus qualities that facilitate reinterpretation extend beyond valence, arousal, or the discrete emotional category depicted in the image. In our own trial-level analyses of reappraisal data, we've found notable variation in per-image reappraisability that, similarly, was not fully explained by differences in valence and arousal suggesting the presence of other affordances. Yet the specific image qualities that offer such affordances remain largely unknown.

METHODS: Here we introduce a normative database designed to map the high-level psychological properties of images. The repository is comprised of nearly 3000 images, rating distributions across 18 unique dimensions, and semantic and visual embedding data captured using artificial intelligence. The 18 dimensions were selected based on our hypotheses regarding level of mental construal and reappraisal affordances. Visual, semantic, and rating cosine similarities were calculated for every image pair in the database resulting in over 2.7 million unique pairs.

RESULTS: A preliminary regression analysis of the similarity data revealed that visual and semantic similarity of the pairs, and their interaction, were highly significant predictors of rating similarity. However, they accounted for a relatively small portion of the variance in rating similarity, as indicated by an adjusted R² of 0.08. Thus, images with similar contents and compositions did not necessarily share similar rating profiles across the 18 psychological dimensions. Further, we utilized a partial least squares regression (PLS) to predict emotional valence and arousal ratings using the 16 additional rating dimensions as predictors. An optimized model with 11 components had moderate predictive power for valence (R² = 0.59) and a relatively strong predictive power for arousal (R² = 0.77).

CONCLUSIONS: This is a promising indicator that beyond content and composition, the high-level psychological characteristics of the image relate to its emotional appraisal. In the future, we will expand the dataset to explore reappraisal affordances by further predicting image reappraisability using these dimensions.

P3-D-32 - Cognitive reappraisal influences the organization of emotional episodes in memory

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BACKGROUND AND AIMS: Across time, fluctuations in emotional states guide an ongoing tug-of-war between memory integration and separation processes, leading to the formation of distinct episodic memories. Recent work suggests that negative emotions play an especially important role in shaping this push-and-pull process. Namely, a negative stimulus may act as an 'event boundary' that parses continuous experience into distinct memories. By contrast, a reduction in negative emotion facilitates the compression and integration of information into individualized episodes. Here, we examined if emotion regulation strategies can modify the impact of negative emotions on the temporal organization of memory.

METHODS: Participants viewed lists of neutral objects and judged the likeability of each item. Midway through each list, participants encountered a negative image and were cued to either reappraise their emotional response to the image or to simply view the image. To determine if memories had been separated or integrated by emotion, participants then had to indicate whether different item pairs had appeared relatively close by in the sequence or relatively far apart. Critically, the objective distance between the item pairs was always identical, so any differences in distance ratings reflected subjective memory distortions of time.

RESULTS: As expected, simply viewing a negative stimulus elicited event segmentation in memory, as indexed by more expanded retrospectives of time for boundary-spanning pairs compared to pairs that preceded or followed the emotional image. Contrary to our prediction, reappraising the emotional images did not reduce event segmentation and led to the same time dilation effect for boundary-spanning pairs. Next, we used linear mixed modeling to examine if trial-level differences in the magnitude of emotional shifts predicted time dilation effects. The success of regulation strategies was inferred by computing the amount of change in likeability ratings between the to-be-tested item pairs. We found a significant ratings-by-condition interaction effect on temporal distance memory, such that reductions in negative affect led to time dilation, or memory separation, in the reappraisal condition but not in the view condition.

CONCLUSIONS: Together, these findings suggest that there may be two routes to segmenting events in long-term memory: a bottom-up process driven by negative emotion and a top-down process driven by cognitive control. Negative emotions thereby do not always lead to the same memory outcomes, revealing flexibility in the way humans organize memories of important events. This work may help to inform cognitive strategies for treating disorders of emotion characterized by memory disorganization, such as post-traumatic stress disorder.

P3-D-33 - Deviations in EEG Microstate B predict catastrophizing, but not adaptive emotion regulation strategy use across the lifespan

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BACKGROUND AND AIMS: Reduced use of effective emotion regulation strategies and overreliance on maladaptive regulation are key features of mood disorders. Disruptions of resting state cortico-limbic connectivity are markers of psychopathology and predictive of trait adaptive and maladaptive emotion regulation strategy use. Similarly, EEG microstates, or brief (80-120 ms), quasi-stable scalp distributions of electric potential that reflect neural activity, can be predictive of psychopathology. Four prototypical microstate classes (A, B, C, and D) have been widely observed in previous resting EEG (rsEEG) research and account for a high proportion of EEG variance. Of these classes, occurrence of microstate B in particular has been found to predict mood and anxiety disorders relative to control. However, associations between rsEEG microstates and trait adaptive and maladaptive emotion regulation use remain unknown.

METHODS: In this study, we analyzed rsEEG data for $n = 129$ participants from the Leipzig Study for Mind-Body-Emotion Interactions (LEMON). Participants were right-handed, had no history of psychiatric illness or current substance use, and were part of a lifespan sample (ages 20-80). Microstate analysis was conducted in MATLAB. After using a modified k-means clustering algorithm to segment rsEEG data into two to eight microstates, we determined goodness of fit using the Pascual-Marqui cross-validation criterion and confirmed four dominant microstates. Traditional EEG microstate measures were then extracted. Multivariate multiple regression models were run in R with emotion regulation strategy use, measured by the Cognitive Emotion Regulation Questionnaire (CERQ), as predictors of each microstate outcome.

RESULTS: Our findings suggest that in nonclinical populations, temporal parameters in microstate B may reflect underlying emotion regulation deficits that contribute to anxiety and mood disorders, particularly engagement in catastrophizing. Results showed that catastrophizing significantly predicted microstate parameters, specifically the duration ($t = 3.657, p < 0.005$), coverage ($t = 3.937, p < 0.005$), and GEV ($t = 4.272, p < 0.005$) of microstate B.

CONCLUSIONS: Microstate B has previously been associated with bottom-up visual network activities, as well as self-focused rumination on one's own behavior and feelings. While past work has shown that the occurrence of microstate B was greater in patients with mood disorders, our findings indicate that other deviations in microstate B parameters are predictive of maladaptive emotion regulation in healthy adults. As past studies have shown that maladaptive strategy use tends to be more predictive of psychopathology than adaptive strategy use, our findings may shed light on the neural mechanisms of maladaptive emotion regulation that could contribute to psychopathology across the lifespan.

P3-E-34 - Differences in Response to Joint Attention in Children with Neurodevelopmental Disorders as Compared to Typically Developing Children Using Eye-Tracking Methods

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BACKGROUND: Responsiveness to joint attention (RJA) is a form of nonverbal communication through coordinating gaze between objects. RJA is related to social development and developmental differences in RJA linked to autism can be detected using eye-tracking (ET) techniques. Phelan McDermid syndrome (PMS) is a rare genetic disorder associated with a high prevalence of autism spectrum disorder (ASD); whether the differences in RJA in ASD also exist in PMS remains unknown. The current study used ET to investigate differences in RJA and their association with clinical symptoms in PMS, idiopathic autism (iASD) with intellectual disability (ID), and typically developing (TD) children.

METHODS: Nineteen iASD+ID, 24 PMS children, and 13 TD children (Age=6.28 +/-3.1 years) completed a joint attention ET task involving observing a central actor look at an object on the left or right. The actor first looks at the center, looks down, then turns their head toward one of the objects (target) and not the other (distractor). The proportion of dwell time spent looking at the target vs. distractor (Target Dwell Time), and proportion of saccades where subjects looked to the target object before the distractor (Proportion Target Looking First) were calculated. We tested if ET differed by group using a Wilcoxon signed-rank test. Correlations explored relationships between ET measures of RJA and the Total and Social Affect Scores from the Autism Diagnostic Observation Schedule (ADOS-2) and the Communication and Socialization Standard Scores from Vineland Adaptive Behavior Scales, Third Edition (Vineland-3) within and across PMS and iASD groups.

RESULTS: There was a significant difference between RJA for iASD and PMS combined, compared to TD children in both Target Dwell Time (TDT:W=186,p=0.048) and Proportion of First Look at Target (PFLT:W=175.9,p=0.035). Median ET measures between the iASD and PMS groups did not differ in both tasks respectively (TDT:W=255.5,p=0.724; PFLT:W=274.5,p=0.422) but were significantly different when comparing the PMS vs. TD groups (TDT:W=90,p=0.037; PFLT:W=82,p=0.0184). Although iASD and PMS ET medians were similar, the differences between iASD and TD group were not significant (TDT:W=87,p=0.118; PFLT:W=97.5,p=0.238). RJA eye-tracking measures did not correlate with clinical measures within or across PMS and iASD.

CONCLUSIONS: Findings demonstrate differences in RJA in neurodiverse children compared to TD children. Similar gaze behaviors across PMS and iASD suggests that ET can be a useful tool for quantifying RJA across neurodevelopmental disorders. The absence of significant relationships between ET measures of RJA and clinical measures of social communication skills may highlight the heterogeneity of the autism spectrum. Future research with larger samples size should continue to explore these relationships, their mechanistic implications, and to evaluate the utility of ET to detect change in the context of intervention.

P3-E-35 - Exploration versus Exploitation Dilemma: Neurochemical and Neurophysiological Correlates of Decision Making in Parkinson's Disease: using Source imaged Magnetoencephalography and Semantic Fluency Data

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Patients with Parkinson's Disease (PD) experience profound impairments in decision-making. Exploration versus exploitation (EE) is a key decision-making tradeoff involving choosing between a familiar option with a predictable reward (exploitation) and an uncertain but potentially more rewarding option (exploration). PD can impair the ability to balance EE, potentially leading to either excessive habitual behaviours (over-exploitation) or inconsistent decision-making (over-exploration). The neurophysiological changes that underlie these potential decision-making deficits are understudied. However, noradrenergic signaling from the locus coeruleus (LC) may be involved.

This study will utilize neuromelanin-MRI of the LC and task-free magnetoencephalography (MEG) to examine the neurophysiological and neurochemical factors linked to the EE trade-off in PD patients. Specifically, we will study neuromelanin-MRI as a measure of the structural integrity of the LC and MEG-derived power spectral density (PSD) from 29 PD patients (mean age = 66 years, 11 Women, 18 Men). We will quantify neuromelanin-MRI of the LC and compute alpha band activity (8-12Hz) using MEG-derived power spectral density (PSD) plots. We will quantify semantic fluency within an EE framework using distributional semantics models with parameters set to capture a range of semantic distances context window sizes from 5 to 10 words, vector dimensions ranging from 300 to 600, and a word frequency cut-off of 5 to ensure robust vector representations. Each vector will be used to calculate weighted average cosine similarity scores stratified by time and word relatedness, with cosine similarity thresholds ranging between 0.2 to 0.8 to score EE semantic shifts in knowledge.

We will use linear regression analysis to identify the role of alpha band activity as a potential mediator of LC neuromelanin to the semantic EE tradeoff in PD. We predict that LC neuromelanin will predict EE behavioural scores and that this association will be mediated by alpha activity in PD. Investigating the relationship between the neurochemical changes in PD and the cognitive shifts in EE decision-making can offer a more comprehensive understanding of PD's impact on core aspects of human decision-making.

P3-E-36 - Social Anxiety in Adolescents: Insights from Neuromelanin-Sensitive MRI in the Substantia Nigra

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BACKGROUND AND AIMS: Social anxiety is a highly prevalent condition characterized by persistent fear of negative evaluation. Onset typically occurs in adolescence, just as salience of peer feedback increases. Children with social anxiety often have comorbid generalized anxiety symptoms, which is defined as excessive and uncontrollable worry across numerous domains. While some evidence suggests a link between dopamine (DA) system function and social anxiety, this relation has primarily been explored in adults due to invasive methods such as PET and SPECT, which utilize radioactivity and are contraindicated in children. Thus, novel methods are needed to study the etiology of social anxiety in youth. Neuromelanin sensitive MRI (NM-MRI) is a non-invasive neuroimaging method that provides a putative proxy measure of DA system function in the substantia nigra (SN). We used these methods in adolescents to test the relation between DA system function and social anxiety symptom severity. To determine specificity or generalizability of effects, relations with generalized anxiety symptom severity were also assessed.

METHODS: Adolescents (N=44, 41% female) 10-15 years of age (12.38 ± 1.45 years) underwent a NM-MRI scan. Social and generalized anxiety symptoms were measured via parent report on the Screen for Child Anxiety Related Disorders. Social and generalized anxiety symptoms were highly correlated ($r(43)=.67$, $p<.001$). To test for symptom specificity, each was residualized on the other. Using residualized variables, two voxelwise analyses were performed within an anatomically defined SN mask (1879 voxels) to test relations between NM signal intensity and each anxiety type. Region of interest (ROI) based regression analysis including both anxiety types were performed to confirm results. Analyses covaried for age due to lifetime NM accumulation.

RESULTS: Higher NM signal intensity (i.e., higher DA system function) was associated with more severe social anxiety (893/1879 voxels, $p=.012$), but not generalized anxiety (36/1879 voxels, $p=.396$). An ROI analysis confirmed results ($R^2 = .24$, $F(3,40)=4.2$, $p=.01$; social anxiety: $b= .40$, $SE= .13$, $t=2.96$, $p=.005$; generalized anxiety: $b= .20$, $SE=.13$, $t=-1.531$, $p=.13$).

CONCLUSION: Results offer preliminary evidence that higher DA system function is associated with more severe social, but not generalized, anxiety. This may be due to the role of reward in social interaction. Our findings suggest specificity for neural mechanisms associated with social and generalized anxiety, and may shed light on their etiology. To better understand the role of DA system function in the expression of social anxiety, future research is needed to examine the relation between NM signal intensity and brain function during symptom-eliciting situations.

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P3-E-37 - Linking real-time exposure to the tobacco retail environment with craving and other outcomes

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BACKGROUND AND AIMS: In the US, smoking accounts for 1 in 5 deaths each year (US Department of Health and Human Services, 2014). The US tobacco industry spends \$8.4 billion or 96.8% of annual marketing on point of sale tobacco marketing (POSTM; US Federal Trade Commission, 2023), which includes advertising commonly installed behind cash registers in retail outlets like convenience stores (Kong & Henriksen, 2022). POSTM exposure is linked to adverse outcomes including increased cigarette cravings, purchase urges, failed quit attempts, and impulse purchases (Carter et al., 2009, 2015; Siahpush, Shaikh, Cummings, et al., 2016; Siahpush, Shaikh, Smith, et al., 2016; Wakefield et al., 2008). Further, neuroimaging studies have linked activity in reward brain systems to subjective craving and to viewing smoking cues including pictures of cigarettes (Engelmann et al., 2012). Few studies have objectively quantified and linked day-to-day POSTM exposure to smoking outcomes in a naturalistic context or neural cue reactivity. Such research is essential in understanding real-world and dynamic associations between tobacco advertising and smoking behaviors, and the mechanisms leading to health decisions. This study combines geolocation tracking and experience sampling through smartphones in a pre-registered, longitudinal design to examine time-sensitive associations between real-world tobacco retail exposure, cigarette cravings, cigarettes smoked, mood, stress, and brain responses.

METHODS: Although pilot data are reported here, results from the full sample of 225 main behavioral study participants are anticipated by February 2024. For the pilot, geolocation and daily experiences were measured in 30 adult smokers in Philadelphia via smartphone for 14 days. Participants answered questions about cigarette cravings (6x daily) and cigarettes smoked (3x daily). We quantified participants' daily POSTM exposure by combining information from their Google Maps location history with licensing data for tobacco retail locations. We hypothesized that individuals' cigarette craving would be higher on days when their POSTM exposure was higher than usual (Preregistration). A subset of eligible participants also complete an fMRI scan, in which they are shown pictures of smoking and non-smoking cues including retail advertising, and report craving.

RESULTS: A linear mixed effects model on pilot data revealed that individuals reported higher cigarette cravings on days when their POSTM exposure was higher than their own usual baseline ($\beta = 0.002$, $t = 2.31$, $p = 0.02$). We did not find associations between POSTM exposure and cigarettes smoked. We will examine these associations, and their interactions with demographics and affect variables such as mood and stress, in the full sample before SANS. We will also present preliminary findings from a subset of participants with fMRI scans relating real-world POSTM exposure and brain responses to POSTM cues.

CONCLUSIONS: Our preliminary results, alongside replication in the full sample, will provide a mechanistic understanding of everyday smoking behaviors which can help inform future interventions. Further, we plan to examine whether neural reactivity to POSTM cues is associated with real-world POSTM exposure levels, which can yield insight into biological mechanisms that drive real-world behavior and decision-making.

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P3-E-38 - Supportive Interpersonal Processes as A Buffer Against Depression Among Minoritized Students

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BACKGROUND AND AIMS: Understanding the role of affective science as it relates to developmental-related and minority stress is crucial, particularly how it could help explain the pronounced burden of depression among minoritized postsecondary students compared to majoritized counterparts. To date, the minority stress model (Meyer, 2003) and distinct social support models (Ibarra-Rovillard & Kuiper, 2011; Marroquín, 2011) have helped to describe the role of social support in buffering the negative mental health outcomes of stressors through the fulfillment of basic psychological needs and interpersonal emotion regulation. This research aims to simultaneously apply the minority stress model and both needs-based and emotion regulation-based social support models in minoritized first-year emerging adult students as they transition into predominately White and straight higher education institutions. More specifically, the study will examine the protective role of feelings of emotional closeness (i.e., an indication of connectedness needs being met) and trait use of soothing (i.e., an interpersonal emotion regulation strategy involving seeking sympathy and comfort from others) on the relationship between minoritized identity and anhedonic depressive symptoms.

METHODS: A sample of 257 Canadian first-year undergraduates completed baseline measures of demographics, feelings of emotional closeness (Flores & Berenbaum, 2012, 2014), trait use of soothing (Hofmann et al., 2016), and anhedonic depressive symptoms (Watson et al., 1995). Statistical analyses will explore two hypothesized two-way interactions.

RESULTS: We expect students of colour and sexual/gender-minoritized students will report higher anhedonic depressive symptoms (e.g., loss of interest or pleasure, sustained low positive affect) compared to their majoritized counterparts. Further, we expect that feelings of emotional closeness will moderate the relationship between minoritized identity and anhedonic depressive symptoms, such that the difference in anhedonic depressive symptoms between minoritized and majoritized groups will be smaller among students with higher (versus lower) levels of feelings of emotional closeness. Soothing will similarly moderate the relationship between minoritized identity and anhedonic depressive symptoms, such that the difference in anhedonic depressive symptoms between minoritized and majoritized groups will be smaller among students with higher (versus lower) trait use of soothing.

CONCLUSIONS: This study will provide a nuanced perspective on the importance of interpersonal resources in buffering disordered affective experiences among minoritized and majoritized groups in the postsecondary environment.

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P3-E-39 - Exploring the patient-clinician relationship in chronic pain treatments: A naturalistic longitudinal study using real-time dual-brain fMRI

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BACKGROUND AND AIMS: Social interactions are complex and driven by individual differences which is particularly true for clinical interactions between patients and clinicians. To fully understand the mechanisms and purported value of therapeutic alliance (THA), we created a synchronized, real-time dual-brain fMRI (i.e., hyperscan) approach to investigate patient-clinician dyadic interactions embedded within a longitudinal study design. As previous research suggests that a warm-empathic (Augmented) compared to a neutral, business-like (Limited) patient-clinician relationship can improve clinical outcomes, clinicians were trained to deliver care in either style during a course of therapy for chronic pain patients.

METHODS: Twenty-five patients with fibromyalgia (23 female, mean age±SD=39.32±13.00) were randomly assigned to an Augmented (N=12) or Limited (N=13) patient-clinician dyadic interaction style (trained acupuncturists). Each dyad underwent synchronized real-time dual-brain fMRI with a live video connection between two scanners and an evoked cuff pressure pain/treatment paradigm (2 synchronized Siemens 3T scanners; TR/TE=1250/33ms; SMS MB acc. factor=5; voxel size=2mm³; 75 slices; 2x358 volumes) before and after 6 acupuncture treatments (i.e. biweekly over 3 weeks). Main treatment effects and dyadic patient-clinician brain-to-brain concordance were analyzed focusing on social mirroring and empathy related brain regions (e.g. TPJ). The quality of the patient-clinician relationship and clinical outcomes were assessed via self-report questionnaires.

RESULTS: Patients rated THA, Trust (T), and clinicians' Warmth (WM) higher for the Augmented (mean±SD: THA=41.38±4.84; T=43.50±2.75; WM=3.98±0.07) vs. Limited group (THA=23.58±12.59; T=33.69±6.26; WM=2.56±0.97; tTHA(23)=4.59, p<0.001; tT(23)=4.99, p<0.001; tWM(23)=4.51; p<0.001). Pain catastrophizing was significantly reduced after the intervention in the Augmented, ΔA=-7.25±5.75, but not the Limited group, ΔL=0.85±5.66 (Time x Group interaction, F(1,23)=12.58; p=0.002). For both groups, the intervention decreased clinical pain. We found reduced patients' fMRI response to anticipated and

delivered evoked pressure pain in nociceptive processing areas. Brain-to-brain concordance analysis revealed changes in dynamic brain responses of patients and clinicians in default mode network (DMN) and nociceptive areas between Baseline and Post intervention MRI (including primary somatosensory cortex, primary motor cortex, superior parietal lobe).

CONCLUSIONS: By studying naturalistic social interactions with two interactive systems (patient and clinician), we start to understand the true underlying neural and behavioral mechanisms of clinical interactions. Moreover, we hope that our results will inform future chronic pain treatment approaches, especially how to harness the positive effects of the patient-clinician relationship.

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P3-F-40 - Heroes and villains: opposing narrative roles engage neural synchronization in the inferior frontal gyrus

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BACKGROUND AND AIMS: Narrative engagement has important implications for social cognition, as we actively infer the actions, goals, and intentions of different characters as we do with people in the real world. Here, using movie-watching fMRI, we sought to identify the neural underpinnings of processing opposing narrative roles (i.e., protagonists and antagonists) while the participants watched a film with highly engaging, socially rich audiovisual narratives.

METHODS: We utilized two publicly available fMRI datasets in which participants watched parts of *Sherlock* and *The Grand Budapest Hotel*. BOLD timeseries were extracted from 100 parcels based on the Schaefer-Yeo cortical atlas (Schaefer et al., 2018). We annotated and concatenated the TRs during which the protagonists (*Sherlock* and *Gustave*) and antagonists (*Mycroft* and *Dmitri*) appeared on screen for each character. Then, neural synchronization was calculated using inter-subject correlation (ISC) by randomly sampling TRs to match the TR length of the protagonist or antagonist who had less screen time. Paired t-tests were performed to identify parcels whose ISC differed between the protagonists vs. antagonists. We repeated this procedure for 1,000 iterations and found parcels that consistently showed significant differences in at least 95% of the iterations (i.e., > 950 iterations) in both datasets for generalizability.

RESULTS: Across both datasets, the left inferior frontal gyrus (IFG) and left orbitofrontal cortex (OFC), which are subregions of the default mode network (DMN), showed significantly higher ISC Bonferroni-corrected $p < .0005$ during the appearance of the protagonists (parcel 42: *Sherlock* ISC = 0.123, $p = .0002$; *Mycroft* ISC = 0.010, ns; *Gustave* ISC = 0.163, $p = .0002$; *Dmitri* ISC = 0.061, ns; parcel 43: *Sherlock* ISC = 0.217, $p = .0002$; *Mycroft* ISC = 0.072, ns; *Gustave* ISC = 0.145, $p = .0002$; *Dmitri* ISC = 0.036, ns). Conversely, the auditory cortex exhibited significantly higher ISC when antagonists appeared on screen (parcel 10: *Sherlock* ISC = 0.439, $p = .0002$; *Mycroft* ISC = 0.543, $p = .0002$; *Gustave* ISC = 0.527, $p = .0002$; *Dmitri* ISC = 0.620, $p = .0002$; parcel 59: *Sherlock* ISC = 0.383, $p = .0002$; *Mycroft* ISC = 0.494, $p = .0002$; *Gustave* ISC = 0.426, $p = .0002$; *Dmitri* ISC = 0.522, $p = .0002$).

CONCLUSIONS: We found that the IFG and OFC, which are parts of the DMN, are conditionally involved in processing opposing narrative roles. A possible interpretation is that information integration and emotional empathy are employed depending on a character's narrative role during movie watching. Our findings add to the current literature that different narrative roles involve high-order social cognitive processing and may set the stage for a better understanding of person perception in more naturalistic settings.

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P3-F-41 - Desynchronized affective responses linked to polarized processing of political content.

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The steep increase in political polarization seen in the United States is assumed to be the result of affective polarization, where negative feelings towards political foes and positive attitudes towards political allies drive polarized perspectives. One proposed mechanism underlying feelings of connectedness to those in the same political party is increased neural alignment or synchronization between politically like-minded individuals. How exactly affect and emotion impact the relationship between neural synchrony and political alignment remains unknown. Here we test various affective pathways that may modulate the neural synchrony observed between those on the same side of the ideological aisle. By measuring the body's physiological arousal response, which provides an unbiased index of emotional arousal, we are able to directly link neural synchrony during naturalistic political content to partisan differences in affective responses. We collected fMRI, skin conductance responses (SCR), and pupil dilation data while participants on both sides of the political spectrum (N=44) completed a naturalistic video watching task, consisting of real-world political videos. Leveraging two measures of shared processing, inter-subject synchrony and shared temporal event segmentation, we find that increasingly similar physiological emotional arousal responses are associated with greater similarity in neural processing of political content when two individuals share a political ideology. In politically like-minded individuals, more similar temporal patterns of emotional arousal—for both SCR and pupil dilation—predicted increased neural synchrony in brain regions commonly associated with affective valuation and perspective taking (i.e., the amygdala, striatum, dorsomedial prefrontal cortex, and temporoparietal junction). These findings provide some of the first neurophysiological support for the theory of affective polarization. By integrating different measures of affective processing, we can gain new insight and a more complete understanding of the mechanisms leading to a polarized perception.

This alignment between political partisans, both at the neural and physiological level, helps explain the perceived social connectedness within one's own party, and the disconnect felt by those on the opposite side of the political aisle.

P3-F-42 - Using Multimodal Transformer and Diffusion Model to Decode Human Brain Activity During Social Narrative Processing

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BACKGROUND: Recent research has highlighted the vast potential of deep neural networks (particularly transformers) in brain sciences, such as in unraveling the language and visual processes in the brain. Meanwhile, studies have also embarked on the ambitious task of reconstructing sensory inputs from brain activity using generative models (especially diffusion models), in terms of both visual images and language. Nonetheless, higher-order functions of the human brain, such as social cognition, remain relatively unexplored from this perspective, while conventional methods struggle to computationally account for these complex cognitive functions. Here, we propose and engineer a pipeline to decode fMRI data, gathered while participants process social narratives conveyed via one modality (e.g., story-listening), into output of another modality (e.g., images). Given that high-level social meaning is modality-independent, this approach could serve as a probing tool to help understand how various brain areas represent and operate on social information.

METHODS: For each participant, we will train this pipeline in 2 stages, using fMRI data from the same individual while they complete movie-watching and story-listening tasks. In stage 1, latent embeddings will be obtained from a vision-language transformer (e.g., CLIP) for the same movie stimuli viewed by participants. Using transformer embeddings, an encoding model will be built to predict responses in each brain voxel and identify the most predictive voxels. These voxels will be used to build a decoding model, which predicts transformer embeddings based on brain responses to the same stimuli.

In stage 2, the decoding model will first be applied to the movie-watching fMRI dataset to predict corresponding transformer embeddings. The predicted embeddings will then serve as input for a generative model (e.g., stable diffusion), to reconstruct the original image input. Using the movie-watching data, this pipeline can be trained from end to end to improve the reconstruction quality. Subsequently, the movie-watching data will be replaced with story-listening fMRI data from the same participants, and as such, this pipeline will allow image reconstruction based on brain responses to stories. Reconstruction performance will be evaluated, and the applications of this pipeline will be discussed. Additionally, we will systematically select voxels from specific brain regions to build different decoding models; comparisons among the generated images could provide insight into the unique contributions of each region to the extraction and processing of supramodal information from social narratives.

CONCLUSIONS: This approach will not only help evaluate the feasibility of mental state reconstruction, but also offer a novel lens allowing us to better understand how the brain derives high-level, supramodal meaning from narratives. This could substantially advance our understanding of high-level information processing in the brain.

P3-F-43 - The role of STS in encoding social information during naturalistic viewing

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BACKGROUND AND AIMS: The superior temporal sulcus (STS) has been demonstrated to play a central role in the processing of social information and its encoding into memory. Disruption of the posterior STS can impair the perception of social stimuli, and neural activity and intersubject correlations in the pSTS are associated with social memory. The formation and maintenance of social connections relies in part on a shared representation of events in the world. Here, we used theta-burst transcranial magnetic stimulation (TBS) to examine the contribution of the pSTS to the encoding of social information during naturalistic movie watching, and to examine the effects of modulation of this region on the similarity of social memories of the movie events.

METHODS: In one session, participants viewed videos consisting of people, places, food, objects, and scrambled videos, to localize pSTS. Resting motor TMS thresholds were also acquired. In a second scanning session, we administered either inhibitory (continuous) or facilitatory (intermittent) theta burst TMS (TBS) to functionally-localized right pSTS or sham (vertex) TBS in a between groups design, before participants viewed a 20min movie ("The Neighbors Window"). Following scanning, participants were asked to recall as many details as possible from the movie. Whisper AI, verified by human observers, was initially used to transcribe the contents of verbal recall. Transcripts then underwent windowing and event segmentation for temporal analyses. Sliding window data were analyzed using sentiment analysis (VADER) to quantify the positive/negative content of speech, and lexical-semantic word properties were used to examine the emotional valence, emotional strength, and social content of speech. Event segmentation was used to segment speech into topics which were then analyzed for episodic and semantic content using a pretrained distilBERT model.

RESULTS: Preliminary analyses show that participants recalled data in different levels of detail; while participants in each group overall used a similar numbers of words during recall, the recall of participants in the continuous TBS group tended to segment into fewer events than the intermittent TBS and sham TBS groups. Time courses for emotional and social content of recall also varied across TBS groups. Additional analysis will examine the similarity of memory recall between the TBS conditions.

CONCLUSIONS: This study is expected to provide new details about the causal role of the pSTS in the encoding of social memories, and the contribution of this region to the formation of shared social representations.

P3-F-44 - Multivariate neural pattern changes reflect within-subject shifts in subjective interpretations

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BACKGROUND AND AIMS: Multivariate neural representations track changing percepts. This has been shown in low-level perception, but social contexts where diverse interpretations and alternative explanations (e.g., a friend's opinion) are common have been underexplored. Here we tested if and where activity patterns shift within an individual when switching between interpretations. Subjects formed interpretations of ambiguous stimuli and were presented with alternatives. We tested whether alternative interpretations induce within-subject multivariate neural pattern shifts that subsequently predict reappraisal (change in subjective interpretation).

METHODS: During fMRI scanning (3T, voxel size=2.7mm³, TR=1.057), subjects (n=14) were presented with ambiguous images and interpreted them. Next, on experimental trials only, they read another possible interpretation and then did an appraisal task where they rated the likelihood of either just the self-generated interpretation (for control trials) or both the self-generated and the alternate interpretation (for experimental trials; Fig. 1a). Scanning was conducted in an iterative design, where alternative interpretations were obtained from earlier subjects and selected in real-time using natural language processing (BERT), ensuring balanced distributions of 1) semantic distance between the interpretations ("consensus"), and 2) the identity of whom inputs were sourced from. Data collection is ongoing (target n=30).

Voxels were grouped into 100 cortical nodes using the Schaefer parcellation. An event-related general linear model (GLM) approach was applied, modeling the onset and offset of viewing of an image within a given trial (e.g., initial or second viewing; Fig. 1), yielding a beta for each. We computed neural shifts as the cosine distance (1-r) between multivoxel patterns in a given node between the two viewing phases of a trial (Fig. 1b).

RESULTS: We fit linear mixed effects models with subject and image as random effects to test the effect of condition (Fig. 2a) and, for experimental trials, consensus and neural shifts on reappraisal (Fig. 2b). The degree of neural shift was greater in the experimental condition and increased on a cortical gradient, with the largest differences across nodes in the frontoparietal network (FPN) and the default mode network (DMN). Greater neural shifts predicted reappraisal trials especially with lower consensus. This was seen mostly in the DMN.

CONCLUSIONS: Using a task with ambiguous social content, we show that shifts in multivariate patterns of neural activity when processing the same sensory information can predict shifts in behavioral interpretation of that information.

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P3-F-45 - Purposeful versus automatic measures of social attention: The impact on ERP correlates during face perception

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BACKGROUND AND AIMS: Social attention, an important mechanism that orients people to social cues, is critical for the development of higher-ordered features of social cognition. Both endogenous (i.e., automatic and undirected) and exogenous (i.e., purposeful and directed) social attentional skills are important for processing social features, yet there is limited work systematically addressing how experimental manipulations of each skill modulates social attention. This study examined how endogenous and exogenous manipulation of a classic face discrimination task influences neural social attentional outcomes.

METHODS: As part of a larger study, 65 adolescent (aged 10-14 years) and 64 young adult (18-35 years) participants completed a battery of social attention tasks during EEG acquisition. For the endogenous task, participants passively viewed neutral expression faces that were either upright or inverted. For the exogenous task, participants were presented with the same experimental design as the endogenous task but were asked to respond after each trial indicating whether the person identified as male or female. Neural social attentional outcomes were measured using EEG. Our objectives are to understand how face inversion effects (e.g., upright versus inverted) are impacted by the paradigm manipulation (passive viewing, active response) and development (adult, child). To do this, we will examine amplitude and latency changes among several different event-related potential components using a single-trial approach.

RESULTS: Data collection is complete and preprocessing of EEG has started. Single-trial analyses will utilize multilevel models with random intercept to account for repeated measures, fixed effects to account for condition (upright, inverted), paradigm manipulation (passive, active), and group (adult, youth) and all possible interactions. We will also include fixed and interacting effects for trial number to assess habituation across the experiments.

CONCLUSIONS: These findings will clarify the role of experimental design on face perception outcomes. We predict that low-level social attentional processes (as reflected by P1, and N170 components) may be less influenced by task demands than higher-order cognitive processes (as reflected by N250, P3, and LPP components). Lastly, we will examine the possible role of habituation by examining temporal dynamics associated with ERP changes across each experiment.

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P3-F-46 - Love at first sight? The role of the dmPFC in responding to social feedback from potential romantic partners

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BACKGROUND: When we form a social relationship with someone (a target), how they feel about us is just as important as how we feel about them. If we learn that a target's feelings about us differ from our feelings about them (i.e., feelings are "unaligned"), this may change our desire to continue building a social relationship with them and may change the neural representation of this target. One brain region that may be important for these processes is the dmPFC, given its role in person perception and schema updating. We investigated whether and how the dmPFC tracks social feedback from others.

METHODS: Whole brain fMRI data were collected from 30 single participants (17 F, 22 straight) while they watched 8 dating profile videos and assessed targets on romantic compatibility (RC). Pre-scan, participants made their own video and were told the targets would provide binary feedback (in reality, feedback was pseudorandomized). After watching target videos, participants underwent a 6.5-minute resting state scan (Rest 1). Then, participants received feedback; watched a new video of, and re-assessed, each target; and completed another resting state scan (Rest 2). Neural templates were calculated for neural similarity and reinstatement analyses by averaging over all timepoints within each target video, using all voxels in a dmPFC mask from the Neurosynth $k = 50$ parcellation.

RESULTS: We found an interaction between feedback valence and alignment for change in participant beliefs about target RC ($B = -2.58$, $SE = 0.38$, $p < 0.001$). Specifically, RC ratings changed more in response to unaligned feedback than to aligned feedback, and even more when the unaligned feedback was negative. The dmPFC tracked feedback alignment, as neural representations for targets were more spatially similar between targets who provided the same feedback than between targets who provided different feedback ($B = -0.025$, $SE = 0.008$, $p = 0.003$). Reinstatement analyses demonstrated that individual targets were reinstated in the dmPFC, as reinstatement frequency was higher for targets during Rest 1 than during a baseline rest pre-videos ($B = 3.95$, $SE = 1.73$, $p = 0.03$). When comparing baseline to Rest 2 (post-feedback), this effect nearly doubled ($B = 7.17$, $SE = 1.80$, $p < 0.001$). However, reinstatement frequency was not predicted by either feedback alignment or feedback valence.

CONCLUSIONS: Our results demonstrate that we change our beliefs about other people based on our initial feelings towards them and their feelings towards us. We also found that the dmPFC contributes to this process by tracking the alignment of social feedback from specific other people. The increase in reinstatement frequency post-feedback in the dmPFC also suggests that we think about people who have provided us with social feedback more than when they haven't provided us with feedback. However, dmPFC reinstatement frequency was not impacted by the specific type of feedback.

P3-F-47 - Sense of agency in joint actions: an fMRI study

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BACKGROUND AND AIMS: The sense of agency refers to the feeling of voluntarily controlling our actions and the outcomes they produce. It plays a pivotal role in our self-awareness, forming the basis of our understanding of responsibility within a social framework.

Although considerable research has focused on investigating the sense of agency in individual contexts, our understanding of agency during motor interactions remains relatively limited despite its significance. Here, we investigated whether the sense of agency and its neural correlates may be modulated by interacting with another agent.

METHODS: During fMRI scanning, fourteen pairs of healthy subjects ($N=28$, age mean: 20.64 ± 1.61 years) actively (ACTIVE condition) or passively (PASSIVE condition) pressed a button to cause, after a variable delay, an external sensorial event (the lighting on of a lightbulb). This task was performed individually (SOLO condition) or while required to press the buttons synchronously with another agent (JOINT condition). We assessed participants' explicit and implicit sense of agency by collecting overt agency judgments (i.e., explicit judgments of agency) and measuring the perceived compression of the time interval between the active/passive movements and outcomes (to quantify the intentional binding phenomenon, our index of the implicit feeling of agency).

RESULTS: At the explicit level, we observed a reduced sense of agency in active JOINT trials compared to the SOLO ones. Similarly, we observed the expected intentional binding effect only in SOLO trials and not in JOINT ones.

fMRI results showed a significant correlation between the magnitude of the intentional binding effect and activation of the pre-SMA in the SOLO condition, replicating our previous results. On the other hand, in the JOINT condition, we did observe a significant association between the perceived sense of agency and the activation of a neural network involved in social cognition and reward-related behavior.

CONCLUSIONS: Our results indicate that the participants feel reduced control over action outcomes when these are achieved by coordinating their actions with a partner. This behavioral result seems related to the recruitment of different neural networks involved in elaborating high-level social and reward-related cues, as if a successful motor interaction may generate satisfaction and pleasure. This process could be linked to strengthening the dyadic "we" identity and the emergence of a we-agency whose strength would be closely related to the quality of the interaction and its degree of success.

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P3-F-48 - Spatial and Temporal Dynamics of Social Touch Processing in Infancy

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BACKGROUND AND AIMS: Understanding the neural correlates of social touch (e.g., non-sexual, affiliative, and pleasant touch) in infancy is critical for providing biomarkers for healthy development. This requires a holistic understanding its temporal and spatial dynamics. Current infant literature capitalizes on electroencephalography (EEG), which provides high temporal resolution, but is sparse in assessing spatial dynamics. Adult literature using functional magnetic resonance imaging (fMRI) has identified subcortical areas related to emotional processing in response to social tactile information. Thus, we must begin to assess the development of sensory processing dynamics from both a temporal and spatial domain. We aim to use EEG and fMRI technology to map social tactile processing in early infancy.

METHODS: The EEG study included 34 infants averaging 126 days old ($F=15$). The infants participated in the EEG while undergoing social and non-social touch. The social condition consists of a 3cm/sec paintbrush stroke to a left limb, while the non-social context uses a piece of plastic to separate the brush from the skin. We calculated the peak amplitude of the late positive potential (400-600 ms post-stimulus), which is thought to reflect the socioemotional processing of touch, for the social and non-social condition. A paired t-test assessed the difference in amplitude for each context. The fMRI study included nine infants averaging 94 days old ($F=3$) who underwent an fMRI while experiencing the social and non-social touch paradigm described above. Group-level analyses in FSL assessed the main effect of social compared to non-social touch across all cortical regions.

RESULTS: We found greater peak amplitude for social compared to non-social touch at C3 ($t(33)=-1.89$, $p=.034$). While FC1 ($t(33)=-1.53$, $p=.068$), CP1 ($t(33)=-1.42$, $p=.082$), C4 ($t(33)=-1.43$, $p=.081$), and FC2 ($t(33)=-1.54$, $p=.066$) trended towards significance, we did not find differences at any other electrode sites. The fMRI portion found greater activation to social touch in the left (L) occipital cortex, L somatosensory cortex, L and right (R) supramarginal gyrus, R frontal pole, R precuneus cortex, R and L precentral gyrus, R medial prefrontal gyrus, R and L superior parietal lobe, R central opercular cortex, R and L superior frontal gyrus, R planum temporale, R medial and inferior frontal gyrus, R occipital fusiform gyrus, R temporal fusiform cortex, R and L middle temporal gyrus, and L occipital pole. Summary statistics can be found in figure 1.

CONCLUSIONS: Results indicate that infants neurologically discriminate between social and non-social touch temporally and spatially. Understanding the dynamics of sensory processing may aid in the development of individualized treatment plans for infants at risk of developing cognitive or socioemotional deficits.

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P3-F-49 - Are ERPs to threat-related facial expressions related to arousal?

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BACKGROUND: Perception of threat-related facial expressions, such as fearful and angry faces, is critical to respond to danger in the environment and is suggested to be prioritized by the visual system. However, the direct within-subject comparison of these expressions' visual processing, as measured by event related potentials (ERPs), has only been investigated in a handful of studies using small sample sizes and error-prone statistics. In addition, the more negative ERP amplitudes elicited by fearful and angry faces compared to other expressions around 150-350ms are supposedly driven by vigilance and arousal mechanisms, enhancing threat detection in the environment. Yet, this idea has never been tested empirically. Based on this explanation, we hypothesized that participants' perceived arousal during expression viewing drives the extent of these amplitude changes. Thus, the present study's objectives were twofold; first, to clarify the difference in ERP amplitudes elicited by fearful and angry expressions compared to neutral and happy expressions; second, to test whether perceived arousal drives these amplitude differences.

METHODS: Face-related ERPs were recorded while participants ($n = 85$) viewed faces expressing fear, anger, happiness, and no emotion, and performed a male/female judgement. Following the gender task, participants viewed each unique photo again, and rated its arousal and valence on a likert scale from 1 (very unaroused/ very negative) to 9 (very aroused/ very positive). ERP data were analyzed using robust mass univariate statistics with LIMO EEG, which decreases type I and II statistical errors.

RESULTS: A main effect of expression was found from 100ms until the end of the epoch (350ms) across most of the scalp. Angry faces differed from neutral and happy expressions during the N170-P2 interval (148-238ms), driven by most negative amplitudes for angry expressions. Fearful and neutral expressions differed predominantly around the N170 (116-190ms), with more negative amplitudes for fearful expressions. Fearful and happy expressions differed mostly at the end of the epoch. Angry and fearful expressions, however, differed during the P1-N170 interval (108-144ms), with more negative amplitudes for fearful expressions. The arousal analysis is underway; we anticipate that when controlling for arousal through a hierarchical model, significant differences between expressions will disappear.

CONCLUSIONS: Our findings indicate that threat-related expressions are processed uniquely and should be researched as such. Further, we only partially replicated previous research, possibly due to individual differences in perceived arousal. Our arousal analysis will test this idea, and hopefully shed a unique light on sources of inconsistency across the field.

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P3-F-50 - The psychological structure of trait impressions from faces evaluated without language

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BACKGROUND AND AIM: We spontaneously form impressions of other people based on their faces. Almost all studies that investigated these face impressions relied on language: typically, participants are asked to rate faces on a set of trait words provided by the researchers. However, the explicit use of language may bias and limit how trait impressions are represented -- for instance, towards words or concepts readily accessible in the English language. In everyday life, people are seldom explicitly prompted with trait words when they see people's faces but may just have a feeling about them. Here, we sought to answer the question: how do people represent faces based on their inferred traits when lexical constraints are removed?

METHODS: Measuring inferred traits of faces without using language is challenging. To tackle this challenge, here we used a novel task to measure the similarity of inferred traits between faces. Specifically, prescreened online participants (n=1751) viewed multiple face images on the screen and arranged the faces so that the distances between faces represented how similar they thought these people were in terms of traits. No trait words were provided to participants. We used 100 representatively sampled faces. Each participant was assigned 20 out of 100 faces, and subsequent aggregation across participants was used to generate a similarity matrix across the 100 faces.

RESULTS: There was strong consensus on how participants arranged the faces based on their unconstrained trait impressions (Spearman-Brown corrected Spearman $r = 0.82$ for split-half consensus). We found that similarity between faces measured without language is highly similar to that measured with the trait words "feminine", "emotional", "nosey", "strong", and "creative", suggesting that our participants made use of representations related to these traits (Spearman $r > 0.54$, $p < 0.00$, noise ceiling = 0.69). Five different pre-registered methods indicated that five dimensions optimally represent our data. These five dimensions accounted for 60% of the total variance, describing trait impressions of warmth, femininity, competence, sociability, and dominance.

CONCLUSIONS: Our findings demonstrate a consensual and reliable structure of trait impressions that are more naturalistically captured without using pre-selected words. Our results provide novel empirical evidence that reconciles longstanding debates on the different facets of warmth and competence: we showed that warmth and sociability are not simply synonymous dimensions but instead capture two distinct aspects of trait impressions; similarly, competence and dominance are not interchangeable but instead capture another two distinct aspects of trait impressions. This richer understanding of social cognitive dimensions is made possible with the conceptual constraint of language removed.

P3-F-51 - Hindered individuation of people in facing relative to non-facing social groups

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Group formation and belonging is foundational to human life. Recent work has shown that in a visual search task, triads (or groups of three) are detected faster when the individuals are facing one another relative to when they are facing away from one another, suggesting that the perceptual system may be attuned for detecting facing individuals, i.e., social groups. Here we investigated if this behavioral advantage reflected perceptual grouping of individuals in facing vs. non-facing groups by examining individuation performance, which is hindered when units are perceptually grouped. Participants viewed displays containing four or eight facing or non-facing triads. They were asked to search for a target individual (a person raising a fist or a person raising a finger) positioned within either a facing or a non-facing group. Targets within facing triads were individuated slower than targets within non-facing triads, suggesting that facing groups are perceptually grouped more than non-facing groups. However, this advantage varied with the type of target, such that it only held for individuals with a pointing finger but not for those raising a fist. Thus, facing groups appear to be perceptually grouped more than non-facing groups, and this perceptual grouping process appears to be modulated by the social meaning conveyed by group members, highlighting an important role of social contextual sensitivity in social and group perception.

P3-F-52 - Beyond Balance Theory: People construct cognitive maps of social relations to learn and represent Frenemy networks

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BACKGROUND & AIMS: Social networks are the bedrock of our colorful social lives. While the fields of social psychology and network science have predominantly focused on characterizing networks consisting of positive social relations (i.e., friendships), a fundamental element of real social networks has been largely ignored: negative social relations. One early theory is the exception—Fritz Heider's balance theory was an attempt to explain how we learn and represent a signed network trio (three-person network comprised of positive and negative relations). Balance theory predicts that people memorize a balanced trio faster than an unbalanced trio. Although balance theory is an enduring theory, it remains a qualitative description of heuristics that cannot be leveraged for a mechanistic account. Here we ask a fundamental question of how humans learn and represent social networks that contain both positive and negative relations, akin to the way networks are configured in the real world.

METHODS & RESULTS: In Exp. 1, subjects learned a signed (friends and enemies) social network before predicting how people trust one another in the network. We find that in line with Heider's theory, people apply three common heuristics about relations, but to different degrees. Subjects infer that 'friends of friends are friends' is a more likely phenomenon than 'friends of enemies are enemies', which is more likely than 'enemies of enemies are friends'. To account for this inference gradient and provide a parsimonious description, we hypothesized that people construct cognitive maps that characterize statistical

relationships between social relations in the network. To test this, we built a computational model that accounts for how inferences are made about relation chains within the network. Our model assumes that cognitive maps are built through statistical learning. An analysis of an existing dataset from a real fraternity network (Exp. 2) supports the account that statistical learning is leveraged for cognitive map building. Converging evidence for this statistical learning hypothesis in controlled experimental settings is illustrated in Exp. 3, where subjects learned a social network whose underlying topology doesn't follow the dynamics observed in the real world (rendering priors useless). We demonstrate that people can learn a new set of predictive relationships through statistical learning, even when the structure of the network's topology violates real-world dynamics.

CONCLUSIONS: Despite the prevalence of negative relations in real social networks, the generative mechanism governing how people learn and represent signed social networks remains unknown. We find that when facing signed social networks, people build flexible cognitive maps that capture the predictive relationships between valenced social relations within the network.

P3-F-53 - ERP correlates of the semantic violations in the deepfakes containing disinformation regarding COVID-19

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BACKGROUND AND AIMS: Nowadays people face a rising number of fake news imitating real medical information. Importantly, new technologies boost deepfakes, digitally manipulated synthetic content providing realistic disinformation. The current study investigated neural processing of audio deepfakes of media influencers: a prominent medical doctor [Speaker X] vs. a COVID-dissident [Speaker Y]. Deepfakes broadcasted views opposite to speakers' public opinion concerning vaccination against COVID-19. Our study aimed to (1) analyse neural correlates of consistent and inconsistent semantic violations in the deepfakes and (2) evaluate the role of internal attitudes, analytical thinking, need for cognition and conformity on the level of trust to deepfakes.

METHODS: 40 healthy participants (18 females, M = 21 y.) took part in the study. 15 participants reported negative attitudes toward COVID-19 vaccination (anti-vaxxers group), while 25 participants evaluated it positively (pro-vaxxers group). To analyze electrophysiological brain responses to deepfakes, we recorded event-related potentials (ERPs). We hypothesized that the N400 component reflects semantic violations in the deepfakes, expecting to observe larger N400 to words mismatching speaker's public opinion (H1). We also expected to see a difference of the N400 between pro-vaxxers and anti-vaxxers. Moreover, we awaited the tendency to believe more in deepfakes that match participants' attitudes (H2). We likewise collected data for cognitive reflection test, need for cognition scale and conformity scale. For the statistical analysis, we used permutation F-test with 1D cluster level (ERP data) and multi-factor analysis of variance (behavioral data).

RESULTS: ERP responses. For the anti-vaxxers, we observed the significant N400-like response (650-750 ms) to words mismatching Speaker X's (a prominent medical doctor) public opinion as compared to words matching it. For pro-vaxxers, we found no similar N400-like response to Speaker X. Also, no significant N400 response was observed to Speaker Y (COVID-dissident) for both experimental groups.

Behavioral data. We found that the level of trust to the deepfakes was significantly affected by group \times speaker interaction ($p = .01$) and need for cognition ($p = .0001$). Individual differences in cognitive reflection ($p = .84$) and conformity ($p = .89$) did not affect the level of trust.

CONCLUSIONS: Using deepfakes, we found the significant N400-like response to the words mismatching the public opinion of the prominent medical doctor, but only for the anti-vaxxers group. Thus, participants' own attitudes toward vaccination and the type of the speaker had a significant impact on the behavioral processing of the deepfakes containing arguments in favour or against COVID-19 vaccination, meaning that both hypotheses were partly justified.

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P3-F-54 - Predicting Others' Internal States within Naturalistic Social Interactions

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INTRODUCTION: Accurate predictions of how another person might feel are crucial for our successful daily social interactions. These predictions can be shaped by an individual's prior emotional states as well as their interactions with others. While recent studies have attempted to characterize the predictive processes of social cognition within simplified experimental settings, they lack the intricate dynamics of social interactions in real-life environments. This study aims to investigate how our social brain integrates social contextual information, dynamically updating predictions of others' affective states during naturalistic social interactions.

METHODS: We segmented a movie featuring a two-person conversation with intense social dynamics into discrete scenes. Before each scene, participants predicted each character's intentions and affective states. Subsequently, they reported their observations of the actual intentions and affective states after viewing each scene. Computational models were developed to elucidate how participants generated their predictions for each characters' affective states in each scene. The reduced model updated recursively based on the valence prediction error (valence PE), reflecting the difference between observed and predicted valence ratings for a specific character. The full model further incorporated social interaction aspects, specifically the mismatch between the two characters' intentions. We conducted nested model comparisons to determine which model best accounted for participants' ratings. fMRI data were collected from an independent group of participants (N=37) watching

the movie in the scanner (3T, voxel size = 3mm³, TR = 1 sec). We correlated voxel-wise activity with each model component to examine neural responses associated with predictive processes during social interactions.

RESULTS AND CONCLUSIONS: The full model, incorporating the intention mismatch, significantly outperformed the reduced model in explaining participants' ratings on predicted affective states of each character in the movie. This suggests that participants update their predictions based on prediction errors and the simulated consequences of the other social agents' intended actions. Furthermore, univariate analysis results identified distinct neural processing for these two computations. The unsigned valence PE, as a surprise measure linked to the cognitive effort to integrate incoming information into our current understanding of social context, signals the striatal activity, whereas its signed value, directing prediction updates, is reflected in the right temporal junction (rTPJ). Tracking the intention mismatch engages higher-order cortical regions such as the angular gyrus (AG) and post cingulate cortex (PCC). This work advances our understanding of the complex psychological and neural processes supporting our ability to infer another person's emotional state in dynamic social interactions.

P3-F-55 - Brain to Brain Coupling: Assessing Sensitivity and Stability in Inter-subject Measurements during Movie-Watching

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As a pivotal development in brain imaging methodology, the naturalistic-stimuli approach involves using stimuli that mimic real-life situations, such as movie-watching, as opposed to highly controlled, trial-by-trial stimuli. This method enhances ecological validity and offers a comprehensive view of cognition and neural processes. A key aspect of this approach is inter-subject (IS) analysis, which examines the synchrony of brain activity among viewers during movie-watching. Despite its importance, there is a need to further investigate the implications, sensitivity, and stability of IS measurements. Our study systematically assessed the effects of various factors, such as task conditions, movie genres, movie lengths, and participant numbers, on IS measurements, including inter-subject correlation (ISC) analysis, inter-subject functional connectivity (ISFC) analysis, and inter-subject representational similarity analysis (ISRSA), utilizing data from both the Human Connectome Project and in-home studies. We found that IS measurements are sensitive to movie content and can reflect psychological states. Additionally, our analysis of the test-retest reliability revealed the stability of IS measurements. These results contribute to a better understanding of IS measurements and suggest optimal conditions for their use in future research, particularly in predicting mental health, cognitive capabilities, diseases, and developmental patterns.

P3-F-56 - A Crime Scene Investigation approach to understanding contextual exploration in Autism

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BACKGROUND AND AIMS: Everyday conversations may appear smooth and effortless, but require inferences at multiple levels. Understanding an utterance involves not only considering linguistic knowledge but also how it relates to what has been said and implied in directly preceding conversational turns. These contextual inferences might hold the key to understanding the difficulties individuals with Autism Spectrum Conditions (ASC) encounter in everyday social interactions (Wadge et al., 2019). However, current research does not routinely acknowledge the dynamically unfolding context present in everyday communication. In this fMRI study, we examine how people disambiguate utterances embedded within an unfolding communicative context, and how these contextual inferences might be altered in ASC.

METHODS: In our Crime Scene Investigation (CSI) fMRI task, participants read chat dialogues and judged whether they contained hidden criminal content. 52 adults with ASC and 52 matched neurotypical (NT) participants read 60 chats displayed line-by-line on a screen, some of which involved planning or discussing crime. For each one, participants judged whether it was suspicious and should be reported to the police. Half of the dialogues used ambiguous slang, such as "bears" for "border patrol" (Unknown). Understanding the context-specific use of slang required spontaneous reinterpretation of the literal meaning of "bears" based on the chat's content, e.g. the word "frisking" in relation to bears. In the other half of the dialogues, participants were informed beforehand about the intended meanings of the slang expressions (Known). By comparing fMRI responses evoked while reading Unknown and Known dialogues, we isolated neural correlates of spontaneous contextual exploration while controlling for linguistic properties of the items. Analysis was focused on sentences containing contextual cues to word meanings.

RESULTS Ongoing analyses revealed that both groups were equally proficient in deducing the meaning of slang words. Yet, there were whole-brain-corrected significant group differences as a function of dialogue type. Specifically, the left inferior frontal gyrus showed similar responses across Known and Unknown dialogues in NT participants, whereas ASC participants showed a weaker response when processing Known dialogues.

CONCLUSIONS: Our findings suggest that individuals with ASC disambiguate utterances by integrating contextual cues differently than their NT counterparts, who engage in spontaneous contextual exploration even when unnecessary for the task. In contrast, ASC participants do not spontaneously coordinate the literal and contextually implied meaning of slang words when the latter is available. More generally, this study illustrates a novel, naturalistic, yet quantitative approach to identify mechanisms of contextual exploration during dialogue.

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P3-F-57 - Tracking and applying knowledge of centrality in social networks

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BACKGROUND & AIMS: To navigate life in complex social environments, people must efficiently track, retrieve, and use information about social relationships to guide their cognition and behavior. In fact, recent research shows that viewing faces of familiar others spontaneously activates knowledge of their social network centrality (i.e. who is particularly well-connected). However, centrality is typically confounded with various factors (e.g. face-based trait impressions, familiarity), rendering it difficult to ascertain if people truly encode and track others' centralities or correlates thereof. Moreover, little is known about how social network knowledge, once retrieved, shapes subsequent inferences and behavior.

METHODS & RESULTS: First, to determine whether humans are attuned to social network centrality in the absence of perception- or knowledge-based confounds, participants learned a novel social network, thus disentangling centrality from its potential real-world correlates. We then used fMRI to examine whether participants' brain activity, elicited when viewing each network member's face, encoded that person's social network centrality. Representational similarity analysis revealed robust encoding of social network centrality in areas associated with visual attention and mentalizing. This suggests that people spontaneously encode others' centrality, even when it is decoupled from real-world confounds. Why might this phenomenon extend to a completely novel network? Central individuals' thoughts and behavior may be particularly emblematic of community norms. Thus, people may be attuned to the value of identifying and attending to central individuals in a novel community to efficiently ascertain community norms. We tested this possibility in two follow-up studies.

Study 2 examined participants' expectations about the flow of social influence in the network. Participants rated how much each person in the network influenced and was influenced by others. We examined the effect of social network centrality on perceptions of influence, contrasting friend and non-friend pairs. Study 3 examined whether participants used information about centrality to ascertain which preferences were more common in the network. Participants were instructed to guess which of two preferences was more prevalent. Before each guess, participants could reveal the preference of one of two network members. We examined whether participants' guesses and choice of whose preference to reveal were driven by differences in social network centrality among each pair of targets.

CONCLUSIONS: Overall, our findings suggest that people combine information about centrality and individual dyadic relationships to infer how influence flows in social networks, that people expect central individuals' preferences to reflect community norms, and that such expectations guide behavior.

P3-F-58 - Chronic intranasal oxytocin effects on visual attention to social vs nonsocial stimuli in older adults

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BACKGROUND AND AIMS: Aging is associated with changes in face processing, including selective desensitization to face cues like eye gaze direction as well as an attentional preference to faces with positive over negative emotional valence. A currently parallel line of research has shown that oxytocin (OT) increases attention to social (vs. nonsocial) stimuli such as human faces. This effect, however, has not yet been well described in older adults as a population demographic that may particularly benefit from OT's ability to enhance face processing. This study integrates these previously independent lines of research by examining the effects of a 4-week OT administration, as more representative of therapeutic intervention than a single-dose administration, on fixation duration to faces compared to nonsocial scenes in generally healthy older adults. We also explored whether facial cues of emotional expression, gaze direction, age, or sex moderated the effects of OT on visual attention to faces.

METHODS: Adopting a randomized, placebo-controlled, double-blind, between-subject design, 112 older adults (aged 55 to 95 years) self-administered either 24 international units of OT or placebo (P) intranasally twice a day for 28 days. Before and after the intranasal OT intervention, participants completed a task in which they rated the trustworthiness of faces and scenes while their eye movements were recorded with an eye-tracking camera.

RESULTS: Overall, fixation duration to both the faces and scenes declined pre- to post-intervention. This effect, however, was less pronounced among participants in the OT than the P group for face, but not scene, stimuli. Emotional expression, gaze direction, age, or sex did not moderate this intervention effect.

CONCLUSIONS: These results highlight the role of OT in selectively maintaining the salience of social cues over time, resulting in ameliorated habituation, in aging.

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P3-F-59 - Age-Related Differences in Facial Trustworthiness Ratings and the Role of Fusiform Gyrus

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BACKGROUND/AIM: Older adults tend to give higher trustworthiness ratings to faces than younger adults, which could reflect reduced sensitivity to negative cues (i.e., a positivity bias) in aging. This age-related reduced sensitivity is likely associated with changes in brain function in regions associated with the processing of emotional stimuli (e.g., faces) in older compared to younger adults. Here, we functional magnetic resonance imaging (fMRI) during a facial trustworthiness rating task to test this hypothesis.

METHODS: In the present study, 57 young and 52 older participants evaluated 108 faces with neutral expressions regarding their facial trustworthiness on a scale from 0 = "Not at all trustworthy" to 10 = "Very trustworthy" while undergoing fMRI. Face stimuli varied on face trustworthiness based on ratings from an independent norming sample of younger, middle-aged, and older adults.

Multilevel modeling was conducted with face trustworthiness rating as dependent variable and participant age group (young vs. older) and face trustworthiness level (5 categories: most untrustworthy, somewhat untrustworthy, neutral, somewhat trustworthy, and most trustworthy) as well as their interaction as predictors.

RESULTS: The results showed a significant age group main effect ($\chi^2 = 14.22$, $p = 0.0002$), indicating older participant rated all faces as more trustworthy than younger participants (i.e., age-related positivity effect). This age group main effect was further qualified by an interaction between age group and face trustworthiness level ($\chi^2 = 10.27$, $p = 0.036$). That is, this age-related positivity effect was more pronounced on the ratings for the less trustworthy faces. In line with these behavioral findings, parametric analysis of the brain data demonstrated a negative correlation between face trustworthiness level and right fusiform gyrus activation in young (but not older) participants.

CONCLUSION: The findings suggest an age-related positivity bias in face trustworthiness ratings, perhaps reflective of reduced sensitivity to untrustworthy facial cues, which may be associated with age-related functional changes in fusiform gyrus.

P3-F-60 - Investigating the neural and ocular markers of facial perception

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BACKGROUND AND AIMS: Facial recognition plays a crucial role in facilitating interpersonal communication and shaping social interactions. To better understand how facial recognition works, we decided to investigate the neural and ocular responses during face perception.

METHODS: To do this, we presented a series of visual stimuli to a group of participants who already knew each other. The stimuli included images of faces from both the study participants and hyper realistic characters produced by StyleGAN2, a generative adversarial network (GAN) for image-modeling. These images provide representations of familiar versus novel faces. Participants were also shown composite images, in which two images were morphed together. During each viewing session, we recorded both eye-tracking data and electroencephalography (EEG) data from the prefrontal cortex. We chose to record data from this region, as it is heavily associated with judgment and decision-making. Participants were also asked to rank the familiarity of each image after it was shown.

RESULTS: We predicted that the participants' eye movement activities, including fixation duration, saccade frequency, and gaze trajectory, would reveal common strategies for visual processing during facial recognition. We also predicted that familiar versus novel stimuli would elicit distinct patterns in event-related potentials.

CONCLUSIONS: Our findings will shed light on how neural and ocular behaviors are involved in facial recognition and how these behaviors may change when looking at familiar and novel faces. Our results may also bear noteworthy implications for individuals with prosopagnosia or "face blindness," by establishing a benchmark for visual processing behavior in individuals without the condition.

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P3-F-61 - Dorsomedial Prefrontal Cortex (DMPFC) Prioritizes Social Learning at Rest

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BACKGROUND AND AIMS: Sociality is a defining feature of the human experience: we rely on others to ensure survival and cooperate in complex social networks to thrive. Are there brain mechanisms that help ensure we quickly learn about our social world to optimally navigate it? We tested whether portions of the brain's default network engage "by default" to quickly prioritize social learning during the memory consolidation process.

METHODS: To test this possibility, participants underwent functional magnetic resonance imaging (fMRI) while viewing scenes from the documentary film, Samsara. This film shows footage of real people and places from around the world. We normed the footage to select scenes that differed along the dimension of sociality, while matched on valence, arousal, interestingness, and familiarity. During fMRI, participants watched the "social" and "non-social" scenes, completed a rest scan, and a surprise

recognition memory test. We implemented a multivariate neural pattern reinstatement analysis to test whether reengaging brain patterns from encoding during subsequent rest predicts memory performance.

RESULTS: Participants showed superior social (vs. non-social) memory performance ($t(44)=3.04$, $p=0.004$) and the social memory advantage was associated with social pattern reinstatement during rest in the dorsomedial prefrontal cortex (DMPFC; $B=0.43$, $p=0.042$), a key node of the default network. Nonsocial memory performance was associated with nonsocial pattern reinstatement in the IVPFC ($B=0.44$; $p=0.029$), a region previously implicated in encoding and subsequent memory effects. Moreover, it was during early rest that DMPFC social pattern reinstatement was greatest ($t(48)=3.093$, $p=0.003$) and predicted subsequent social memory performance most strongly (early: $B=0.58$, $p=0.004$; middle: $B=0.12$, $p=0.600$; late: $B=0.19$, $p=0.391$), consistent with the “prioritization” account. We don’t see evidence of the same temporal prioritization in the relationship between the number of IVPFC nonsocial pattern reinstatements and nonsocial memory performance, suggesting this consolidation effect is unique to social content in the DMPFC.

CONCLUSIONS: Results simultaneously update 1) theories of memory consolidation, which have not addressed how social information may be prioritized in the learning process and 2) understanding of default network function, which remains to be fully characterized. More broadly, the results underscore the inherent human drive to understand our vastly social world.

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P3-G-62 - Dissecting the Functions of the Medial Prefrontal Cortex During Thinking about the Self and Others

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BACKGROUND AND AIMS: Previous research suggested a strong link between the medial prefrontal cortex (mPFC) and self-processing, leading to claims about the mPFC’s specificity to the self. However, its involvement in various social/cognitive processes, such as other-reference, autobiographical memory, and introspection, has cast doubt on this specificity. We tested whether self-reference processing shares similar or distinct activation patterns in the mPFC compared to other-reference, autobiographical memory, and introspection.

METHODS: Using functional magnetic resonance imaging (fMRI), we scanned 35 participants while they performed a self-reference task, an other-reference task, an introspection task, and an autobiographical memory task, in addition to control tasks. We used multi-voxel pattern analysis (MVPA) to compare the underlying neural code of these processes.

RESULTS: Our MVPA results showed that mPFC activation patterns evoked by the self-reference task were distinguishable from each of the other-reference, autobiographical memory, and introspection tasks. However, we also found evidence that activation patterns during the self-reference task were similar to those of the other-reference, autobiographical memory, and introspection tasks, suggesting that there are shared cognitive processes common to the self-reference task and each of the other three tasks. Further, the other-reference task showed similar results; other-reference neural responses were systematically similar but still distinguishable from the other three tasks.

CONCLUSIONS: Our study provides consistent interpretations of previously reported mPFC activations by various tasks and a critical insight into the role of the mPFC in thinking about the self and others.

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P3-H-63 - Evaluating how feedback and social learning modulate pain assessment through facial expression

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BACKGROUND AND AIMS: Facial responses to pain are evolutionarily conserved, communicating a need for social support and clinical attention (Broom, 2001; Kavaliers, 1988). Training with constructive feedback has been shown to enhance individuals’ performance to recognize emotional cues in others (Blanch-Hartigan, 2012). While research has delved into the mechanisms underlying social learning of emotions, such as selective emotional inference (Zaki et al., 2016) and instructed knowledge of aversive emotions (Atlas et al., 2016), the role of quantified feedback underlying emotion recognition, particularly pain recognition, remains largely unexplored. Our study aims to establish a social learning framework using real expressions of pain in healthy participants. We will investigate whether feedback on a trial-by-trial basis enhances the accuracy of interpreting others’ pain from facial responses. We hypothesize that participants will improve their recognition of pain, specifically by 1) distinguishing between expressions of pain and no pain, and 2) assessing the intensity of pain experienced by others.

METHODS: To verify these hypotheses, we plan to recruit 46 healthy participants to observe video clips showing individuals (“targets”) who previously underwent heat stimulation of varying intensities and provided pain ratings on every trial. Participants will undertake two tasks: 1) Determining whether or not the target was in pain, and 2) estimating the target’s pain intensity. Importantly, a No-Feedback Group ($n=23$) will provide ratings without feedback about the target’s actual pain, while a Feedback Group ($n=23$) will be shown the target’s actual rating after each of their ratings. To investigate pain assessment accuracy and social learning on categorical judgments, we will use logistic mixed effect models with correctness as the dependent variable, and Group, Target Pain, and Time as independent variables. To investigate how feedback modulates accuracy of intensity judgments, we will use linear mixed effect models, with the absolute difference of the perceiver’s and the target’s rating as the dependent variable, and Group, Stimulus Intensity, and Time as independent variables. The participant and the target codes will serve as random effects and model comparison will be used to identify the most explanatory model.

EXPECTED RESULTS: we anticipate both tasks showing significant group effects and interactions in the mixed effect models. Specifically, Feedback Group will be more accurate in pain assessment overall and over time compared with No-Feedback Group.

IMPLICATIONS: This study will enhance our understanding of how people learn to perceive pain in others. Ultimately, the findings could be instrumental for medical providers in improving pain assessment and management.

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P3-H-64 - Neurocomputational basis of learning when choices simultaneously affect both oneself and others

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BACKGROUND AND AIMS: Successful social living often requires considering the conflicting ways our behaviors simultaneously affect ourselves and those around us. To know whether to repeat behaviors that help or harm, we must learn from their outcomes. But the neurocomputational processes supporting such simultaneous learning remain poorly understood. We aimed to elucidate these processes in three pre-registered studies.

METHODS: Three samples of participants (N=211) completed a novel multi-outcome social learning task, in which various actions simultaneously affected the self and another person, either in the same way (mutual benefit, mutual cost) or in conflicting ways (altruism, instrumental harm). Using computational modeling, we tested two overarching hypotheses: (A) whether people mentally simulate how other people value their choices during learning or (B) whether people integrate self- and other-relevant information to guide their choices. We also examined the brain regions that encode the computations from the winning model using functional magnetic resonance imaging. As an additional aim, we assessed whether individual differences in learning prosocial and antisocial behaviors mapped onto traits associated with the acquisition of these behaviors (e.g., psychopathic traits).

RESULTS: Detailed model comparison showed that mental simulation was not required across samples: people integrated self- and other-relevant information into a single value function to guide choices, but updated asymmetrically based on different types of prediction errors related to the target (e.g., self, other) and valence (e.g., positive, negative). People who acquired more prosocial patterns were more sensitive to information about how their choices affected others (i.e., they had higher other-relevant learning rates). However, those with higher levels of subclinical psychopathic traits were relatively insensitive to unexpected outcomes for others. Model-based neuroimaging revealed distinct brain regions tracking prediction errors guided by the asymmetric value update, including the ventral striatum, subgenual anterior cingulate, amygdala, and anterior insula (qFDR-corrected<.05).

CONCLUSIONS: Beyond identifying the brain regions supporting the asymmetric integration of new information when acquiring prosocial behaviors, results suggest that learning to select actions that help or harm both the self and others may be computationally distinct from cognitive tasks that require actively representing and maintaining how others value our actions (e.g., via simulation). For such learning tasks, people integrate self- and other-relevant information to guide future prosocial behaviors. In other words, the way people distinctly encode self- and other-relevant outcomes that result from a particular behavior guides how desirable that same behavior will be in the future, regardless of whether the behavior is mutually beneficial or costly, instrumentally harmful, or altruistic.

P3-I-65 - Climate Change Emotions and their Impact on Mental Health Among Preadolescent Latinx Youth in the Inland Empire

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BACKGROUND: Climate change has far-reaching repercussions on extreme temperatures, hurricanes, and wildfires, yet the physical and mental health impacts of these changes are not experienced equally. Recent work suggests Latinx communities are among the groups most likely to experience serious climate-related psychological distress due to intersecting and compounding factors such as pre-existing mental health challenges and systemic racial inequities (Torres et al., 2022; Uppalapati et al., 2023). Little is known about how these issues impact Latinx children, thus understanding how Latinx children process and cope with climate change emotions is imperative. The goal of the current study is to characterize Latinx children's climate change emotions during preadolescence, when threat neurocircuitry may be particularly sensitive to variations in climate change uncertainty (Michalska et al., 2023). Using a culturally informed design, we focus on children's future-oriented cognition and intolerance of uncertainty, two cognitive processes with preliminary links to the phenotypic presentation of anxiety undergoing developmental change during this period. We examine whether greater levels of intolerance of uncertainty, coupled with more advanced future-oriented cognition, are associated with more negative emotions regarding climate change across age.

METHODS: The target group comprises n = 30 preadolescent Latinx youth (ages 8-13 years) residing in the Inland Empire in California, a majority Latinx center of industry relocation. Parents will complete the SCAARED and SCARED, two well-validated surveys on their own and their child's anxiety symptoms (Birmaher et al., 1997). Children will also complete an adapted survey of climate change emotions and coping strategies (Ojala, 2012), as well as measures of intolerance of uncertainty (Comer et al., 2009), and future-oriented cognition (Carstensen & Lang, 1996; Steinberg et al., 2009). Preliminary data (n = 4, age = 9-11) demonstrate that climate emotions children endorsed include worry, fear, and frustration. We anticipate completing data analysis by March 2024.

CONCLUSIONS: This study aims to empower Latinx families with the knowledge to mitigate climate change's impact on children's

emotional well-being, foster commitment towards equitable developmental research, and train educators and health providers in environmental influences on mental health. Results will offer insights for public health leaders to facilitate climate change emotion conversations, reducing stigma and isolation of these emotions. Anticipated future directions include inducing momentary climate change emotions and examining associations between climate change-related future-oriented cognition and prefrontal cortex maturation using neuroimaging techniques, advancing affective neuroscience. These initiatives aim to further understand the complex interplay between climate change anxiety and future-oriented cognition in Latinx children.

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P3-I-66 - Unraveling the interplay between stress, inflammation, and methylation of the oxytocin receptor gene in aging

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BACKGROUND AND AIMS: Oxytocin (OT) is a naturally occurring neuropeptide involved in the regulation of inflammation and stress. OT's impact on inflammatory and stress-related processes may be particularly relevant in older adults, given aging is associated with elevated levels of systemic inflammation, which can be amplified by stress. Methylation of the OT receptor gene (OXTRm) reflects availability of OXTR to bind with OT. Studies have shown that greater OXTRm decreases the number of OT receptors produced and that OXTRm increases in response to acute stress in older adults. However, the interplay between stress, inflammation, and OXTRm in aging has not been examined yet.

METHOD: Embedded within a larger clinical trial investigating OT's role on cognitive, socioemotional, and physical functioning in aging (NCT02069431; Oxytocin and Aging Study), data from 62 generally healthy older men (M = 71.70, SD = 7.20, range = 55-88 years) were included in this project. After written informed consent, blood samples were taken and subjected to highly sensitive Enzyme Immunoassay (Enzo Life Sciences, Inc.) to quantify tumor necrosis factor- α (TNF- α) a biomarker indicative of systemic inflammation. OXTRm at CpG site -934 was determined through pyrosequencing using PyroMark Gold Q24 reagents (Qiagen, Hilden, Germany). Participants also completed the 10-item Perceived Stress Scale (PSS; Cohen et al., 1983) to measure their stress level over the last two weeks. To test the effects of TNF- α and stress levels on OXTRm level, we conducted a linear regression with TNF- α , PSS score, and their interaction as predictors of OXTRm. Chronological age and time of blood draw were entered as covariates. Statistical significance was set at $p < 0.05$.

RESULTS: Higher TNF- α levels were associated with greater OXTRm ($b = 4.23$, $t(56) = 2.24$, $p = 0.03$). While PSS scores were not significantly associated with OXTRm, the interaction between TNF- α and PSS scores was significant ($b = 1.13$, $t(56) = 2.68$, $p = 0.01$), in that higher TNF- α and higher stress levels were associated with greater OXTRm in our sample of older men.

CONCLUSION & SIGNIFICANCE: This work highlights the interconnected nature of inflammatory and stress-related processes and OT-related epigenetic mechanisms in aging. Future work should assess implications of the interplay between stress, inflammation, and OXTRm on social cognition as higher OXTRm has been associated with social cognitive impairment. Also, extension of this research into older adults suffering from neurodegenerative diseases is warranted.

P3-I-67 - Precision mapping of the default network reveals common and distinct (inter)activity for autobiographical memory and theory of mind in younger and older adults

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BACKGROUND AND AIMS: Older adulthood is marked by changes in social cognitive behavior and brain function. The default network is considered a common neural substrate of several age-related differences in social and cognitive processes (e.g., theory of mind, autobiographical memory). Novel precision mapping methods in younger and middle-aged adults have revealed new, spatially discriminable, aspects of the default network that have different functional associations. The objective of the current work was to discover if precision mapping methods in younger and older adults reveal age differences in default network activity across multiple social and cognitive processes.

METHODS: Twenty-three younger adults (Mage=22.91, SDage=3.54; 13 women, 10 men) and 21 older adults (Mage=67.05, SDage=4.54; 12 women, 9 men) underwent multi-echo acquisition of rest and task fMRI. Multi-echo acquisition has better signal-to-noise than single-echo acquisition, facilitating precision mapping. Rest scans were used to create participant-specific mappings of the Schaefer et al. (2018) 400 region whole-brain parcellation using the Group Prior Individual Parcellation method. Parcel boundaries were adjusted within individuals, but the anatomical correspondence among labels was preserved. During the task, participants were presented with scenes and then cued to engage in autobiographical memory, theory of mind, and a sensorimotor control condition. We extracted first-level t-contrasts for each condition versus the implicit baseline, and individually parcellated them in the unsmoothed native volume. Parcellated data was submitted to group analysis using partial least squares analysis, which derives data-driven contrasts of groups and conditions.

RESULTS: We found common and distinct activations for autobiographical memory and theory of mind (Figure 1). A first latent variable ($p < .001$; 65% covariance explained) characterized primarily left-lateralized regions across the default network that had greater activity during both experimental versus control conditions across age groups. A second latent variable ($p < .001$, 24% covariance explained) revealed discriminant activity during the experimental conditions. In younger adults, medial prefrontal, posterior cingulate, parahippocampal cortices showed stronger activity in the control and autobiographical memory conditions. In younger and older adults, lateral temporal and parietal regions and ventrolateral prefrontal cortex were more active for theory of mind.

CONCLUSIONS: These results support that autobiographical memory and theory of mind invoke common and distinct aspects of the default network even when ensuring high fidelity to subject-specific characteristics. In line with extant theories of aging, that older adults more weakly contributed to the pattern discriminating activity between autobiographical memory and theory of mind may reflect the loss of functional specialization of individual regions in older age.

P3-J-68 - Neural correlates underlying the development of emotion recognition skills

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BACKGROUND & AIMS: The ability to recognize and interpret emotional signals from others ('emotion recognition') is a key socio-cognitive ability that matures throughout childhood and adolescence. Intriguingly, the ability to recognize emotion in the voice follows a more protracted developmental trajectory than the same skill with the face. What neurobiological mechanisms underlie this dissociation at the behavioural level? To date, most studies on neural correlates of emotion recognition (ER) in youth have focused on the interpretation of facial stimuli only, and relied on cross-sectional data. Building on this work, this presentation will demonstrate how developmental change in neural activation and connectivity patterns relate to the growth of facial and vocal ER skills in youth, using longitudinal functional magnetic resonance imaging (fMRI) data.

METHODS: 8- to 19-year-old youth (n=41) completed a facial and a vocal ER task while undergoing fMRI, at two timepoints 1 year apart. In each task, youth identified the intended emotion in emotional faces or voices. Partial least squares (PLS) analyses of functional connectivity, as well as linear mixed-effects (LME) models of neural activation patterns, were used to identify regions of the brain that showed changes in neural response across time, in one or both nonverbal modalities.

RESULTS: PLS analyses identified two latent variables representing modality and time effects in connectivity patterns during ER. First, results indicated that patterns of functional connectivity were dissociable across modalities (Fig. 1A), adding to evidence that vocal and facial ER are complementary but distinguishable social cognitive skills. Second, change in neural connectivity over time was more pronounced for vocal than facial ER (Fig. 1B), suggesting differential developmental trajectories for networks supporting these skills. LME models of whole-brain neural response indicated that activation in the right temporo-parietal junction (TPJ) showed an inverted U-shaped pattern of development during vocal ER, denoting specialization of response in this region. Both activation in the TPJ and changes in connectivity during vocal ER predicted later ER task performance, identifying potential neurodevelopmental mechanisms for the growth of this social cognitive skill during adolescence.

CONCLUSIONS: Moving beyond a characterization of age-related changes in neural activation and connectivity, our findings specifically tie these neurodevelopmental patterns to the growth of functional skills. Our results suggest that dissociations in vocal and facial ER development may arise from differential neural responses to these social stimuli. Lastly, our findings highlight the importance of including non-facial assessments of emotional processing in large consortium efforts to better understand the development of social cognition.

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P3-J-69 - Neural mechanisms of BeMim: copying of choices leads to liking and temporoparietal brain activity

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Being mimicked (BeMim), the state of having your own actions copied by another person, is believed to lead to liking and affiliation. To understand the neural and cognitive mechanisms behind this effect, we used fNIRS to track brain activity in two groups of participants experiencing different types of mimicry. Choice BeMim participants pointed to a painting and then saw a confederate who liked the same/different painting. Motor BeMim participants pointed to a painting and then saw a confederate make the same/different arm movement to another painting. Brain activity in temporal and parietal cortex was recorded throughout using fNIRS. Behavioural findings demonstrated a robust liking effect for Choice BeMim, providing evidence that mimicking choices yields significant benefits in social perception. This effect was also reflected by the activation patterns within the temporoparietal junction (TPJ) during BeMim trials compared to No-BeMim trials. Additionally, we observed increased activation in the Mirror Neuron system (MNS) during Choice BeMim trials compared to the baseline and Choice No-BeMim trials. These activation patterns suggest that the MNS plays role in interpreting the decisions of a Choice mimicker across the interaction. Conversely, for Motor BeMim, we identified a subtle behavioural liking effect with no activation in TPJ or MNS. These outcomes suggest that mimicking choices may be a more influential factor in likability judgments than mimicking motor movements.

P3-J-70 - Exploring the Interplay Between Affective and Cognitive Empathy: Insights from P300 Event-Related Potentials in a Passive Auditory Oddball Task

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BACKGROUND AND AIMS: Empathy, a multifaceted personality trait, encompasses affective (emotional sharing) and cognitive (perspective-taking) dimensions. The P300 event-related potential (ERP) component, indicative of cognitive and attentional processes, is triggered by rare or unexpected stimuli, as observed in an auditory oddball task. There are mixed findings regarding the relationship between empathy and the P300 component. Therefore, we investigated the interplay between affective and cognitive empathy and P300 responses.

METHODS: An electroencephalogram (EEG) headset was utilized to collect ERP data from 56 participants (64% female) engaged in a passive auditory oddball task. Participants were exposed to rare auditory stimuli, and their neural responses were recorded. The study aimed to assess the correlation between empathy (both affective and cognitive dimensions) and the P300 component.

RESULTS: Our findings substantiate the hypothesis that there exists a positive relationship between empathy and the P300 component. Specifically, affective empathy demonstrated a significant positive correlation with P300 amplitudes, suggesting heightened arousal. The cognitive dimension of empathy did not exhibit a significant relationship with the P300 component. These results imply that individuals with high affective empathy, characterized by emotional sharing, may display more pronounced reactions to unexpected stimuli.

CONCLUSIONS: This research sheds light on the intricate relationship between empathy and cognitive processing, particularly in the context of the P300 component during a passive auditory oddball task. The positive association between affective empathy and P300 amplitudes aligns with previous studies and underscores the role of emotional sharing in shaping neural responses to rare or unexpected stimuli.

ADDITIONAL INFORMATION: This study was part of a collaborative study between Dr. Kyle Nash's NSN lab and Dr. Yao Zheng's Adolescent Development lab at the University of Alberta.

P3-J-71 - Information Transmission Between the Ventral Visual Stream and the Prefrontal Cortex Supports the Subjective Experience of Fear

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BACKGROUND AND AIMS: It has been reported that threatening and non-threatening visual stimuli can be distinguished based on multi-voxel patterns of hemodynamic activity in the human ventral visual stream. Does it mean that there may be evolutionarily hardwired mechanisms within early perception, for the fast and automatic detection of threat, and maybe even for the generation of the subjective experience of fear?

METHODS: In this functional magnetic resonance imaging study, we investigate whether patterns of hemodynamic activity predictive of a specific "fear profile" (i.e., fear ratings reported by a given participant) can be observed in the ventral visual stream whether a participant reports being afraid of the visual stimuli (i.e. commonly feared animals) or not. To do so, we conducted machine learning decoding of brain activity of a group of participants (No Fear group; N = 30) presented with a series of animal stimuli (2700 images) based on the subjective fear ratings provided by a second group of participants (Fear group; N = 30).

RESULTS: We provide evidence that the ventral visual stream (mainly, occipital and fusiform cortex) may represent affectively neutral visual features that are statistically associated with fear ratings of participants, without representing the subjective experience of fear itself. More specifically, we show that the "fear profiles" of a group of participants can be decoded in the ventral visual stream of other participants reporting not being afraid of the stimuli. Further, we found that the multivariate information transmission between ventral visual areas and prefrontal regions distinguished participants who reported being subjectively afraid of the stimuli from those who did not.

CONCLUSION: Together, these findings support the view that the subjective experience of fear may depend on the relevant visual information triggering implicit metacognitive mechanisms in the prefrontal cortex.

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P3-J-72 - Alexithymia is not consistently associated with accuracy, confidence, or metacognitive sensitivity scores in emotion recognition nor other decision tasks

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BACKGROUND: Alexithymia is a clinically relevant trait characterized by difficulty identifying and describing one's feelings and a tendency to avoid emotion-related introspection. Its rich associations with a wide variety of mental, physical, and social health conditions have sparked interest in its potential to reveal transdiagnostic features of cognition and behavior underlying a wide variety of threats to wellbeing. Interestingly, despite the fact that poor emotional self-insight is a central feature of alexithymia, extant work disproportionately focuses on decision accuracy (e.g., percent of emotional images correctly categorized) rather than metacognitive components of the decision-making process. Moreover, it is not clear to what extent the relationships between alexithymia and any of these decision features are specific to emotional content or generalized across task domains (e.g., visual perception, social perception).

METHODS: We collected data from three samples (Ns = 123, 124, 317). All participants completed the TAS-20 and three decision-making tasks indexing different task domains: coherent visual motion detection (Random Dot Kinematogram; RDK), emotional mentalizing (Revised Reading the Mind in the Eyes Test; RMET), and social decision-making (the Trust Game). After each trial of each task, participants were asked to rate how certain they felt that they answered correctly. We calculated metacognitive sensitivity scores using the area under the type-2 ROC curve for the RDK and RMET, estimating the extent to which an individuals' confidence ratings aligned with their task accuracy. To examine the relationship between alexithymia and decision features, we conducted Spearman correlations between total TAS-20 scores and percent-correct and median confidence in all three decision-tasks.

RESULTS: Alexithymia was associated with poorer accuracy in the RMET in study 2 ($\rho = -.26, p < .05$) and poorer confidence in

the RMET in study 2 ($p = -.26, p < .05$). However, these results did not replicate across different samples. Notably, our third and largest sample found no relationships between alexithymia and any of the three decision features. Preliminary analyses examining the relationship between alexithymia relative entropy (i.e., Kullback-Leibler divergence) in confidence ratings suggest convergent results. Exploratory regression models suggest that confidence ratings do not significantly change over the course of trials and alexithymia does not appear to alter this relationship.

CONCLUSIONS: Contrary to conventional reports on the topic, our results do not support the assumption that alexithymia is consistently associated with deficits in emotional mentalizing ability. Moreover, despite the explicit inclusion of poor emotional self-knowledge in the definition of alexithymia, alexithymia was not associated with either an emotion-specific or domain-general metacognitive deficit in our data. Future work seeking to elucidate the alexithymia or emotional awareness more broadly may benefit from examining more precise dimensions of the constructs and considering a wider variety of behavioral indices of metacognitive functioning.

P3-J-73 - Exploring amygdala encoding of facial expressions with single-unit recordings and deep convolutional networks

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BACKGROUND AND AIMS: Humans rapidly detect and interpret the emotional significance of facial expressions. The amygdala's role in this process is debated—it could encode fine-grained facial features (e.g., eye whites), or it could encode specific emotion categories. Using convolutional neural networks (CNNs) as models of brain function, we previously found that activation in “fine-grained” intermediate, but not later layers of a CNN trained for emotion recognition (EmoFAN; Toisoul et al., 2021) predicted amygdala BOLD responses to naturalistic stimuli (Soderberg et al., 2023). Here we test whether fine-grained or categorical representations of facial expressions are encoded by amygdala neurons, using EmoFAN to model single unit responses.

METHODS: We analyzed a dataset of single unit recordings from epilepsy patients who viewed emotional faces morphed from happy to fear (Wang et al., 2017). First, we validated EmoFAN by passing all facial images to the CNN and correlating its predictions with human ratings. To assess which representations were encoded in the amygdala, we created encoding models by extracting activations from an intermediate convolutional layer and a later fully connected layer. We used these representations to predict the average firing rate of each cell and compared it to observed firing rates using Spearman correlation with five-fold cross-validation and randomization tests for inference.

RESULTS: Activations from the “fear” and “happy” units of the late layer of EmoFAN were highly correlated with subjects' behavioral ratings ($\rho_{\text{fear}}=.96, SD=.14, 95\% CI=[.86, 1], p<.05, \rho_{\text{happy}}=-.96, SD=.14, 95\% CI=[-1, -.86], p<.05$). Given our prior work, we anticipated that the EmoFAN encoding models would better predict amygdala firing rates compared to a control model based only on stimulus emotional intensity. Of 442 recorded cells, 32 (7.2%) were predicted by the control model, 31 (7.0%) by intermediate layers, and 29 (6.6%) by late layers. Cross tabulation revealed considerable overlap in the cells predicted by each model ($\chi^2 = 324.58, p<.0001$). A linear mixed effects model across all cells (with random intercepts for cell and subject) supported our prediction, with layers from EmoFAN better predicting firing rates compared to the control model ($F=356.2, p<.0001$). In addition, the intermediate layer of EmoFAN predicted firing rates better than the late layer ($F=4.85, p=.028$).

CONCLUSIONS: An encoding model derived from EmoFAN better predicted amygdala cell firing compared to a model based on stimulus intensity, with the “fine-grained” intermediate layer outperforming the late “emotion category” layer. This suggests that the amygdala does not solely encode the intensity of emotion categories, nor variables capturing a single dimension (such as valence or behavioral relevance), but rather identifies specific features that are relevant to behavior.

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P3-K-74 - The brain indexes social network distance to predict likelihood of information transmission

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Understanding how information travels through a social network is critical for many day-to-day social decisions, such as whether to disclose sensitive news to someone. While past simulation work has shown that information flow is affected by factors such as distance or similarity among network members, it remains unclear how humans predict the trajectory of information flow in the wild. Here we examine how an individual's structural knowledge of their actual social network, such as being able to identify densely connected groups, influences perceptions of how information flows through the network. By following a subset of the incoming freshmen class at Brown University (N=187), we were able to apply cluster detection algorithms to identify a number of discrete social communities within the network. Students completed a task in which they were informed that someone in their network had shared news, and then rated the likelihood another person would hear the news. We observe that the likelihood of information traveling between two individuals that belong to separate communities is modulated by how far away those communities are from each other. This effect persists after controlling for which community an individual belongs to, suggesting that people rely on information about distance to predict the path along which a piece of news travels. To examine how the brain encodes such community-based distance information, we used fMRI to measure neural activity patterns in a subset of subjects (N=43). Given the entorhinal cortex's (EC) role in indexing metric distances in space and organizing relational knowledge in non-spatial contexts, we hypothesized that the EC may also track distances between members of an individual's own social network. Preliminary analyses reveal that community distance is indexed by greater dissimilarity of neural activity in the EC to network members that belong to communities that are farther away from one another. This neural signature—increasing difference in neural patterns between two individuals in separate communities—predicted beliefs about

whether news would travel between communities. Overall, these findings contribute to our understanding of the specific social network properties that people leverage to predict information transmission between members in their own social network.

P3-K-75 - Mental representation of network structure drives later network position in real-world social networks

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BACKGROUND AND AIMS: To thrive in our dense communities and solve a range of social challenges, people must generate mental representations of who is connected to whom. For example, people may gain social status if they know who gatekeeps privileged information or who within the community can make introductions to important others. The human ability to represent and navigate social networks is poorly understood, in part because the lion's share of past work has probed how people learn about small, static, artificial social networks in the lab. In such studies, participants act as omniscient outside observers of others' friendships. But in real-world networks, people are embedded in their networks and occupy different structural positions, which likely influence their mental representations, given that one's network position impacts one's access to social information. For example, popular individuals (who are friends with well-connected peers; i.e., eigencentrality) might observe information more often, while brokers (who bridge distinct groups of their peers; i.e., inverse constraint) might observe more novel information. It is also possible that the relationship between network position and representation evolves over time, in a bidirectional manner. That is, the accuracy of one's representation of the network might also contribute to changes in one's position as the network itself changes, helping individuals to attain (and maintain) popularity.

METHODS: To characterize how mental representations influence network position over time, we follow freshmen (N=185) as they make friends for the first time in college. At multiple times, we assess how individuals represent their network by probing inferences about both direct friendships between others and longer-range information flow across the network.

RESULTS: We find that those who are popular early on in the academic year exhibit relatively inaccurate network representations, suggesting that popular individuals in an emerging network do not leverage their status to learn about their peers. Once the network stabilizes mid-year, accuracy is critical for becoming, and remaining, popular. Accurate network representations early on are predictive of who goes on to be popular—an effect indexed by the fidelity of hippocampal representations of the network's structure. The role of representational accuracy as a mechanism for gaining social status is unique to popularity, as brokers are consistently associated with better detection of network structure (i.e., how people cluster into communities) across time, and network representations do not predict later changes in brokerage.

CONCLUSIONS: To our knowledge, this work is some of the first to longitudinally track a network from its inception, allowing us to link individuals' representations of an emerging social network to their trajectory within that network over time.

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P3-K-76 - Social environment quality defines hierarchical and dynamic clusters with dissociable brain network functional connectivity

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BACKGROUND AND AIMS: The environment plays a key role in shaping the development of the brain, particularly during adolescence. The social environment is especially important, with differences in brain network organization associated with differences in socioeconomic status and social support. Here, we take a data-driven approach to clarifying the relationship between variation in the social environment over time and variation in brain network connectivity.

METHODS: We used social and resting state fMRI data from 2776 adolescents (Mage = 9.95, 8.92 – 11 years) in the ABCD dataset. We computed the pairwise Pearson correlation between all subjects on 9 measures of social environment quality recorded at baseline (Figure 1). We applied a hierarchical clustering algorithm with a uniform null model to the correlation matrix, which allows us to identify clusters at different resolutions (Figure 1). We identified differences in brain network functional connectivity (using the 333 node Gordon parcellation) across these "envirotypic" clusters with mass t-tests on network edge weights and corrected for multiple comparisons (Figure 2). Additionally, leveraging ABCD's longitudinality, we examined how "envirotypes" (i.e., patterns of experiences or properties of the environment) changed over time using the same hierarchical clustering algorithm applied to social environment quality measures from three time points (Figure 3).

RESULTS: Our hierarchical clustering algorithm yielded 12 levels when applied to measures from baseline, with 169 total clusters across all levels. We focused on level 2, which contained 6 clusters (N1 = 1475, N2 = 1005, N3 = 91, N4 = 165, N5 = 36, N6 = 4), and further zoomed into the two largest clusters, which accounted for 89.3% of subjects. Cluster 1 was characterized by higher Parental Monitoring scores and lower School Environment and Neighborhood Safety; cluster 2 showed the opposite phenotype (ps < 0.05 on 8 of 9 measures; Figure 1). Mass t-tests between clusters on edge weights identified persistent differences (after correcting for multiple comparisons and for brain geometry) in somatomotor, DMN, CO, FP, DAN, Aud, and other systems (all ps < 0.43; Figure 2). Longitudinal clustering resulted in 11 hierarchical levels with 78 total clusters. We focused again on level 2, which contains 5 clusters (N1 = 614, N2 = 301, N3 = 384, N4 = 7, N5 = 223). Clusters differed in their quality and in the stability of quality (Figure 3).

CONCLUSIONS: We used measures of social environment quality to cluster adolescent subjects from the ABCD dataset. These clusters captured "envirotypes" of social experience, with differences in brain network edge weights between clusters. Moreover, "envirotypes" differed in both quality and stability.

P3-L-77 - New Vistas for the Relationship between Empathy and Political Ideology

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BACKGROUND AND AIMS: The study of ideological asymmetries in empathy has consistently yielded inconclusive findings. Yet, until recently these inconsistencies relied exclusively on self-reports, which are known to be prone to biases and inaccuracies when evaluating empathy levels. In the present research, we conducted a series of investigations to address the interplay between political ideology and empathy while relying on neuroimaging techniques and behavioral measures.

METHODS: We used well-validated paradigms to examine neural mechanisms associated with empathy both toward vicarious distress (n=55) and physical pain (n=125) in individuals from two distant countries, using magnetoencephalography (MEG).

In addition to the neural measurement, we evaluated participants' political ideology and empathic ability using several self-report scales.

RESULTS: In the first MEG study examining empathy toward vicarious emotional distress, the findings revealed a typical rhythmic alpha-band 'empathy response' in the temporal-parietal junction. This neural empathy response was significantly stronger in the leftist than in the rightist political group (p=0.03). In addition to this dichotomous division, the neural response was parametrically associated with both self-reported political inclination and right-wing ideological values. Conversely, in the second MEG study examining empathy toward vicarious physical pain, the results indicated no asymmetry both at the neural (p=0.92) and behavioral levels.

CONCLUSIONS: This study raises a novel premise: the question of whether empathy is ideologically asymmetrical depends on the targeted component of empathy (e.g., physical pain vs cognitive-affective), and requires explicit but also unobtrusive techniques for the measure of empathy.

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P3-L-78 - Neural Activity Associated with Normative and Non-Normative Euthanasia Decision-Making

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BACKGROUND AND AIM Active euthanasia is currently legal in seven countries worldwide and in five states in the US.

The decision to perform active euthanasia is challenging for healthcare practitioners and is still considered a controversial practice by many people. Thus, understanding the intricate psychological terrain that healthcare practitioners navigate during euthanasia decision-making becomes paramount. The study examines how healthcare professionals make decisions about hypothetical end-of-life scenarios by measuring the neural responses associated with normative and non-normative euthanasia situations and their interplay with participants' empathic dispositions.

METHOD 58 students (28 Male, 29 Female, 1 Non-binary; Mage = 24 years, SD = 3.64) from the health science department at the University of Melbourne were recruited to participate in an fMRI study. Before scanning, participants completed a survey to assess their dispositional empathy level (cognitive empathy and emotional empathy). During scanning, participants were presented with two different types of scenarios (normative and non-normative) related to active euthanasia. Normative scenarios follow a typical framework designed to meet all criteria in the Australian States where the services are legal, while nonnormative scenarios occur when some legal criteria for suitability are met but not others. Following each scenario, a yes/no question and a 1-10 confidence scale were presented.

RESULT Increased activity while viewing non-normative vs. normative scenarios was found with a whole-brain univariate analysis in the right middle frontal gyrus, bilateral pre-supplementary motor area (pre-SMA), right angular gyrus, and the right inferior parietal lobe (IPL). No effect was found in the reverse contrast. Moreover, when averaging differences in brain activity for non-normative vs. normative stimuli across the four clusters listed above within each participant, people with higher emotional empathy (but not cognitive empathy) showed less of a difference between scenario types, suggesting individual differences in these effects.

CONCLUSION These findings suggest that non-normative euthanasia scenarios are associated with increased cognitive engagement during decision-making relative to more clear-cut normative scenarios. This seems less true for individuals who are high in dispositional emotional empathy. This suggests that there is a tradeoff between social norms (i.e., euthanasia should not be approved for someone whose death is not imminent) and empathy for individuals who report suffering to a degree that they are asking for euthanasia. From these results, we speculate that individuals lower in empathy are more influenced by the social norm framework, whereas those higher in empathy focus more on others' distress, which is presumably more similar across normative and non-normative conditions regardless of the precise medical prognosis.

P3-M-79 - Chronic intranasal oxytocin administration increases positive mood in older adults

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BACKGROUND/AIM: Oxytocin (OT) is a neuropeptide associated with socioemotional processes, including modulation of mood. Subjective mood has been associated with diverse health outcomes in both younger and older adults, with higher positive mood linked to increased cognitive function, lower cortisol and stress responses, and decreased levels of pain and fatigue. While much research has investigated effects from a single dose of intranasal OT, less understood are the effects of chronic intranasal OT

administration, which would resemble treatment effects. Further, previous research has almost exclusively been conducted in younger adults, despite well-documented socioemotional changes with age, and emerging evidence of age-differential benefits from intranasal OT administration. Adding to this novel line of research, here we utilized a double-blind, randomized, placebo-controlled design to investigate the effects of chronic intranasal OT administration on mood in healthy aging.

METHODS: Data from 131 healthy older adults (31% women; aged $M=71.3$ yrs, $SD=7.4$) who participated in a larger clinical trial investigating OT's role on cognitive, socioemotional, and physical functioning in aging (NCT02069431) were analyzed. The protocol was approved and monitored by the local IRB, a Data Safety Monitoring Board, and the FDA and all participants provided informed written consent. Participants self-administered either 24 IUs OT or a placebo (P) twice daily via intranasal spray over a period of four weeks. Pre- and post-treatment, participants completed the 20 item Positive and Negative Affect Schedule (PANAS, Watson et al., 1988) as well as six additional items to capture hedonic balance in older populations (as suggested by Röcke et al., 2009); participants responded using a Likert scale (1 = very slightly or not at all; 5 = extremely) to indicate how they felt on average or in general.

We conducted a mixed-model repeated measures ANOVA to determine the effects of treatment (between-subject variable: OT vs P), timepoint (within-subject variable: pre- vs post-treatment), valence (within-subject variable: positive vs. negative) on PANAS scores. Follow-up t-tests were used to decompose significant interactions, with statistical significance set at $p < .05$.

RESULTS: The treatment by timepoint by valence interaction was significant ($F(1,122) = 4.16$, $p = .03$). In particular, participants in the OT group reported more positive mood post- than pre-treatment ($p = .019$); this effect was not present in the P group ($p = .30$) or for negative mood. Effects did not vary when including chronological age and sex as covariates into the model.

CONCLUSIONS: Our findings extend previous research, by demonstrating that repeated administration of intranasal OT enhances positive mood in older adults; while no effects on negative mood. These findings are relevant in the context of evaluating chronic intranasal OT administration as safe and effective treatment towards promoting health and well-being in aging.

P3-N-80 - Neuroscience Education as a Tool for Shifting Beliefs about Distress and Coping

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BACKGROUND AND AIMS: A person's beliefs about stress and coping can play a major role in their mental health outcomes. An emerging method for shifting these beliefs in the direction of psychological wellness is "neuroscience education" -- education about how the brain regulates distress and facilitates coping. Here I present preliminary findings from two pilot studies examining the usefulness of neuroscience education, particularly as a tool to nudge beliefs about coping and therapy.

METHODS: In Study 1, 83 college students attended a 45-minute lecture about how the brain regulates stress and fear. The key messages in the lecture were: 1) adult brains can change, 2) tolerating discomfort strengthens connections in the brain that help future tolerance of discomfort, and 3) psychological therapy strengthens these neural connections. Prior to the lecture, students rated their interest and background in neuroscience. After the lecture, they rated the usefulness of the lecture for psychological wellness. In Study 2, 16 university students, staff, and faculty attended a 20-minute version of the slide presentation. Before and after the presentation, they responded to items about their self-efficacy to cope with distress, growth mindset, expected efficacy of therapy for anxiety, and self-stigma of seeking psychological therapy.

RESULTS: In Study 1, participants indicated (scale of 1-9) that neuroscience education can help someone receiving therapy ($M=7.4$, $SD=1.6$) and help them personally ($M=7.0$, $SD=1.5$). Prior interest in neuroscience ($r=0.3$, $p<0.05$), but not prior knowledge of neuroscience ($r=0.01$, $p>0.4$), correlated with these outcomes. In Study 2, neuroscience education led to a 13% increase in growth mindset ($p=0.007$), 7% increase in expected efficacy of psychological therapy ($p=0.02$), and 8% increase in self-efficacy ($p=0.02$). Concerns for demand characteristics are somewhat alleviated by the finding that the presentation did not improve self-stigma of seeking psychological therapy (-1.5% , $p=0.16$). Consistent with Study 1, participants rated (scale of 1-7) the presentation as interesting ($M=6.3$, $SD=0.9$) and useful ($M=6.1$, $SD=1.1$).

CONCLUSIONS: These results support the usefulness of neuroscience education, suggesting that it may help change beliefs that are key to resilience and success of psychological therapy. Prior interest in neuroscience may moderate these effects. Future studies can test the implication that for clients who are interested in learning about the brain, neuroscience education may be a useful adjunct to psychological therapy. A larger implication of such findings is that learning about the neuroscience of emotion-regulation may help improve emotion-regulation.

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P3-N-81 - Anxiety and brain-heart communication during suspenseful movies

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INTRODUCTION: Over the past century, research has helped us build a fundamental understanding of the neurobiological underpinnings of anxiety. For instance, there is evidence to suggest anxiety impacts communication from the brain to the heart, as well as from the heart to the brain. However, this evidence base is built mostly on the foundations of tightly controlled experiments, such as task-based fMRI. The use of suspenseful movies presents a novel, naturalistic, and effective means to induce and study brain-heart communication in the context of anxiety.

METHODS: Using a suspenseful movie fMRI paradigm (n=29 healthy volunteers; Caltech Conte dataset), we investigated the extent to which activity across an anxiety-relevant 'defensive response network' in the brain (in particular, amygdala-prefrontal circuitry) would show altered communication with cardiac responses heart rate as a function of induced anxiety. We aimed to investigate how coherence between the brain and the heart may change as a function of an anxiety-inducing, suspenseful movie clip. To test this, we employed three methods (bivariate correlation, dynamic time warping, and cross-correlation maxima) to gauge how brain-heart communication would alter as a function of a suspenseful movie clip.

RESULTS: Our results indicate that suspenseful movie-watching may be associated with altered associations between amygdala-prefrontal dynamic connectivity and heart rate ($d = -1.08$, $p = .0001$). However, effects were in the inverse direction to which we hypothesized. Brain-heart coherence was positive during the non-suspenseful condition but reduced during the suspenseful condition. This effect remained consistent when we contrasted the suspenseful movie condition to rest. We also found evidence for reduced coherence between heart rate and activity in precuneus, vmPFC, and bilateral putamen.

CONCLUSION: Our results highlight that suspenseful movie-watching offers a useful naturalistic platform for research into anxiety and brain-heart communication. Movie-evoked anxiety appears to be associated with reduced brain-heart communication. We posit that these decreases may be underpinned by parasympathetic withdrawal or decreased interoceptive awareness during suspenseful movie-watching.

P3-O-82 - How do brains and body language align during conversations? An fNIRS hyperscanning investigation with deep neural network (DNN) analyses of multimodal dynamics

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Conversations between people represent complex non-linear combinations of nonverbal and neurocognitive responses, in addition to the words that are spoken. New tools are needed to wrangle these multimodal components into coherent models of conversations. Although the psychological aspects of conversations have been examined (Kardas et al., 2022), these other conversational channels remained unexplored. Using functional near-infrared spectroscopy (fNIRS), a portable neuroimaging device, we investigate the neurobiological foundations of social connections initiated by conversations among stranger dyads. By coupling neural activations with audiovisual recordings of participants (N=70 dyads), we aim to explore the multimodal synchrony across neural and behavioral dimensions during dyadic conversations. Rather than running discrete analyses of neural and nonverbal data, time series data from each are being entered as features into a multimodal deep neural network (DNN) – including channel-based fNIRS signals typically used in synchrony analyses and OpenFace data that quantifies facial expressions over time with artificial intelligence algorithms. In our pipeline, time-series data is segmented into 5-second chunks, reduced to 32 dimensions using an Autoencoder DNN, and then examined for the degree to which dyads exhibit synchronous movement, occupy nearby locations, and cover similar territory in a 3-dimensional representation of their conversation. Results show that real dyads score differently on these variables than permuted dyads. For example, remoteness between individuals of a dyad in this space (measured as Euclidean distance) is significantly smaller (closer together) than across dyads ($B = -0.95$, $t = -6.2$, $p < .0001$ in 10,000 comparisons). Additionally, dyadic synchrony, defined by the covariation of position across 3 dimensions using Pearson's correlation r , is significantly greater between individuals of dyad compared to baseline ($t = 8.6$, $p < .00001$). Results support the presence of brain-to-brain synchrony. Moreover, this neural synchrony may be integrated quantitatively with other behaviors in a single machine-learning model. These variables will be compared across conversational depths (i.e., shallow/deep), gender compositions (i.e., male-male/female-female/male-female), and racial backgrounds (i.e., same/different), and related to self-reported social connections formed. A goal of this work is to make a meaningful contribution to the broader literature on multimodal synergy and to elucidate the complex interplay between various channels involved in social communication and connection.

P3-O-83 - The cognitive and societal effect of the native and foreign language on pro-social decision making among multilingual

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When using a foreign language (L2) instead of their native language (L1), people think, make decisions, and behave differently. One cause for such difference is due to the differences in cognitive processes and demands associated with processing L1 and non-native language (L2). However, language is also associated with group identity and culture, and therefore the cultural and political relations between the groups associated with L1 and L2 may shape decision-making. In this study, we are interested in the impact of written language on pro-social decisions among multi-linguals due to cognitive and cultural effects. Cognitive demands associated with prosocial decisions may lead participants to be less considerate of others when the task is presented in L2. Group identity may shape participants' prosocial decisions if L2 is associated with a political-conflict group. We tested pro-social decisions using the social value orientation (SVO) task, where participants are asked to choose between different allocations of money between them and another recipient participant. We tested Jewish and Arab Israeli citizens, in task presented in Hebrew, Arabic and English. In the context of the Israeli-Arab conflict, Arab participants were expected to perform the task differently when it was presented in Hebrew (L2-conflict) and English (L2-neutral). We conducted two experiments online among students from the University of Haifa, Israel. In the first experiment, Arabic speakers performed the SVO task, with three recipient participants: an unknown participant, a participant who speaks their native language, and a participant who speaks a foreign language. The task was presented either in Arabic (L1), Hebrew (L2-Conflict), or English (L2-Neutral) to different groups. The results showed that participants were more pro-social when the task was presented in L1 compared to L2-Conflict. The second experiment was conducted with Hebrew speakers and the task was presented either in Hebrew (L1) or English

(L2-Neutral), and no significant difference in prosocial behavior were found. As these data were collected before the outbreak of the war between Israel and Hamas, we now carry an additional data collection and expect results to show increased language-dependent intergroup bias. Our results so far highlight the collective impact of cognitive and cultural factors associated with written language on decision making.

P3-P-84 - Is this Real? Age-Related Differences and Their Brain Correlates in Deepfake Detection

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Deepfakes are images or videos created with artificial intelligence to fake someone's audio-visual representation. They are used as one of the novel deception tactics to spread false information. The dramatically growing presence and negative impact of deepfakes across many domains of life have raised important questions about processes underlying and factors contributing to their detection.

Aging is associated with greater susceptibility to deception. It is presently not known is, whether older adults are less capable of detect deepfakes than young adults. In addition to cognitive variables, emerging evidence suggests that older adults may experience challenges with deception detection given reduced anterior insula response to deceptive cues.

The anterior insula is a core node of the salience network and is involved in integrating bodily signals with environmental cues. Altered patterns of neural activation in anterior insula with age may impair the integration of internal states (e.g., heart rate) with external information (e.g., deceptive cues) with negative impact on decision making and deception (e.g., deepfakes) detection. In the present study, young and older adults rated the veracity of real and deepfake face images while undergoing functional magnetic resonance imaging (fMRI). We hypothesize that older adults will be less able to detect deepfakes than young adults (Hypothesis 1), with this age-related reduced deepfake detection associated with reduced anterior insula activity (Hypothesis 2).

Data collection for this study is ongoing. Currently, this dataset consists of 35 young and 28 older adults. Study sessions start with a T1-weighted structural scan using an MP-RAGE sequence. During the fMRI data acquisition, using a multi-echo acquisition sequence for increased signal-to-noise ratio, participants are presented with 80 face images (40 real and 40 fake created via the StyleGAN2 deep learning algorithm), and are asked to rate the veracity of each face on a scale from 100% real to 100% fake.

To test Hypothesis 1, we will conduct a linear regression on detection accuracy with age group (between-subject; categorical: young, older) and face veracity (within-subject; categorical: real vs. fake) as predictors in the model. To test Hypothesis 2, we will conduct a linear regression on the blood-oxygen-level-dependent (BOLD) signal in anterior insula with age group (between-subject; categorical: young, older), face veracity (within-subject; categorical: real vs. fake), and detection accuracy (within-subject; continuous) as predictors in the model. Findings from this research will advance understanding of age-related differences in deepfake deception and shed light on the underlying brain processes in deepfake detection in aging. Novel insight from this project has potential to inform intervention to tackle the major concern around misinformation spread via deepfakes.

P3-H-85 - Keeping an eye out for change: Anxiety disrupts adaptive resolution of policy and epistemic uncertainty

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BACKGROUND AND AIMS: Human learning unfolds under uncertainty. Uncertainty is heterogeneous with different forms exerting distinct influences on learning. While one can be uncertain about what to do to maximize rewarding outcomes, known as policy uncertainty, one can also be uncertain about general world knowledge, known as epistemic uncertainty. In complex and naturalistic environments such as the social world, adaptive learning may hinge on striking a balance between attending to and resolving each type of uncertainty. Prior work illustrates that people with anxiety—those with increased threat and uncertainty sensitivity—learn less from aversive outcomes, particularly as outcomes become more uncertain. How does a learner adaptively trade-off between attending to these distinct sources of uncertainty to successfully learn about their social environment?

METHODS: We developed a novel eye-tracking method to capture highly granular estimates of policy and epistemic uncertainty based on gaze patterns and pupil diameter (a physiological estimate of arousal).

RESULTS: These empirically derived uncertainty measures reveal that humans flexibly switch between resolving policy and epistemic uncertainty to adaptively learn about which individuals can be trusted and which should be avoided. Those with increased anxiety, however, do not flexibly switch between resolving policy and epistemic uncertainty, and instead prioritize reducing epistemic uncertainty at the cost of optimizing behavior, leading to maladaptive behaviors with untrustworthy people.

CONCLUSIONS: While our findings dovetail with prior work showing that highly anxious people learn less from uncertain outcomes, we show that anxiety is not associated with a blanket uncertainty insensitivity. Rather, anxiety is characterized by a biased uncertainty filter.

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