

# Zall Hirschstein

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## EDUCATION

Columbia University New York, NY  
Ph.D. Student in the Department of Psychology (GPA: 4.18) 2023 – Present  
Co-advisors: *Mariam Aly, Ph.D.*; *Chris Baldassano, Ph.D.*

Bard College Annandale-On-Hudson, NY  
B.A. in Quantitative Psychology (cumulative GPA: 3.6; major GPA: 3.8) 2014 – 2018  

- Research Thesis: *Towards Improving Learning with Real-Time, Closed-Loop, Electrophysiological Neurofeedback*

## RESEARCH POSITIONS

Columbia University New York, NY  

- **Ph.D. Student** (PIs: *Mariam Aly, Ph.D.*; *Chris Baldassano, Ph.D.*) September, 2023 – Present
- **Lab Manager & Research Assistant** (PI: *Mariam Aly, Ph.D.*) July, 2020 – August, 2023
  - Project: Concurrent guidance of attention from long-term and working memory

Duties: Oversaw operation and maintenance of lab including IRB protocols, participant records & payment, lab spaces, equipment, website, meetings and events

Albany Medical College Albany, NY  

- **Research Technician** (20h/week) (PI: *Damian Shin, Ph.D.*) March, 2019 – March, 2020
  - Project 1: Effect of peripheral ultrasound stimulation on activity of glucose-regulating hypothalamic neurons
  - Project 2: Altering gut-brain axis development of Parkinson's disease with ultrasonic nerve stimulation
  - Project 3: Ameliorating inflammatory bowel disease with ultrasonic nerve stimulation

Duties: Performed craniotomy surgeries on rats *in vivo* and multi-channel neuro-electrophysiology, ELISAs, histology, behavioral testing, suturing, injections; wrote manuscripts and grants; trained lab personnel

- **Lab Manager & Technician** (30h/week) (PI: *Patricia Grasso, Ph.D.*) September, 2018 – March, 2020
  - Project 1: Effect of novel peptide on development of Alzheimer's/dementia in type 1 diabetes mouse model
  - Project 2: Mitigating development of Alzheimer's/dementia with peptide in mouse models of type 2 diabetes

Duties: Sectioned and stained tissue, quantified histopathological markers; performed dosing, cardiac puncture, ELISAs, dissections, glucose and behavior testing; managed lab spaces and inventory; trained lab personnel

Memory Dynamics Lab Annandale-On-Hudson, NY  

- **Lab Manager & Research Assistant** (PI: *Justin Hulbert, Ph.D.*) September, 2016 – June, 2018
  - Project 1: Characterizing the costs of endogenous hippocampal inhibition (direct memory suppression)
  - Project 2: Selectively reactivating deprioritized memories during sleep using real-time electrophysiology
  - Project 3: Effect of cardiac rhythm and mindfulness training on endogenous hippocampal modulation ability

Duties: Supervised/trained 14 research assistants; developed/executed/analyzed EEG, behavioral experiments; coordinated meetings, events; managed lab space, website, equipment; wrote manuscripts, IRBs, grants

- **Research Assistant** October, 2015 – June, 2016

Bard Summer Research Institute Annandale-On-Hudson, NY  

- **Research Assistant** Summer, 2018
- **Research Assistant** Summer, 2017
- **Research Assistant** Summer, 2016

## PUBLICATIONS

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1. **Hirschstein Z.**, Aly M. (2022). Long-term memory and working memory compete and cooperate to guide attention. *Attention, Perception, and Psychophysics*. doi: 10.3758/s13414-022-02593-1
2. Cotero, V., Graf, J., Miwa, H., **Hirschstein Z.**, et al. (2022). Stimulation of the hepatoportal nerve plexus with focused ultrasound restores glucose homeostasis in diabetic mice, rats and swine. *Nature Biomedical Engineering*. doi: 10.1038/s41551-022-00870-w
3. Akhtar K.\*, **Hirschstein Z.\***, Iannilli E., Ravi M., Mikkilineni S., Chua F.Y., Watkins H., Ashe J., Puleo C., Kao T.J., Shin D.S. (2021). Non-invasive peripheral focused ultrasound neuromodulation of the celiac plexus ameliorates symptoms in a rat model of inflammatory bowel disease. *Experimental Physiology*. doi:10.1113/EP088848 [\*co-first authors]
4. **Hirschstein Z.**, Wang A., Anderson B.M., Novakovic Z.M., Grasso P. (2021). MA-[D-Leu-4]-OB3, a Small Molecule Synthetic Peptide Leptin Mimetic, Improves Serum Lipid Profiles in Mouse Models of Type 1 and Type 2 Diabetes Mellitus. *International Journal of Peptide Research and Therapeutics*. doi:10.1007/s10989-020-10155-y
5. Sahai S., Effendi E., Mahoney E., Tucker H., Moolick B., Mamone G., Mikkilineni S., Gupta M., Nicholson A., **Hirschstein Z.**, Akhtar K., Molho E., Pilitsis J., Shin D.S. (2020). Effects of Subthalamic Nucleus Deep Brain Stimulation on Neuronal Activity in the Substantia Nigra Pars Compacta in a Rat Model of Parkinson's Disease. *Neuroscience Letters*. doi:10.1016/j.neulet.2020.135443
6. **Hirschstein Z.**, Vanga G. R., Wang G., Novakovic, Z. M., & Grasso P. (2020). MA-[D-Leu-4]-OB3, a Small Molecule Synthetic Peptide Leptin Mimetic, Improves Episodic Memory, and Reduces Serum Levels of Tumor Necrosis Factor-Alpha and Neurodegeneration in Mouse Models of Type 1 and Type 2 Diabetes Mellitus. *Biochimica Et Biophysica Acta (BBA) - General Subjects*. doi:10.1016/j.bbagen.2020.129697
7. **Hirschstein Z.**, Novakovic Z.M., Grasso P. (2019). MA-[D-Leu-4]-OB3, a Small Molecule Synthetic Peptide Leptin Mimetic, Normalizes Glucose Tolerance and Episodic Memory in a Mouse Model of Type 2 Diabetes Mellitus and Alzheimer's Disease-Like Cognitive Impairment. *International Journal of Peptide Research and Therapeutics*. doi:10.1007/s10989-019-09995-0
8. Anderson B.M., **Hirschstein Z.**, Novakovic Z.M., Grasso P. (2019). MA-[d-Leu-4]-OB3, a Small Molecule Synthetic Peptide Leptin Mimetic, Mirrors the Cognitive Enhancing Action of Leptin in a Mouse Model of Type 1 Diabetes Mellitus and Alzheimer's Disease-Like Cognitive Impairment. *International Journal of Peptide Research and Therapeutics*. doi:10.1007/s10989-019-09929-w
9. Hulbert J.C., **Hirschstein Z.**, Brontè C.A.L., & Broughton E. (2017). Unintended side effects of a spotless mind: Theory and practice. *Memory*. doi:10.1080/09658211.2017.1354999

## PRESENTATIONS

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1. **Hirschstein Z.**, Aly M. (April 2022). Long-term memory and working memory compete and cooperate to guide attention. Talk delivered at the Manhattan Area Memory Meeting. New York, NY.
2. **Hirschstein Z.**, Aly M. (April 2022). Cooperation and competition in memory-guided attention. Poster presented at the Cognitive Neuroscience Society annual meeting. San Francisco, CA.
3. **Hirschstein Z.** (February, 2019). Introduction to EEG: Neurophysiological to methodological (and a thesis). Invited lecture to Bard College cognitive psychology course introducing the neurophysiological basis of EEG methods, culminating in presentation of undergraduate thesis. Annandale-On-Hudson, New York.

4. Hulbert J.C., Libby N.W., Greenberg M.B., Zhang Z., Agosto M., Prusky S., Parum H., **Hirschstein Z.** (February, 2019). Sleep's repercussions: Reactivating deprioritized memories during naps. Poster Presented at the Eastern Psychological Association Annual Meeting. New York, New York.
5. Zhang Z., Depietro B., Agosto M., Machen J., Libby N.W., **Hirschstein Z.**, Thuyein M., Sandbank L., Hulbert J.C. (March, 2018). Reminders of the forgotten: Targeted reactivation of deprioritized memories during sleep. Poster presented at Fenway Psychology Research Conference. Boston, Massachusetts.
6. Libby N.W., **Hirschstein Z.**, Hulbert J.C. (September, 2017). An unnoticed note to forget: Targeted reactivation of deprioritized memories during naps. Poster presented at the 3<sup>rd</sup> Annual Society for Neuroscience (Hudson-Berkshire Chapter) Meeting. Scotia, New York.
7. **Hirschstein Z.**, Baker-Blake B. Murphy S., Hodge Z., Hulbert J.C. (March, 2017). When forgetting the past induces amnesia for the present: Temporal dynamics of the amnesic shadow. Poster presented at the International Conference of Psychological Science. Vienna, Austria.
8. Baker-Blake B., **Hirschstein Z.**, Hodge Z., Murphy S., Hulbert J.C. (September, 2016). Forgetting the past induces amnesia for the present: Temporal dynamics of the amnesic shadow. Poster presented for the Bard Summer Research Institute. Annandale-On-Hudson, New York.

## SKILLS

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### Non-Computational Research Skills:

- **Electrophysiology:** EEG recording and signal processing; single-unit and multi-channel *in vivo* signal recording (MAPs, Omniplex) and processing; event-related potentials (ERPs) and electrocardiography (ECG) analysis
- **Behavior:** Human behavioral paradigm (Think/No-Think, Stop-Signal, n-Back, Stroop, Visual Search; survey design) and rodent behavioral paradigm (Open Field, Sucrose Preference, Y-maze, Morris Water Maze, Novel Object Recognition, Limb-Use Asymmetry Test) design, execution, and analysis
- **Histology:** Sectioning, staining, imaging; quantification (NeuroLucida, ImageJ/Fiji) and analysis
- **Animal:** Rat/mice experience: dosing (intraperitoneal, subcutaneous, intracerebroventricular, oral gavage), craniotomy/stereotactic surgery, tissue collection (brain, colon, nerve, liver), suturing, trans-cardiac perfusion, exsanguination via cardiac puncture, euthanasia (thoracotomy, cervical dislocation)
- **Analytics:** General statistical proficiency; cell sorting/quantification; basic machine learning, signal processing
- **Writing:** IACUC (animal) and IRB (human) protocols, grants (including 2 R01s), manuscripts, websites
- **Biochemistry:** ELISAs, immunostaining, BCA

### Computational Skills:

- Cross-platform proficiency (Mac OSX, Windows, Linux; Android, iOS)
- Proficient with:
  - Python (including, e.g., Matplotlib, Pandas, NumPy, statsmodel, SciPy)
  - Matlab (including, e.g., PsychToolbox, FieldTrip, EEGLab, dmlt, wave\_clus)
  - JavaScript (including, e.g., jQuery); moderate experience with CSS, HTML
  - R (including, e.g., lme4, dplyr)
  - Prism, NeuroExplorer, Any-Maze, Microsoft Office/OpenOffice, Origin Pro, Prolific, Gorilla.sc
  - Adobe Creative Cloud (Photoshop, Illustrator, InDesign, Lightroom, Premiere, etc.)
- Experience with E-Prime, SPSS, Sigmaplot, Qualtrics, and SurveyGizmo
- Hardware and software troubleshooting experience, including electrophysiological/eye-tracking equipment (e.g., OpenVibe, Emotiv, BioPac, AcqKnowledge, Neuroexplorer, Tobii) and basic computer repair

## SELECT NON-RESEARCH INTERESTS AND LEADERSHIP

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- Graphic Arts and Photography** **2007 – Present**
- Freelance graphic design work: logos, diagrams, pamphlets, splash screens, etc.
  - Featured in IBPA Benjamin Franklin Gold Award Winner Book *Silk Weavers of Hill Tribe Laos* (2018)
- Bard College Annandale-On-Hudson, NY
- Captain of Bard Ultimate (Frisbee) Team** **2017 – 2018**
- Mines Advisory Group Laos / Vietnam / Oregon
- Outreach Assistant** **2008 – 2015**
- Educated and fundraised for MAG's mission to remove unexploded ordnance in Southeast Asia