Praveen Prem

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EDUCATION

BSc with Specialization in Psychology, **University of Alberta**, Edmonton, Canada　　　2021 – 2023

　　Relevant Coursework: Cognitive Neuroscience, Human Neuroanatomy, Social Neuroscience, Neuropsychology, Behavioral Genetics, Neurobiology

BSc in Clinical Psychology, **Amity University**, Mumbai, India　　　2019 – 2021 (Transferred)

　　Relevant Coursework: Clinical Psychology, Individual Research Project, Psychophysiology

RESEARCH EXPERIENCE

Faculty of Rehabilitation Medicine, University of Alberta, *Edmonton,Canada*　　　July 2023 – Present

Research Assistant, Supervisor: Dr. Jacqueline Cummine　　　*Full-time*

- Contributed in data acquisition of large-scale fMRI project on statistical learning and language processes
- Analyzed dataset using several neuroimaging modalities including anatomical, diffusion tensor imaging, and functional MRI
- Designing and leading development of a highly replicable segmentation protocol for Cranial Nerve Nuclei from the Brainstem by applying advanced neuroimaging packages and deep learning

Nash Social Neuroscience Lab, University of Alberta, *Edmonton, AB*　　　January 2023 – Present

Undergraduate Research Assistant, Supervisor: Dr. Kyle Nash　　　*Part-time*

- Trained and experienced in EEG data acquisition, EEG data analysis, and economic game experiments

Heera Psychological Testing, Research and Consultancy, *Haryana, India*　　　July 2020 – August 2020

Psychology Research Intern

- Conducted an online study on the perception of overpopulation in Indians from different socioeconomic backgrounds to investigate its effects on fertility decision-making and family planning

Indian Association of Health, Research and Welfare, *New Delhi, India*　　　July 2020 – July 2020

Psychology Research Intern

- Trained in research methodology, statistical analysis, and design of personality and clinical research

AWARDS AND SCHOLARSHIPS

International Undergraduate Transfer Student Grant (CA$1000)　　　June 2021

　　Nominated and awarded to international student for transferring in with high academic standing and exceptional leadership

PUBLICATIONS

Manuscripts in Review

1. **Prem**, Boadu, Saju, Nisbet, & Cummine. (Submitted, 2024). Functional Brain Activation during Visual Statistical Learning is Related to Rapid Automatised Naming of Digits and Objects: an fMRI Study. *Scientific Studies of Reading* (in Review)

   Short Abstract: Statistical learning refers to the brain's ability to detect patterns in the environment and is important for language acquisition in both infants and adults. The extent to which neural processes of SL are related to reading-related tasks is unknown. Using fMRI, we investigated the neural relationship between visual statistical learning (VSL) and rapid automatized naming (RAN) for digits, letters, and objects in 44 adults. VSL had a familiarization phase and a testing phase. Both phases had their separate functional runs. Using a whole-brain approach, we found significant relationships for RAN digits and objects, in clusters that covered left-lateralized motor, articulatory, and visuospatial regions (e.g., middle occipital gyrus, inferior frontal gyrus, cerebellum, precuneus). No such relationship was found for letters, suggesting task-specific neural substrates. These findings underscore shared mechanisms for SL and RAN, emphasizing their distinct and overlapping contributions to reading fluency and orthographic-specific processing.

2. **Prem**, Saggu, Boadu, Saju, Nisbet, & Cummine (Submitted, 2024). Neuroanatomy of Visual and Auditory Statistical Learning: A Volumetric Account of Cortical and Subcortical Regions. *Journal of Neuroscience Research* (in Review)

   Short Abstract: This study examined the neuroanatomical basis of visual and auditory statistical learning (VSL and ASL) in 61 participants. High-resolution T1-weighted MRI scans were used to measure volumes in cortical (planum temporale, inferior frontal gyrus, middle temporal gyrus, fusiform gyrus) and subcortical (globus pallidus, nucleus accumbens, caudate, putamen) regions. Results revealed that ASL performance was significantly associated with IFG volume, while VSL performance correlated with subcortical structures, including the caudate and nucleus accumbens. These findings suggest distinct domain-specific neural substrates for SL, with auditory tasks relying more on cortical areas and visual tasks involving subcortical networks.

3. **Prem**, Eze, Chew, Boadu, Saju, Nisbet, & Cummine. (Submitted, 2024). The Crossing Path(ways) of Reading Processes and Statistical Learning: Evidence from Diffusion Tensor Imaging Study. *Neurobiology of Language* (in Review).

   Short Abstract: The white matter pathways that support basic reading processes have been well defined but the extent to which statistical learning abilities, which is well established to reading abilities, are also related to these same underlying white matter pathways has yet to be explored. Using DTI, we investigated the relationship between statistical learning (SL) and reading-related white matter tracts in 61 participants. Diffusion metrics of fractional anisotropy (FA) and mean diffusivity (MD) were extracted from the inferior fronto-occipital fasciculus (IFOF), uncinate fasciculus (UF), arcuate fasciculus (AF), and corticospinal tract (CST). Significant associations were observed between reading performance and all four tracts. Interestingly, only the CST was linked to both auditory and visual SL performance, suggesting motor pathways may contribute to SL processes. These findings advance models of implicit learning and its neural connections to reading.

4. Simpson, **Prem,** & Nash (Submitted, 2023). Increased attention decreases the convincingness of belief-confirming evidence. *Journal of Experimental and Social Psychology* (in Review). Preprint available at SSRN: doi.org/10.2139/ssrn.4671269

   Short Abstract: This study tested whether attentiveness modulates confirmation bias in evidence evaluation. Participants read arguments for and against raising the minimum wage and were tested on comprehension to ensure attentiveness. Results revealed that increased attention significantly reduced the perceived convincingness of belief-confirming evidence, with no effect on disconfirming evidence. The findings demonstrate that attentiveness can reduce cognitive biases, providing insights into strategies for improving critical thinking and evidence evaluation.

In Preparation

1. Ellis, **Prem**, Kecinski, Nash, Messer, & Lusk. *Feelings Vs. Behavior - A Neuroeconomic Perspective on Food and Water Stigma.*

   Abstract: Dealing with large-scale societal problems, such as water scarcity, often requires changes in behavior that consumers resist. Some sustainable, cost-effective, and safe solutions are even rejected because of a psychological response of disgust, such as food produced with recycled water to supplement traditional water supplies and crickets as a replacement for water-intensive proteins like beef. Adding the "right" positive elements to a stigmatized item has been shown to mitigate disgust. However, this can be difficult and expensive to do as it requires the stigmatized object to go through a process that restores its "natural" and "pure" state. This study combines fMRI and a choice experiment to test if a behavioral intervention that emphasizes the existing, positive dimensions of a stigmatized object can lessen the weight of disgust in the decision process, mitigating its effects. Results suggest that it can. A video that promotes recycled water was shown to ameliorate consumers' aversion to food produced with it. However, consumers' greater acceptance of recycled irrigation water came not from overcoming whatever psychological reactions of disgust they experienced but from reweighting its importance in their decisions. These findings are relevant to many real-world scenarios where stigma-driven behavior produces inefficiencies, such as farm-level adoption of recycled irrigation – a safe, cost-effective and environmentally sound solution to water shortages.

2. **Prem** & Nash. *Experimentally Induced Anxiety Reduces Behavioural Dishonesty in Low-Trait Anxious Individuals: Neural Evidence from EEG.*

   Short Abstract: Prior research has found that neural markers of trait anxiety (TA) predict reduced behavioral dishonesty in the Broken Promise (BP) paradigm, i.e., modified trust game with an antecedent promise stage. This study examined the interaction between trait anxiety (TA), state anxiety (SA), and dishonesty using EEG in 112 participants. High TA was consistently associated with low dishonesty, while SA reduced dishonesty in low-TA individuals. Using oddball passive listening task, Mean P300 amplitude difference ERPs, a marker of neural arousal, were recorded and this measure moderated this effect, linking increased arousal to decreased dishonesty. Findings suggest transient anxiety influences ethical decision-making through heightened self-regulation.

3. Boadu, **Prem**, Saju, Nisbet, & Cummine. *The Neural Correlates of Statistical Learning and Reading Fluency.*

   Short Abstract: Using fMRI, this study investigated the neural mechanisms underlying statistical learning (SL) and reading fluency in 48 participants. Brain activity during auditory and visual SL tasks was significantly associated with reading fluency, with key regions including the middle frontal gyrus, superior frontal gyrus, and cingulate gyrus. These findings support a domain-general neural network for SL that links sensory processing to fluency.

4. Borle, **Prem**, Boadu, Saju, Nisbet, & Cummine. *Functional Connectivity during Visual and Auditory Statistical Learning*

TALK PRESENTATIONS

*Not the presenting author

1. **Prem**, Boadu, Nisbet, Tan, Chan, & Cummine (2024). *Functional Brain Activation during Visual Statistical Learning is Related to Rapid Automatized Naming of Digits and Objects: an fMRI Study.* Research talk presented at 2024 Annual Meeting of Canadian Society for Brain, Behavior and Cognitive Science, Edmonton, AB, Canada

2. *Boadu, **Prem**, Tan, Eze, Chan, Nisbet, & Cummine (2024). *The Neural Correlates of Statistical Learning and Reading Fluency.* Research talk at 2024 Annual Meeting of Canadian Society for Brain, Behavior and Cognitive Science, Edmonton, AB, Canada

3. **Prem** (2020). *Review: Predictive Factors of Delinquent Behaviour in Children of Low Indian Socioeconomic Groups.* Talk presented at *2020* National Conference on Community Mental Health, Navi Mumbai, India

4. **Prem** (2017). *How to live for what you really need to live for.* Talk presented at TEDxYouth @ DPS RK Puram 2017, New Delhi, India.
ted.com/talks/praveen_prem_how_to_live_for_what_you_really_need_to_live_for

RESEARCH POSTER PRESENTATIONS

1. **Prem** & Nash. (2024). *Experimentally Induced Anxiety Reduces Behavioural Dishonesty in Low-Trait Anxious.* 22nd Annual Meeting of Society for Neuroeconomics in Cascais, Portugal. Available at ResearchGate: doi.org/10.13140/RG.2.2.31526.54082

2. *Saggu, Boadu, **Prem**, Nisbet, & Cummine (2024). *Towards Defining the Relationship Between Auditory and Visual Statistical Learning Performance and Cortical Thickness.* 2024 Annual Meeting of Canadian Society for Brain, Behavior and Cognitive Science in Edmonton, AB, Canada

TECHNICAL SKILLS

- **Programming and Data Analysis:** MATLAB, Python, R

- **Neuroimaging Analysis/Visualization**: SPM12, FSL, FMRIPrep, CONN, BrainNetViewer, MRIcroGL, Mango, ExploreDTI, BrainVision Analyzer (EEG)

- **Experimental Design:** Psychtoolbox, PsychoPy, E-Prime, Inquisit, Qualtrics

- **Graphic Design:** Adobe Illustrator, Adobe Photoshop

- **Languages:** English, Hindi, French (A1), German (A1)

COURSES AND WORKSHOPS

Introduction to Neuroeconomics (Higher School of Economics, Coursera)

Econometrics: Methods and Application (Erasmus University Rotterdam, Coursera)

Supervised Machine Learning (Stanford University, Coursera)

SPM Course - fMRI & VBM (University College London)

Principles of fMRI I (Johns Hopkins University, Coursera)

swirl: Learn R (swirlstats)

Python for Data Science (Codecademy)

MATLAB Fundamentals (MATLAB Onramp)

PROFESSIONAL DEVELOPMENT

Academic Community Organizing

The Brain Imaging Journal Club, **University of Alberta**, *Edmonton, Canada*   September 2023 – Present

- Organized and led a group consisting of over 20 academic members including professors, graduate students, and researchers from several interdisciplinary neuroscience labs at the University of Alberta

Memberships

1. Society for Neuroeconomics (2024)
2. Canadian Society for Brain, Behavior, and Cognitive Science (2024)

CLINICAL EXPERIENCE

Aloha Lifestyle Reversal Clinic, Pune, India   June 2021 – July 2021

Clinical Psychotherapy Intern

- Interviewed and assessed several clinical patients of multiple spectrums, from multiple age groups and background for family history, clinical history, and MSE under supervision
- Developed psychotherapeutic strategies and treatment plan for select patients

PEACE Clinic, New Delhi, India   June 2020 – July 2020

Clinical Psychotherapy Intern

- Applied psychometric assessments and diagnostic exercises for 5 individual clinical cases including one case of psychotic spectrum disorder
- Developed patient history reports and presented case reports

ACADEMIC ADVISING EXPERIENCE

Undergraduate Research Mentor (Faculty Supervisor: Dr. Jacqueline Cummine)

Rachael Chew, *PSYCH 398: Individual Study*, 2024

Mackenzie Caddy, *NEURO 451: Honors Research Project in Neuroscience*, 2024

Katelyn Ngo, *PHYSL 468/469: Undergraduate Research Thesis*, 2024-25

Claire Borle, *NEURO 498/499: Honors Research Project in Neuroscience*, 2024

Isaac Thiel, *NEURO 450: Honors Research Project in Neuroscience*, 2024

Dev Patel, *BIOL 498: Research Project*, 2024-25

Khushleen Dhindsa, *PSYCH 499: Honors Thesis Research*, 2024

Hanna Farbin, *PSYCH 499: Honors Thesis Research*, 2024-25

OTHER EXPERIENCES

- *Runners-up*, **NASA Ames Space Settlement Design Contest**   2017
- *Runners-up*, **13th Asian Regional Space Settlement Design Competition**   2016-17
- *Runners-up*, **Conrad Innovation Challenge**   2016-17

EXTRACURRICULAR

- Martial Arts: Krav Maga, Kickboxing, Karate, Taekwondo

- Professional Photography (landscape, abstract), and Graphic Design