

**Abstracts by McNair Scholars
at the University of Oregon**

**Contextual Modulation:
Components of the Rod-and-Frame Illusion
and the Systemizing Trait of Autism**

David Adams

Psychology, Biology, Honors College

Mentor: Paul Dassonville
Psychology

A vertical line surrounded by a tilted frame 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 (a visuovestibular effect), but small frames are thought to elicit the illusion through local-contrast effects within early visual processing. Past work has found that an intact frame was not necessary to induce the illusory visuovestibular effect. However, it remains unclear if 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 presented in the context of an intact tilted frame or a partial frame (flankers consisting of either the top/bottom or the left/right sides of the frame). Significant contrast effects occurred for all stimulus conditions, with the effect of the top/bottom flankers substantially larger than that of the left/right flankers. The effect of the top/bottom flankers even surpassed that of the intact frame. These findings suggest an underadditivity of the cellular mechanisms responsible for the contextual effects of lateral and collinear flankers.

A Diverse Look at Switch Rate and Task Switching

Dagger Anderson

Psychology

Mentor: Ulrich Mayr

Psychology

Mentor: Jason Hubbard

Psychology

A common method to assess executive control is the task-switching paradigm. It is well known that reaction times are larger when subjects switch tasks compared to when the same task is performed over consecutive trials. This reduction in performance when flexibility is required is known as a switch cost. It is not well understood how switch costs are influenced by a rapidly changing environment that sometimes demands more flexibility (i.e., more switching) and other times requires more stability and resistance to distracting information. Prior research using between-subjects designs suggests that people can indeed shift between a more flexible or stable state depending on switch rate (Mayr et al., 2012). Unlike previous research, the current paper investigates how low and high switch rate conditions influence the tendency to adopt a flexible or stable state as a within-subject manipulation. Results using a sample of college students indicate that people can quickly adapt their behavior to meet the demands of both flexibility and stability.

Pheromones and Path Selection of *Atta cephalotes*

Joshua Coon

Biology

Mentor: Robert Schofield

Physics

Atta cephalotes has been studied widely for its use of pheromones to determine the choice of foraging trails, but there is a lack of research focusing on energetically successful trail choice. According to the current methodology, once a trail is established there is no way for a new trail to become established, even if it is energetically advantageous. I propose that pheromones play a role in controlling the preference for a foraging trail that is shorter and consumes less energy. To test that idea, I will look for differences in leaf carrying and non-leaf carrying ants when given a new path to walk along. Teflon tubing provides a way to collect the pheromones laid down by each group of ants in two separate scenarios. The samples will then be analyzed with a coupled gas chromatographer and mass spectrometer (GC-MS) using a split method.

Maternal Betrayal Trauma and Response to Adolescent Negative Emotion: Does Maternal Emotion Regulation Matter?

Zachary Cunningham

Psychology

Mentor: Jennifer Freyd

Psychology

Mentor: Christina Gamache Martin

Psychology

Maltreatment and other distressing experiences are quite common in childhood. Parental reactions to childhood trauma are especially important because they occur during a time when parents are engaged in the process of emotion socialization with their child. The current study investigated the role of maternal emotion regulation as a moderator between maternal trauma history and invalidation of teen negative emotion, an area with little prior investigation. Participant data were acquired from ongoing research involving mother and teen dyad disclosures at the University of Oregon. Participant responses to a series of three questionnaires covering child negative emotion, emotion regulation, and betrayal trauma history were recorded and analyzed to determine if maternal emotion regulation acts as a moderator in the relationship between maternal trauma history and invalidation of teen negative emotion.

Where There's Smoke, There's Fire: PM2.5, Forest Fires, and Hospital Admissions in Oregon

Matthew Dodier

Economics

Mentor: Benjamin Hansen

Economics

In the past few decades, economists have improved the analysis of air pollution and its health impacts as described in epidemiology literature by utilizing quasi-experimental techniques such as instrumental variables (IV), natural experiments, and difference-in-differences models. However, much of the economic literature exploring the health impacts of outdoor air pollution has focused on more populated states, such as California and Texas, and consequently lacks external validity for many regions of the United States. To help fill that gap, I analyzed particulate pollution in the state of Oregon from 2008–2014. This paper studies the relationship between particulate pollution and hospital admissions. I examined whether higher levels of particulate pollution have a causal impact on hospitalization rates for respiratory and circulatory diagnoses in Oregon. To do this, I use forest fires as a natural experiment to estimate the implied effect of particulate matter less than 2.5 microns in diameter (PM2.5) on hospital admissions rates for respiratory and circulatory illnesses.

**Proton Exchange Rates on
Hydroxide Bridges of the Mineral-Like
 $\text{Ga}_{13}(\mu_3\text{-OH})_6(\mu_2\text{-OH})_{18}(\text{H}_2\text{O})_{24}(\text{NO}_3)_{15}$ Cluster**

Caitlyn Fields

Biochemistry

Mentor: Darren W. Johnson

Chemistry, Biochemistry

Mentor: Anna Oliveri

Chemistry, UC Davis

Mentor: William H. Casey

Chemistry, UC Davis

Soluble metal-hydroxide clusters of Group 13 metals are popular in both materials chemistry and geochemistry. In geochemistry these clusters are used as experimental models for clay-like minerals. In materials chemistry these clusters are the precursors for useful thin films. However, little is known about the kinetics, formation mechanisms, and solution dynamics of these species or how these processes compare to monomer ions. In this study we use ^1H -NMR spectroscopy to estimate the exchange rates of protons on sites in the $\text{Ga}_{13}(\mu_3\text{-OH})_6(\mu_2\text{-OH})_{18}(\text{H}_2\text{O})_{24}(\text{NO}_3)_{15}$ (**Ga₁₃**) and $\text{Ga}_7\text{In}_6(\mu_3\text{-OH})_6(\mu_2\text{-OH})_{18}(\text{H}_2\text{O})_{24}(\text{NO}_3)_{15}$ (**Ga₇In₆**) cluster species.

The Neurotoxic Effects of Amyloid-Beta Oligomers in *C. elegans*

Robel Haile

Human Physiology

Mentor: Janis Weeks

Biology, Institute of Neuroscience

Mentor: Kristin Robinson

Institute of Neuroscience

Alzheimer's disease (AD) is one of the most common neurodegenerative disorders causing dementia in the aged population. Clinically, AD strips patients of memories and cognitive performance, while pathologically it results in deposits of toxic amyloid-beta ($A\beta_{1-42}$) oligomers and neurofibrillary tangles of tau protein in the brain (Dosanjha et al., 2010). The existing treatments for AD have limited effectiveness, a fact that makes it vital to accelerate the search for new therapeutic compounds. Accordingly, it may be productive to target $A\beta_{1-42}$ oligomers when searching for new therapeutic drugs for AD. Preliminary experiments have shown that feeding $A\beta_{1-42}$ oligomers to *Caenorhabditis elegans* can inhibit the nematode's normal pharyngeal pumping rate. This project has three goals: (1) to replicate the toxic effect of $A\beta_{1-42}$ oligomers using visual pharyngeal pump counts, (2) to implement a microfluidic electropharyngeogram platform to obtain more quantitative and sensitive data, and (3) to test for protective effects of EGCG and isradipine against $A\beta_{1-42}$ toxicity.

Malcolm X and Martin Luther King Jr.: The Vanishing Point of Two Black Streams of Consciousness

Diamanté Jamison
Ethnic Studies, History

Mentor: Michael Hames García
Ethnic Studies

The principle objective of this research is to contribute to a critical body of work by recent scholars who have challenged the popular understanding and the perceived differences of both Dr. Martin Luther King Jr. and Minister Malcolm X. Scholarship has not yet adequately compared and contrasted the political messages and insights that each leader presented in the final years of his life. This research engages with Malcolm X's and MLK's later works, which were critical for understanding new developments in their political messages and strategies. In order to comprehend the final years of both leaders, this paper will use a close reading of primary and secondary sources to provide a comparative analysis of their work. Also, the paper seeks to explore the commonalities and divergent strategies that MLK and Malcolm X used in their final messages and suggests ways that these messages are still relevant to US society.

**The Genetic Architecture Underlying
Biting in the Pitcher-Plant
Mosquito, *Wyeomyia smithii***

Nicole Kingsley

Biology, Honors College

Mentor: William Bradshaw

Biology, Institute of Ecology and Evolution

Mentor: Christina Holzapfel

Biology, Institute of Ecology and Evolution

Mentor: Rudy Borowczak

Biology, Institute of Ecology and Evolution

By taking multiple blood meals, a female mosquito becomes an ideal vector for transmitting blood-borne diseases. To better combat disease transmission by mosquito vectors, this research used quantitative genetics to investigate the genetic interactions underlying the biting trait. We generated line crosses between an obligately nonbiting population and a biting population of *Wyeomyia smithii* and assayed the crosses for biting. The biting propensity for each cross was determined based on the number of biting females and the total number of females. The propensities were then compared to determine the role of additivity, dominance and epistasis on the genetic components underlying biting.

Shifting Racial and Ethnic Identities Among Guatemalan Immigrants

Erica Alexia Ledesma

Ethnic Studies, Anthropology, Spanish

Mentor: Lynn Stephen

Anthropology, Center for Latino/a and
Latin American Studies (CLLAS)

This research explores the interaction between racial and ethnic identity formations that socialized Guatemalans in their country of origin and the process of becoming re-racialized and socially labeled in the United States, specifically as they live in Oregon. Earlier studies of ethnic identity have been narrow and tended to link ethnic group identification with ethnic identity while failing to recognize the wide variability existing within ethnic groups. In the last three decades, studies of ethnic identity have broadened to explore feelings of belonging as well as specific ethnic knowledge and behaviors, while other studies continue to focus on identification labels, self-identification and agency. My research seeks to illuminate the structural racial formations in Guatemala and the US, analyze individual understandings of racial and ethnic identities, and determine whether they have shifted because of migration or place of settlement. To accomplish these tasks, I use data gathered from primary interviews with five Guatemala immigrants living in Oregon.

Food and Gardening: Benefits and Challenges for Latino/a Communities in Public Spaces

Tamara LeRoy
Anthropology

Mentor: Lynn Stephen
Anthropology, Center for Latino/a and
Latin American Studies (CLLAS)

This project explores how Latino gardeners in public, community-garden spaces use food, food production, and cooking in the public sphere to preserve and promote cultural and ethnic identity in a majority Anglo city. Ethnographic methods of participant observation and interviews may illuminate additional topics for exploration that relate to interactions between Latino and non-Latino gardeners. Such topics for further exploration include food autonomy, food security, diversity and inclusion for marginalized groups, and opportunities for improved communication and collaboration in venues shared by minority and majority groups. This research is grounded in recent theoretical discourse including decolonization and food sovereignty, two concepts that frame this research in the contemporary and local setting.

The Role of Self Doubt and Empathic Accuracy in STEM Fields

Kristina Lowney

Psychology

Sara Hodges, Psychology, Associate Dean of the Graduate School

Adrienne Wise, Psychology

Colton B. Christian, Psychology

In their daily interactions, people demonstrate varying levels of empathic accuracy, a construct that refers to one'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 scheduled to hold 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 to complete a questionnaire, part of which inquired about feelings of general 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 the STEM domains.

Sociability Gap between Chinese American Mothers and their Children: Consequences of the Gap for Young, School-Age Children's Adjustment

Christine Nguyen

Psychology

Mentor: Jeffrey Measelle

Psychology

Mentor: Jennifer Ablow

Psychology

Mentor: Xiaoning Sun

Psychology

A gap in sociability, a key element in adapting to any culture, has generally been overlooked in the current literature of the acculturation gap. This study explored the sociability gap and the degree to which such a gap constitutes risk for children in their early school years. Participants included 70 Chinese American mothers and their 5-7 year-old children. A standard residual and difference sociability gap score was generated from each child's and each mother's self-report on two dimensions: introversion/extraversion and social acceptance. This study examined the acculturation of the mothers as a predictor of the sociability gap. Children self-reported maladjustment, the dependent variable, along four dimensions: depression and over anxiousness, separation anxiety, antisocial behavior with peers, and social inhibition. Results indicated that mothers' acculturation was significantly negatively correlated with the mother-child sociability gap along the social acceptance dimension. That finding in turn was significantly negatively correlated with child depression and social inhibition.

Integrated Photonic Circuits

Brandon Riemer

Physics

Mentor: Benjamín Alemán

Physics

Photonics is a relatively young field. With many applications, including molecular sensors and quantum computers that are yet to be developed, photonics may have as significant an impact in the 21st century as electronics had in the 20th century. In this work, we propose to explore, engineer, design, and fabricate an integrated photonic circuit. The architecture of that circuit consists primarily of a fiber optic wave guide coupled with a mechanical oscillator. A fiber optic photoresist, SU8, will be deposited on a silicon nitride substrate and patterned to form the photonic circuit. A suspended structure, such as a cantilever, will be affixed to the edge of the substrate; the SU8 wave guide will be placed directly on top of the cantilever. This configuration of the wave guide and the cantilever will allow light from the wave guide to be emitted from the end of the cantilever. The light emission angle will carry information about vibrations (or static deflections) of the cantilever as a result of being driven and allow the effects caused by amplification of this light to be explored. These devices will enable novel actuation and sensing experiments, opening the door to real-time spectroscopy.

The Continuation of US Imperialism through Transnational Marriages between Pilipinas and US Men

Paulla Santos

History

Mentor: Julie Weise

History

This paper explores connections between marriages of Pilipinas and US men and the period of US imperialism during the late 19th century and the first half of the 20th century. Events, such as the US imperial government establishing a US-centric education system in the Philippines and the US-Philippine involvement in the Second World War, set the foundation of sexual and gendered stereotypes associated with Pilipinas and US men. These stereotypes consisted of Pilipinas being viewed as submissive, docile, and possessing western notions of traditional femininity and US men as powerful, wealthy, and dominant. These associations persisted throughout the 20th century with the assistance of the Military Bases Agreement of 1947, the Philippine presidencies of Ferdinand Marcos and Corazon Aquino, and the growth of correspondence relationships in the late 20th century. This paper examines the continuation of US imperialism through the representations of and interactions between Pilipinas and US men.