

Undergraduate Honors Projects – 2020-21

Youri Benadjaoud

Disentangling Neural Activation to Self and Other Using Structural Connectivity

Advisors: Taylor Guthie, M.S., and Rob Chavez, Ph.D.

The medial prefrontal cortex (MPFC) is prevalent in self-referential and social cognition tasks, often found to be split between the ventral MPFC and dorsal MPFC, with the former engaging in self-reference and the latter engaging in responses when thinking of others. Yet, the split has limited neuroanatomical definition as there is frequent and significant overlap of activation between the two regions. In this study, we investigated the role that structural connectivity, measured by probabilistic tractography, played to differentiate the overlap in the MPFC to distinguish self-other related activity. In a sample of 114 subjects, brain activation to self and others was measured using a trait-judgement fMRI task paradigm. Using diffusion magnetic resonance imaging (dMRI), a regularized regression model was used to predict activation values within the MPFC for both self and other based on the underlying structural connectivity patterns. By comparing the structural connectivity pattern weights, the model aimed to differentiate activity for self vs. other within overlapping areas within the MPFC. Results tested the utility of using predictive models based on structural connectivity for differentiating these processes, which aided in understanding how different mental processes share overlapping cortical real estate.

Anastasia Browning

Leveraging Evidence-Based Messaging to Prevent the Spread of COVID-19

Advisors: Elliot Berkman, Ph.D.

With cases of COVID-19 still spreading in America, and vaccines still inaccessible or undesired by many, one of our primary defenses against this deadly virus remains to mitigate its spread on a behavioral level. Official messaging targeting behavioral mitigation procedures is therefore critical for reducing virus transmission. This study assessed whether approach-versus-avoidance message framing and goal-orientation affect people's intentions to follow COVID-19 preventative procedures. To test this, 832 subjects were randomly assigned to view mitigation messaging with either approach or avoidance framing, and either self-protective or altruistic goal-orientation. Kruskal-Wallis tests revealed a significant effect of goal-orientation, suggesting that altruistic (over self-protective) goal-orientations in COVID-19 health messaging lead to stronger intentions to follow mitigation procedures. No significant effect of approach or avoidance framing was found on individual intentions to follow mitigation procedures. These results suggest an immediate need to address the wording of our public health messages. By adjusting the framing within our COVID-19 preventative procedures to reflect more altruistic goals, we can leverage our official communications as a prevention tool to protect at-risk populations from further contracting COVID-19.

Reed Colgrove

Measuring the Usefulness of Virtual Reality for Evoking Directed Balance Responses

Advisors: Dr. Jeffrey Peterson and Paul Dasonville, Ph.D.

For most of us, simply standing in place without falling over is no great feat. It requires no appreciable effort or attention, even for young children. While it seems obvious that our ability to balance is a fairly simple mechanism in the brain, this assumption is false. Human balance is a complicated process which requires the integration of information from the visual, vestibular, and proprioceptive sensory systems (Lee & Aronson, 1974; Peterka, 2002). For example, since the vestibular organs are located in the ears, the orientation of the head must modify how vestibular information is interpreted. If the head is turned to one side, the sensations received from the vestibular organs will be processed differently than if it is facing forward (Lund & Broberg, 1983). In order to study how this sensory integration occurs, it is useful to examine illusions which affect these senses. Illusions are often used in sensory research because they cause disruptions to normal processing. These disruptions can be used in a similar manner to how programmers use edge cases to discover the limitations of their programs: by observing how a particular input (or stimulus) creates an atypical result, you can infer something about how the underlying mechanism works. The head return illusion is the result of one such atypical stimulus, and has proven useful for understanding how head orientation impacts balance.

Josh Coughlin

Measuring Intellectual Humility through Cognitive Task Responses

Advisors: Paul Dasonville, Ph.D.

Intellectual humility is the degree to which someone understands the strengths and limitations of their ideas. Research into intellectual humility is still new and uses self-report measures for all results. This study attempts to add a behavioral component to the analysis of intellectual humility. 173 participants answered intellectual humility related items, as well as cognitive ability tasks within the SAPA Project, a free online personality test. The number of times participants answered "I don't know" to cognitive tasks, as well as their results on humility items were collected. The study found that between two existing measures for intellectual humility – the Comprehensive Intellectual Humility Scale and the General Intellectual Humility Scale – the General Intellectual Humility Scale significantly predicted participant's likelihood of responding with what is believed to be an intellectually humble behavior. Analysis supports the notion that intellectual humility and general humility are two distinct constructs. Further research can improve on this study by requiring participants to answer all questions.

Shifa Hamid

Interpersonal Perceptions of Political Ideology

Advisors: Sanjay Srivastava, Ph.D., and Bradley Hughes, M.S.

Conservative and liberal identities are becoming increasingly polarized in daily interactions within the United States. This partisanship is important in making judgments of the political ideology of others. The present work seeks to understand interpersonal perceptions of political ideology, concerning consensus, accuracy, and stereotypes formed between persons at zero-acquaintance. The hypotheses tested if perceptions of political ideology reach consensus, the accuracy of perceptions of political ideology, and the stereotype content of political ideology in the two dimensions of the Stereotype Content Model (SCM) and in the Big Five. Undergraduate participants ($N= 225$) completed a self-report survey, participated in a round-robin design of an adapted Leaderless Group Decision task, and subsequently provided ratings of their group members. The results found perceivers reach some consensus about who is liberal and who is conservative. Perceivers are moderately and significantly accurate in perceptions of political ideology. Perceptions of political ideology are associated with stereotypes of warmth to inform interpersonal perceptions of political ideology, however there was no significant stereotype effect for competence. The results also showed perceptions of political ideology were significantly associated with stereotype content. People who tended to be perceived as conservative were seen as lower in warmth, and all five factors of the Big Five.

Aaron MacArthur

Referential Communication Task in a Naturalistic Setting

Advisors: Dare Baldwin, Ph.D.

Reaching shared understanding in conversation is an important part of daily life. Various mechanisms facilitate this achievement including: the ability to engage in perspective taking, sensitivity to gaze, sharing attention, and making pragmatic inferences about an interlocutor's intent. We wanted to know how different participants use these different modalities of perspective taking to reach a shared understanding. Prior research on this topic has prioritized experimental control over ecological validity by placing participants in highly constrained situations. We addressed these limitations in the present study by facilitating naturalistic communication and let discussions of ambiguity arise naturally. Specifically, pairs of participants were placed on either side of a shelf with a series of cells and prepared a cake from a given recipe card. Some of the cells on the shelf were visible to only one participant or the other, while some cells were visible to both. We measured participant's use of various disambiguation strategies which included gaze checking, making a clarification request, perspective taking, and spontaneous perspective sharing. This research helped shed light on the nature of real-life social interaction when challenged with ambiguity and the effort to achieve shared understanding therein.

Alexis Sinclair

“I’m Sorry!”: The Relationship of the proclivity to Apologize and Parenting Quality

Advisors: Alexis Adams-Clark, M.S., and Maureen Zalewski, Ph.D.

The basis of long-lasting relationships is the ability to resolve conflicts. Apology is one way to establish trust and connection after a conflict occurs. It is used in relationships where conflict occurs naturally and often. However, little is known about what constitutes an effective parental apology, or when and how often parental apologies occur. Inadequate apologies after conflict may lead to unresolved negative feelings by either parent or child. Too much apology could diminish the significance of the act of apology and be perceived as less effective. Despite these possibilities, apology still plays an important role in the maintenance of the parent-child relationship. We are interested in the effect specifically of a parent’s apology to their child. We will examine how parental apology behavior and parenting constructs are correlated, focusing on parent proclivity to apologize and parenting quality.

Shyla Yu

Does Affect make Meaning or Does Meaning Make Affect? A Multisession Multilevel Analysis in Older Adults

Advisors: Melissa Moss, M.S., and Ulrich Mayr, Ph.D.

An individual’s perceived purpose, or meaning in life, has been identified as an important component of their mental health and general well-being. There is also substantial evidence that positive affect and meaning in life are related. Here we test the hypothesis of positive feedback dynamics between affect and meaning in life. Positive affect (PA) and the presence of meaning in life (MIL) were assessed across 12 weeks on a weekly basis in a group of 50 to 90-year-olds (N=259) within the context of a larger study examining psychological responses to the COVID-19 pandemic. Multi-level cross-lagged panel analyses revealed that experiencing greater positive affect resulted in greater meaning in life in the following week. In addition, we found an interaction between meaning and age in which previous meaning did predict positive affect, but only for the older adults in our sample. This result suggests the possibility of positive feedback dynamics where meaning and positive affect build on each other over time in older adults. Ongoing analyses are examining the effects of PA and MIL on mental health indicators such as stress. We discuss the implications of our results for potential interventions targeting positive feedback cycles between mental-health-related variables and the need for replicating our results in a more diverse sample.