

Undergraduate Honors Projects – 2015-2016

David Adams

An Underadditivity of the Cellular Mechanisms Responsible for the Orientation Contrast Effects of the Rod-and-Frame Illusion

Advisors: Paul Dassonville, Ph.D. and Cris Niell, Ph.D.

If a vertical line is surrounded by a tilted frame, it is typically perceived as being tilted in the opposite direction. This rod-and-frame illusion is thought to be driven by two distinct mechanisms. Large frames cause a distortion of the egocentric reference frame, with perceived vertical biased in the direction of the frame's tilt (i.e., a visuovestibular effect). Small frames are thought to drive the illusion through local contrast effects within early visual processing. Wenderoth and Beh (1977) found that the visuovestibular effect could be induced by a stimulus consisting of only two lines, indicating that an intact frame was not necessary to achieve the illusion. Furthermore, Li and Matin (2005) demonstrated that the Gestalt of an intact frame provided no additional impact to the illusion, as the visuovestibular effect of an intact frame was less than the sum of its parts. It is unclear whether the same is true for the local contrast effects caused by small frames. Participants performed a perceptual task in which they reported the orientation of a target line (12' in length) presented in the context of either an intact frame (32' on a side, tilted $\pm 15^\circ$) or partial frame (that is, flankers consisting of either the top and bottom of the frame in collinear locations with respect to the target line, or the left and right sides in lateral locations). Significant contrast effects occurred for all stimulus conditions, with the top and bottom flankers causing an effect substantially larger than that of the left and right flankers. Indeed, the effect of the top and bottom flankers even surpassed that of the intact frame, indicating that the overall effect of the frame was a weighted average of the two flanker conditions. These findings suggest an underadditivity of the cellular mechanisms responsible for the contextual effects of lateral and collinear flankers.

Courtney Adler

Parental Cognitive Stimulation and its Relation to Child Brain Function for Selective Attention in Low Socioeconomic Status Families

Advisors: Philip Fisher, PhD, Erik Pakulak, PhD and Jimena Santillan, MS

Selective attention is important for academic readiness and success. Past research indicates that children from lower socioeconomic status (SES) families exhibit deficits in a neural index of selective attention relative to their higher SES peers, which is consistent with the academic achievement gap seen between lower and higher SES children. Selective attention exhibits neuroplasticity, which means it can be influenced by the environment in which children develop. One of the most prominent factors children are exposed to early on is the quality of parenting they receive. Previous research has shown that parenting quality predicts behavioral measures of many cognitive abilities related to academic success. In particular, cognitive stimulation elicited by parenting behaviors may promote early development by enhancing language and vocabulary. The present study examined whether the quality of parental cognitive stimulation can shape neural indices of selective attention in children from lower SES families. We coded mother-child interactions during a free play task for parenting behaviors related to cognitive stimulation. To assess brain function for selective attention, event-related potentials (ERPs) were recorded during an auditory task in which children were simultaneously presented with two different stories and were instructed to attend to one story while ignoring the other. We hypothesized that greater cognitive stimulation would be associated with a greater attention effect, operationalized as the amplitude difference between the neural response to the attended vs. the unattended stories. We found a negative correlation between cognitive stimulation scores and the size of the attention effect – as cognitive stimulation on the part of the parent increased, the size of the attention effect decreased. One interpretation of these correlational results is that children with poorer selective attention may elicit more frequent and stronger cognitive stimulation behaviors from their parents. Another interpretation is that lower SES children may benefit more from less parent-guided cognitive stimulation for the development of selective attention. Both of these alternatives should be examined further by future studies.

Brigitte Amidon

Does a Preschool Boy's Ability to Self-Regulate during a Stressful Task Predict Externalizing Problem Behavior?

Advisors: Philip Fisher, PhD and Leslie Roos, MS

In the present study, we examined preschool aged boys' minute-to-minute parasympathetic nervous system (PNS) activity and emotional behaviors elicited in response to a stressful task, as predictive measures of child externalizing behavior problems. A sample of (N=27) preschool aged boys, varying in levels of externalizing behavior problems, participated in a matching task, while PNS activity and expression of emotions were observed and recorded as measures of self-regulation. Externalizing behavior problems were assessed using the Child Behavior Checklist (CBCL) (Achenbach, 1991). In addition, regulation of PNS activity was assessed using constructed measures of respiratory sinus arrhythmia (RSA) during a resting baseline and during the stressful task, while emotion regulation was examined using observer-coded measures of child emotions (shame, embarrassment, anger, frustration, withdrawal, anxiety, self-determination, and pride). It was hypothesized that children reported as having greater externalizing behavior problems would have difficulty self-regulating while performing the stressful task. Results indicated that more approach behaviors were related to higher levels of externalizing behavior problems. A detailed examination of preschool age boys' moment-to-moment display of emotions and adjustments in PNS activity elicited under a validated stressor can contribute to understanding the relation of immediate behavioral responses and RSA that may underlie externalizing problems and actual symptomatic behavior.

Colton Bowden

The Association between Competitive Motives and Pronoun Usage

Advisors: Sara Hodges, PhD and Colton Christian, MS

When individuals consider out-group members, they are more likely to project their attributes onto cooperative out-groups than competitive groups (Toma, Yzerbyt, & Corneille, 2010). However, unpublished data from the University of Oregon found significantly greater projection during face-to-face competitive interaction than during non-competitive interaction. The present study examined whether linguistic differences which might explain this finding emerged between groups of competitive and non-competitive conversation pairs. 162 students at the University of Oregon were randomly assigned into conversation pairs. Some groups were asked to simply discuss their study habits, while others were asked to determine who had the worst study habits between the two participants. Conversations were then analyzed using Linguistic Inquiry and Word Count (LIWC). Our results demonstrated that participants in the competitive condition asked more questions, spoke with a greater degree of clout, and used more second-person pronouns than participants in the non-competitive condition. These findings suggest that face-to-face interpersonal competition directs conversational focus onto the other to a greater extent than the self. Focus on the other rather than the self, in line with previous research (Mussweiler, 2001), elicits perceived similarity and heightened projection.

Caitlin Corona

Musical Boundaries and Task Switching

Advisors: Ulrich Mayr, PhD and Atsushi Kikumoto, MS

Event structure describes how we separate "ongoing, continuous experience into events" through a process known as "event segmentation" (Reimer, Radvansky, Lorschach, & Armendarez, 2015). Listening to music is an event that is segmented by different musical factors, such as "pitch range, dynamics, and timbre; lengthening of durations; changes of melodic contour; and metrical, tonal, and harmonic stress" (Jusczyk & Krumhansl, 1993). In the present study, we sought to investigate the role that musical boundaries had on

performance in a task switching paradigm. We hypothesized that there would be a reduction in switch costs during tasks that were performed at a musical boundary.

We conducted two experiments (Experiment 1, $n = 31$; Experiment 2, $n = 28$) and found that there is a decrease in switch costs during tasks that occur at the first musical boundary, which is driven by the increase in response time on no-switch trials. Future research should investigate how specific musical elements (e.g. rhythm, melody, tempo) contribute to this effect.

Ruth Grenke

The Academic Climate of Science, Technology, Engineering, and Math Fields: How Stereotypes Influence Perceptions

Advisors: Sara Hodges, PhD and Colton Christian, MS

Despite recent progress toward gender equality, women continue to be systematically underrepresented in STEM (science, technology, engineering, and math) fields. One reason for this disparity is found in the academic culture surrounding STEM fields. Within this culture, pervasive beliefs exist that men, more frequently than women, are born with the innate ability required to succeed in STEM fields. In the face of these stereotypes, women in STEM fields are not only told that their gender is at a disadvantage, but also that the incremental improvement that may come with experience will not help, because STEM ability is innate. In the current study, female and male undergraduate and graduate students in the same STEM field were paired (98 pairs) and instructed to have a conversation about the undergraduate's interest in pursuing graduate school. We hypothesized that participants who endorse a belief in innate models of intelligence would give lower ratings to female undergraduates' qualification for graduate school across three variables: undergraduates' self-assessments of their qualification, graduates' assessments of undergraduates' qualification, and "meta-assessments" in which undergraduates guess how graduates rated their qualification. We found that endorsing a belief in innate theory of intelligence was associated with lower self- and meta-assessments of female undergraduates' qualification for graduate school, but this effect was not found for graduates' assessments of female undergraduates' qualification.

Rebecca Howard

Reducing Stigmatizing Attitudes toward Veterans with PTSD: The Impact of Empathic Engagement with Fictional Literature

Advisors: Sara Hodges, PhD and Brianna Delker, MS

Combat-related post-traumatic stress disorder (PTSD) diagnoses are becoming more prevalent, yet fewer than half of veterans diagnosed with PTSD seek treatment. Stigmatizing attitudes toward military veterans with combat-related PTSD prevents veterans from seeking treatment. Fictional literature may serve as an efficient, accessible way to increase personal experience with, and empathy toward, individuals diagnosed with a mental health disorder. In prior research, increased levels of empathic engagement with fictional literature (i.e., "transportation" into the text) has been associated with increased reports of empathy. In this study, undergraduate participants ($N=344$) were randomly assigned to read one of three passages: a fiction passage about PTSD, a nonfiction passage about PTSD, or a non-PTSD fiction passage. Afterwards, self-report surveys assessed stigmatizing attitudes toward people with PTSD, empathic concern for the character in the vignette, and transportation into the text. We hypothesized that the fictional PTSD (vs. nonfiction PTSD) passage would decrease stigmatizing attitudes toward people with PTSD. We also hypothesized that the fictional PTSD (vs. fiction control) passage would increase empathic concern toward the character in the vignette and that this effect would be mediated by increased transportation into the text. Analysis of covariance revealed that the fictional PTSD passage was associated with more pity toward people with PTSD than the nonfiction PTSD passage, $F(1, 243) = 5.16, p = .024$. Empathic concern for the character was greater with the fictional PTSD passage than the fictional control passage, $F(1, 211) = 77.45, p < .001$. Transportation into the text partially mediated the effect of the fictional passages on empathic concern, $B = .15, SE = .03, 95\% CI [.10, .22]$.

Kellan Kadooka

Investigating the Role of Action Experience on the Reorganization of Action Segmentation

Advisors: Dare Baldwin, PhD and Jason Wallin, MS

Human actions are dynamic and complex, yet children exhibit knowledge of the hierarchical organization of action in ways that parallel adults' knowledge (Meyer, Baldwin, & Sage, 2011). Preschoolers segment action by modulating attention to privilege boundaries of events that coincide with the hierarchical structure. Motor engagement in self action facilitates children's ability to discover details about action such as goal construal and intentionality of actions (Sommerville, Woodward & Needham, 2005; Cannon, et al., 2012), yet little research exists identifying the role of action production on action segmentation. The current investigation explores the role of self action on the reorganization of perceived structure using the dwell-time paradigm (Hard, Recchia, & Tversky, 2011). Dwell-time presentation consists of a self-paced sideshow depicting an actor using a syringe to extract liquid from one container and depositing it into another. Preschoolers engaged in sequenced dwell-time and action performance tasks imitating the observed action, in a framework modified from Sommerville and colleagues (2005). After a baseline dwell-time presentation, children performed self action prior to (perform-first) or after (perform-second) a secondary dwell-time presentation. Exploratory analyses identify differences and changes in dwell-time patterns. Specific attention is given towards isolating portions that exhibit the most change which provide insights to the ways that self action may reorganize one's action segmentation.

Katia Krane

The Effects of Colored Word Stimuli on Neural Processing and Behavior during an Emotional Stroop Task: An Event-Related Potential Investigation

Advisors: Don Tucker, PhD, Anita Christie, PhD and Jenn Lewis MS

Western associations of colors, especially of red and green, influence how individuals consciously perceive the meanings of these colors. However, very little research has investigated the underlying neural processes of localized colors presented as meaningful stimuli, like words, and the possible effects these colors have on behavior. The aim of this study was to investigate early neural responses to red and green colored word stimuli during an emotional Stroop task and the effects of these colors on behavior, including working memory and response time. Using dense-array EEG, event-related potentials (ERPs) were recorded following presentation of an emotional word stimuli presented in red and green ink. Additionally, total word recall and average response times for each color category were recorded. Participants recalled more red colored words than green, however, did not show significant differences in average response times while naming the color of the presented word, indicating that color may impact working memory but not response performance during the Stroop task. ERP waveform amplitude differences between color categories in components known to be involved in visual processing and discrimination, such as the C1, P1 and N1, suggest that differences in color perception occur quickly post stimulus presentation. These results suggest a bottom-up cognitive mechanism of color perception that may influence behaviors, such as working memory. Associations of the colors red and green may not simply be arbitrary, but linked to underlying differences in early neural processing which may imply biases in previous research in which an emotional Stroop task was used to investigate behavioral and neural responses.

Kristina Lowney

The Role of Self Doubt and Empathic Accuracy in STEM Fields

Advisors: Sara Hodges, PhD and Colton Christian, MS

In their daily interactions, people demonstrate varying levels of empathic accuracy, a construct that refers to people's ability to accurately infer the thoughts and feelings of others. This study examines whether feelings of self-doubt impact empathic accuracy, particularly in women, when they are interpreting feedback in STEM fields (science,

technology, engineering, and mathematics). Women are underrepresented in the STEM fields as they choose not to continue their studies or not even pursue STEM fields at all. One reason for this trend might be attributed to how they interpret feedback in the domain. Seventy-two dyads composed of graduate and undergraduate students in STEM fields were recruited and held recorded conversations to discuss graduate school. Graduate students provided feedback to undergraduates interested in attending graduate school in a related field. Undergraduate students were asked about their feelings of self-doubt, and they were also asked to infer the graduate student's thoughts regarding the undergraduate's future prospects in graduate school. Results indicated that there was no significant difference between male and female undergraduates for self-doubt or empathic accuracy. These findings are considered in terms of other possible underlying factors contributing to women's underrepresentation in STEM.

Kathryn McMahon

Back in the Good Old Days: Do Beliefs about Societal Decline Contribute to Political Conservatism?

Advisors: Azim Shariff Ph.D. and Brett Mercier, MS

Previous researchers have linked conservative attitudes to the belief in the regression of morals and other human dynamics in relation to the world, but the research is limited. The possible link between conservative and traditional beliefs to a person's view on the state of the world could partially explain the enduring divide between political attitudes. We hypothesized that people who perceive the world as declining will become more conservative and more supportive of traditional ideals. Using Amazon's Mechanical-Turk, an online survey-based format, 592 participants were assigned one of four conditions to read an article describing the state of the world as improving, declining, remaining the same or did not receive an article at all. Dependent variables were measured by a three-item conservatism scale and eight-item traditionalist scale. While there were no significant differences for the conservatism scale, the results from the traditional scale supported our hypothesis suggesting that those exposed to the declining of the world article significantly displayed the most support, and those exposed to the improvement of the world article significantly displayed the least. Further research should focus on developing a stronger manipulation as well as revise the conservatism scale to avoid any predispositions people have regarding their political beliefs.

Adam Norris

Investigating Public Perceptions of Mass Shootings

Advisors: Azim Shariff, PhD and Stephanie Kramer, MS

Recent mass shootings have captivated public attention worldwide. With this has come the journalistic narrative that explains actions carried out by white perpetrators as the product of individual aberrations, such as mental illness or being 'disturbed', whereas actions carried out by people of color are explained in terms of group caricatures where the individuals are labeled terrorists or 'thugs'. This study provided experimental evidence for the validity of this narrative within a US sample. Participants were exposed to one of four purportedly real news articles which reported a mass shooting. Manipulations included the perpetrator's ethnicity (black vs. white) and religiosity (Christian vs. Muslim). Using past research rooted in social identity theory, we hypothesize that our sample would significantly perceive Christian and white perpetrators as less violent and punishable, and more mentally unstable than compared to their Muslim and black counterparts. We predicted that these differences would relate to explicit and implicit attitudes towards Muslims and blacks. Our results showed significant differences between groups, where Muslims and blacks were perceived to possess less mental illness than their Christian and white counterparts. Methodology, limitations, and implications are discussed.

Anna Stenkamp

Perceived Bias in Judicial Selection Methods

Advisors: Robert Mauro, PhD and Robert Rocklin, JD, MS

Judges play a crucial role in the creation and interpretation of law. The perceived procedural fairness of the judicial system directly affects system legitimacy, and, by extension, its success. A concern has been raised that certain judicial selection methods inject political pressures into the judiciary, potentially diminishing citizens' perception of the justice system's legitimacy.

To test whether judicial selection method affected the perceived legitimacy of the courts, we used an undergraduate sample (n=193) to examine perceptions of four common selection methods (partisan election, non-partisan election, gubernatorial appointment and merit based selection). Participants were presented with a fictional newspaper vignette that described a wrongful termination suit brought by a union against a corporation. Vignettes varied by selection method, political leanings of the judge, and the outcome of the case. We predicted that: (1) Participants presented with the unbiased merit based selection committee would perceive this selection method as most just, independent of political leanings (self-report: liberal/conservative) and (2) Participants presented with vignettes opposing their political leanings would perceive these scenarios as the least just. Results suggested that independent of political affiliation and trial outcome, participants viewed judges who were selected to be significantly more just ($F(1,154)=2.484, p = .046$) than those who were elected. This suggests that without additional information, citizens would perceive judicial systems that relied on an elected judiciary as less fair than systems that rely on an unelected judiciary. These results must be replicated in a representative population to determine if these conclusions can be generalized to the larger population.

Taylor Wilson

Socioeconomic Status and its Relationship to Children's Executive Function

Advisors: Philip Fisher, PhD and Leslie Roos, MS

Executive function (EF) cognitive processes begin to develop in preschool age children and are related to important developmental outcomes, including psychopathology and school readiness (Skowron et al., 2014). Children from low socioeconomic status background have been documented to exhibit lower EF (Li Grining, 2007; Sheridan 2012; Ardila, 2005), but research to date has not considered the specific aspects of low SES environments that may impact risk. Notably, stress-related characteristics of families in low SES environments are often overlapping (e.g. low maternal education, low income, single-parent status, parental exposure to ACES) so it is unclear how such experiences may differentially affect EF function in children. The present study examined maternal socioeconomic status and its association with child's executive function performance using an inhibitory control (IC) task. We hypothesized that children whose mothers had higher maternal risk (maternal education, income, marital status, ACES), will have poor executive function performance. IC was assessed with a computerized game that elicited 'go' and 'no-go' actions. Maternal education, marital status, and income were collected via self-report. The adverse childhood experiences (ACES; Edwards, 1998) questionnaire was used to measure mother's negative life events experienced under the age of 18. Results showed maternal ACES was associated with children's inhibitory control performance, such that children with poorer EF performance had mothers with higher ACES scores compared to children who had mothers with low ACES score. There was a significant relationship between marital status and EF; however, mothers who weren't married had children with higher EF performance, than mothers who were married. Lastly, income and marital education was not significantly related to children's EF performance. These results suggest that future research should explore more proximal factors that may account for the link between children's EF development and maternal ACES.