

## Studies of Gene Expression Across Multiple Stages of Eye Development in *Daphnia Magna*

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*Daphnia magna*, a widely used model organism in ecological, developmental, and evolutionary research, is a species of freshwater crustaceans and a naturally occurring cyclops found in ponds and lakes. Understanding the genetic basis for eye development in this organism is crucial for comprehending the evolution of vision and its ecological significance. This research aims to continue in measuring the level of Six3 gene expression across four developmental timepoints of eye development in *Daphnia magna*, to unravel the molecular mechanisms involved in the cyclopic eye formation on the midline. Previous research work examined the function of the hedgehog gene in *Daphnia magna*, where qRT-PCR analysis indicated a sharp decline in hh gene expression in *Daphnia magna* prior to the emergence of eyes. In a more recent study with the Six3 gene which is known to act upstream of hedgehog and activate it, the expression of Six3 progressively declines throughout the four developmental stages, spanning from early embryo to adult in *Daphnia magna*. To do this, the initial step is to extract RNAs from pooled samples of staged embryos. Next, cDNA is synthesized to serve as a template for both standard PCR and quantitative PCR (qPCR). I hypothesize based on the previous study that there will be a steady decline in the Six3 across the developmental time points.

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## Effects of Inverted vs. Upright Faces on the N170 Event-related Potential Face Effect

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Event-related potentials (ERPs) reflect the ongoing changes in EEG activity as a result of the brain's response to various stimuli. ERPs are valuable tools for understanding the time course and nature of cognitive processes (e.g. attention or categorization) that occur before, during, and after the presentation of a stimulus. The N170 ERP component is emerging as a key neural indicator in psychology and associated disciplines. The N170 is characterized by a large negative deflection in the brain's electrophysiological activity that occurs around 170 ms after a visual stimulus is presented, with a greater amplitude in response to faces in particular. Given its potential to grant insight into perhaps one of the most important stimuli in our species, the present study will investigate the N170 ERP face effect in a design that uses both upright and inverted

faces. As the N170 is sensitive to the structural and configurational aspects of faces, it is anticipated that this will eventually allow for the distinction of how the brain perceives faces from non-face stimuli. Participants (N = 20) will passively view pictures of inverted and upright faces while being asked to mentally count rarely interspersed pictures of butterflies. It is predicted that a larger negative amplitude and longer latency for the N170 will be elicited for inverted faces compared to upright faces, consistent with the literature. These results will complement and improve the ongoing research that investigates the utility of the N170 ERP as a potential biomarker for face processing.

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## The Capacity for Care: Transcending the personal sphere- A comparative study of mutual aid efforts during the Covid-19 and HIV pandemic

**Leeroy Doe, Sarah Combellick-Bidney, Ph.D.**

Revisiting the HIV pandemic is key to understanding how the current challenges of the COVID-19 pandemic are being addressed. Marginalized communities were the most affected by failed public health policies during both the HIV and COVID-19 pandemic. This paper takes a comparative approach to identify how marginalized groups survived through mutual aid networks during both times of crisis. We analyze cultural artifacts from marginalized communities hit hardest by HIV from 1986 to 1993, and compare and contrast with personal accounts and cultural production from the current era of COVID-19 to add to the growing body of research on pandemics and cultural change. Our results indicate that mutual aid networks are built around harm reduction practices developed most significantly during times of crisis, that comprise an ever changing infrastructure for survival for those who are abandoned by the state. Moreover, this paper finds that the latent mutual aid networks created by the HIV pandemic are being revived in new forms in response to COVID-19. We refer to the rich mutual aid networks during both pandemics as an infrastructure of care which begins to address the harm caused by gaps in public health policy during a pandemic.

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## The Effects of a Novel Drug on the swimming behavior of *Daphnia magna* treated with Manganese

**Ifrah Edow, Matt Beckman, Ph.D.**

*Daphnia magna* are freshwater microcrustaceans used for toxicological and water quality studies. The detailed study of the organism's motor and swimming behavior makes it a valuable specimen to study neurochemical effects. *Daphnia* locomotion was observed under the effects of Manganese (II) Chloride. Manganese is an abundant element and in prolonged exposure, can result in a neurological condition called manganism. This condition causes movement and cognitive deficits like those seen in Parkinson's disease. To build upon previous research, *Daphnia* were also rescued from post-manganese toxicity using P7C3-A20. P7C3-A20 is a small neuroprotective molecule discovered to promote neurogenesis by preventing premature neuronal cell death. *Daphnia* were treated with manganese concentrations between 0.0-100.0 mg/L. This range includes the previously determined IC50 at 43.1mg/L. At the 24-hour time point, the animals were imaged and then treated with P7C3-A20. Locomotion was also imaged at 48 and 72 hours after manganese treatment. Tracking was accomplished using CTRAX, a two-dimensional imaging tool. Data from CTRAX was analyzed using MATLAB, a programming software, and then plotted in Excel. Our working hypothesis is that P7C3-A20 treatment after manganese exposure will result in an improvement in the motor behavior of *Daphnia* compared to *Daphnia* that were treated with manganese alone.

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## How Polygraphs are Used to Induce False Confessions

**Cynthia Faber, Ben Denking, Ph.D., Henry Yoon, Ph.D.**

Recent literature has shown that polygraph testing does not have a strong scientific backing, yet it is still commonly used to screen new employees and as an investigation tool with criminal suspects. The technique associates changes in breathing, blood pressure, and skin conductivity due to sweating with deception by the examinee, but there are many reasons for these physiological indicators that vary outside of the act of lying. Each human is unique, meaning we all react in different ways to events and in this case we all lie differently. For this project I analyze and discuss how interrogators use polygraphs as an interrogation tool to elicit false confessions in criminal investigations. I also discuss different types of false confessions and how interrogators can manipulate suspects into believing they were the person that committed the crime. Since jurors and criminal justice officials treat confessions as more probative than any other piece of evidence in cases, it is crucial that who is confessing to a crime is the true perpetrator. The number of false confessions that are elicited by polygraph testing is alarming, and the criminal justice system should understand the research and background of polygraph testing, re-evaluate their use, and consider alternative interrogation techniques.

Key Words: polygraph, lie detection, false confessions, interrogation techniques

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## Anti-Racist Pedagogy in the Communication Discipline: An Extended Literature Review

**Drew Gross, Kristen Chamberlain, Ph.D.**

The communication discipline equips undergraduate students with the skills to interact ethically and effectively with the world. Increasingly, students seeking careers in communication related fields need to be prepared to use these skills across difference. This paper argues that the communication discipline should embrace and implement anti-racist pedagogy as a way to create effective and ethical communicators who are equipped to create positive organizational and social change. This move toward anti-racist pedagogy is vital because college students need to be equipped to confront systemic injustice that is becoming more widely acknowledged because of digital communication and social media. Anti-Racist Pedagogy is the method and curriculum used to teach content in reference to race, ethnicity and power dynamics. The goal of this pedagogy is to move beyond celebrating diversity and towards action. "Anti-racist pedagogy seeks to eliminate social oppression through reflection and action," (Basque and Britto, 2019, p. 2). It challenges individual and systemic oppression at the interpersonal, institutional and cultural levels, (Blakeney, 2005). Utilizing an Anti-racist pedagogy can promote the inclusivity of people from historically marginalized groups to the communication discipline and open spaces for the exchange of ethical and effective ideas between people of different backgrounds. To begin, this essay that Anti-Racist Pedagogy is effectively being used in a variety of disciplines. The expected result of this research is an articulation of the value of this framework specifically within the communication discipline.

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## Effectuating the P3 Brain Response with Passive Counting Task

**Hafsa Hassan, Ben Denkinger, Ph.D., Henry Yoon, Ph.D.**

The P3 event-related potential (P3-ERP) brain response is the most widely researched component in the field of psychophysiology and allied disciplines. The P3-ERP is a positive-going waveform that is reliably seen when participants are required to actively respond to stimuli presented infrequently (i.e., rare targets) among other stimuli that are presented much more frequently (i.e., frequent nontargets). Since it is reliably

measured, this brain component has been investigated in a wide range of research studies where it shows promise in advancing our understanding of brain function in both nonclinical and clinical populations. However, with regard to the former (i.e., nonclinical populations) most of the paradigms used to evoke the P3-ERP have used simple designs often only including two stimuli: i.e., targets and nontargets. Since our brains encounter an almost infinite number of stimuli in our daily experiences, such designs may lack ecological validity or relevance to more complex, real-world settings - such as our social worlds where we encounter numerous faces that we have to recognize. With regard to the latter (i.e., clinical populations), the traditional P3 designs that require active participation and understanding of the instructions by the participant may not be feasible for those suffering from cognitive challenges (e.g., dementia) or who have mobility issues where a physical response is not possible. Thus, in the current study, we incorporated a passive, oddball P3 paradigm using a complex design consisting of many faces that differed along multiple dimensions: i.e., along gender, race, age, and whether the faces were presented upright or upside down (inverted). More specifically, the P3 was evoked through the rare images of butterflies. Overall, the results of this study will provide insight into the brain's ability to recognize stimuli that are deemed significant and task-relevant while we process socially-relevant stimuli such as faces.

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## False Memories in Polygraphs

**Alex Hernandez Olivera, Ben Denkinger, Ph.D., Henry Yoon, Ph.D.**

People use lie detectors in many different places but they have their most profound impact when law enforcement tries to get the “truth” out of someone to see if they committed a crime or not. In these examples, it's always assumed that the results from the lie detector test are 100% accurate when determining if the person was lying about the question they were asked. I will be evaluating the validity of the polygraph test or simply the quality of the test and how accurate it is in measuring whether or not a person is being deceptive. Those being examined under the polygraph may trust that the results are trustworthy and if they are told something other than what their memory remembers, this will lead them to believe and later falsely confess to the crime. The focus will be more on whether or not polygraphs cause false memories, leading people to think that they have committed the crime they are being accused of. There will be a review of 56 exoneree cases and I will be looking deeper into those who have persuaded confessions. I hypothesize that polygraph tests and interrogation tactics used by investigators lead some examinees to believe that they have committed the

crime they are accused of, due to both the environment they are put in and the current state of mind that many accused may be in.

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How does toxic masculinity shape identity among BIPOC young adults?

**Edward Stockard Jr., Kao Nou Moua, Ph.D.**

Toxic masculinity is used to describe “a loosely interrelated collection of norms, beliefs, and behaviors associated with masculinity, which are harmful” (Sculos, 2017, p. 3). This harm can manifest in many ways such as gender roles and expectations, heteronormativity, misogyny, violence, and sexism. These norms, beliefs, and behaviors are learned at a young age among individuals from families to school settings to culture and society. In social work, these norms impact bullying and harassment (Ingram, et. al., 2019), sexual and intimate partner violence (Murnen, et. al., 2002), and resistance to physical and mental health treatment (Kupers, 2005). Learning more about toxic masculinity as a social worker will gauge a better understanding of clients. While there is growing literature about how toxic masculinity manifests and how it is perpetuated, very little research exists about toxic masculinity and the intersections of race, ethnicity and gender. This qualitative study explores the ways toxic masculinity shapes gender identity among 10 young adults who identify as Black, Indigenous and People of Color (BIPOC). Research suggests that messages about masculinity occur in early development such as home and school settings and are affirmed among peer groups, cultural and societal expectations into young adulthood. Participants provided their unique experiences as racialized and gendered individuals, which expands the knowledge of toxic masculinity as not only reinforcing harmful gender norms, but also sustaining racist, misogynistic, homophobic, and transphobic norms, beliefs, and behaviors.