Taylor W. Uselman

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Education

Ph.D. in Biomedical Sciences — **Aug 2018 - present**
Concentration in Neuroscience — GPA: 4.03
University of New Mexico Health Sciences Center, Albuquerque, NM

M.B.A. in Management of Technology *(concurrent)* — **May 2024**
University of New Mexico Anderson School of Management, Albuquerque, NM — GPA: 4.18

B.S. in Engineering Physics — **May 2018**
Emphasis in Mechanical Engineering — GPA: 3.53
Minor in Biochemistry
New Mexico State University, Las Cruces, NM

Personal Statement

Multifaceted research scientist with experience in engineering physics, business/technology management, data analytics, and biomedical sciences - neuroscience. My scientific interests are centered around understanding the complex dynamical systems that govern human experience in both health and disease states and developing biology-informed computational systems and technologies for research and clinical applications. I am interested in post-doctoral opportunities to expand my technical expertise in the modulation of dynamic neural systems.

Research Experience

I am a Ph.D. candidate and NIH F99 Scholar in the lab of Dist. Prof. Elaine L. Bearer at the University of New Mexico Health Sciences Center. My dissertation focuses on mapping and modulating brain state dynamics associated with threat and early life adversity (ELA). We use high-field Mn(II)-enhanced MRI (MEMRI) of mouse brains coupled with novel data- and hypothesis-driven computational strategies to characterize brain-wide activity and functional neural projections in the living brain in 4D. We combine these approaches with transgenics and neuromodulation technologies (e.g., DREADDs) to investigate the potential role of endogenous neuromodulatory systems in vulnerability to neuropsychiatric disorders after threat or ELA.

Ph.D. Candidate, University of New Mexico Health Sciences Center
Advisor: Dist. Prof. Elaine L. Bearer, MD-PhD, FAAAS, FCAP, FASCB — **Jan 2019 – present**

Visiting Student Researcher, California Institute of Technology
Sponsor: Prof. Harry B. Gray, PhD, NAS, FAAAS, APS — ***Jan 2024* – present**

Research Grants Awarded / Funding

NIH *F99NS139535* (D-SPAN F99/K00) — **July 2024 – June 2030**
Title: *Mapping and Modulating Brain States*

Other Research Experience at UNM HSC

Department of Pharmaceutical Sciences – Advisor: Jim Liu **Oct 2018 – Jan 2019**

Zinc regulation of autophagy in ischemic stroke

- Performed behavioral tests, structural MRI, tissue staining, western blot, and drug delivery to determine the role of zinc in regulation of autophagy at different stages of ischemic stroke.

Department of Neurology – Advisor: Surojit Paul **Aug – Oct 2018**

The neuroprotective role PTPN5 (STEP)

- Standardized lab immunohistochemistry protocol to study resident and peripheral immune cell activation in the brain of mice with strokes or lipopolysaccharide injections.

New Mexico State University

Department of Kinesiology, NMSU – Advisor: David Keeley **Aug 2017 –May 2018**

Inertial measurement of functional movement tests

- Generated MATLAB code to process and analyze inertial signals of patients performing functional tests (30 Second Chair Stand, Functional Reach, & Timed Up and Go) to consistently match clinically obtained results.

Department of Biology, NMSU – Advisor: Elba Serrano **Jan 2015 – May 2017**

Mining GEO datasets for analysis of TRP channels in glioma cell lines

- Mined human glioma cell line protein expression data and performed a heat map clustered analysis to reveal dysregulated TRP channel proteins.

Physical analysis of 2D versus 3D astrocytoma cell culture systems

- Worked to standardize protocol for the use of Atomic Force Microscopy in analyzing the dynamics, topology, stiffness, and adhesion forces of cell microenvironments.

Department of Chemical Engineering, NMSU – Advisor: Reza Foudazi **Jan – May 2016**

Development of instructional materials for a rheology laboratory workshop

- Standardized protocol for the analysis of a variety of viscoelastic materials to be used for NMSU RISE graduate workshop for applications in material and biological sciences.

University of Colorado Anschutz, BP-ENDURE, Summer Internship

Department of Physiology and Biophysics – Advisor: Gidon Felsen & John Thomson **May – Aug 2015**

Immunhistochemical analysis of the D1 and D2 pathways of the striatum

- Worked toward developing a protocol for immunostaining dopaminergic neurons of the striatum of mice for the analysis of the dysregulated pathways seen in Parkinson's Disease

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ENGINEERING DESIGN

City of Las Cruces, NM **Jan – July 2018**

Department of Economic Development/Office of Sustainability

Moving to 100% clean energy: photovoltaic system analysis for a municipal request for power

- Complete a photovoltaic systems analysis of a proposed $8 million, 4MW system.
- Produced a cost avoidance model displaying upwards of $24 million costs avoided upon implementation of the 4MW system.

New Mexico State University **Aug – Dec 2017**

College of Engineering

Design of spectrophotometer module of Field Modular Assay Kit (FieldMAK)

- Lead design team in research, drafting, material acquisition, prototyping, and testing of a compact modular spectrophotometer

PUBLICATIONS

1st Author:

Uselman TW* and Bearer EL. Structural Equation Modeling of Brain-wide Neural Circuit Dynamics. In progress.

Uselman TW*, Jacobs RE, Bearer EL. Data-driven Segmentation Analysis of 4D MEMRI Data. In progress.

Uselman TW*, Jacobs RE, and Bearer EL. Reconfiguration of Brain-Wide Neural Activity after Eary Life Adversity. Submitted. *bioRxiv* 2024. DOI: 10.1101/2023.09.10.557058

Uselman TW*, Medina CS, Gray HB, Jacobs RE, and Bearer EL. Longitudinal Manganese-Enhanced Magnetic Resonance Imaging of Neural Projections and Activity. *NMR in Biomed*. 2022;e4675. DOI: 10.1002/nbm.4675

Uselman TW*, Barto DR*, Jacobs RE, and Bearer EL. Evolution of Brain-Wide Activity in the Awake Behaving Mouse after Acute Fear by Longitudinal Manganese-Enhanced MRI. NeuroImage. 2020. 28;222:116975. DOI: 10.1016/j.neuroimage.2020.116975

Medina CS*, **Uselman TW***, Barto DR, Cháves F, Jacobs RE, and Bearer EL. Decoupling the Effects of the Amyloid Precursor Protein from Amyloid-β Plaques on Axonal Transport Dynamics in the Living Brain. Front. Cell. Neurosci. 2019. 13:501. DOI: 10.3389/fncel.2019.00501

Coauthor:

Bearer EL*, Medina CS, **Uselman TW**, and Jacobs RE. Harnessing Axonal Transport to Map Reward Circuitry: Differing Brain-Wide Projections from Medial Prefrontal Cortical Domains. *Front. Cell Dev. Biol.* 2023. 11: 1278831. DOI: 10.3389/fcell.2023.1278831.

PRESENTATIONS

Published Abstracts:

➢ **Platform**

Uselman TW*, Jacobs RE, Bearer EL. Noradrenergic Stimulation Reconfigures Brain States. ASIP 2023: Tissue, Matrix, and Pathobiology. Salt Lake City, October 2022. *American Journal of Pathology*. ASIP Meritorious Trainee Award Lectures. Abstract 003.

Uselman TW*, Jacobs RE, Bearer EL. Brain-wide Network Restructuring after Chemogenetic Locus Coeruleus Activation: Implications of Tonic Noradrenergic Activity for Neurodegeneration. Experimental Biology, Annual Conference. Philadelphia, PA. April 2022. *FASEB Journal*, 36:S1. DOI: 10.1096/fasebj.2022.36.S1.R3749

Uselman TW*, Barto DR, Jacobs RE, Bearer EL. Early Life Adversity Potentiates Adult Response to Acute Threat: A Brain-wide Neuroimaging and Behavior Study. PISA Virtual Conference. October 2021. *American Journal of Pathology*. 191(10);NEURO5. DOI: 10.1016/S0002-9440(21)00400-4

Uselman TW*, Barto DR, Jacobs RE, Bearer EL. Serotonin transporter lacking mice are resilient to anxiety after early life adversity: Using MEMRI to obtain a bird's-eye view of the brain. Society for

Neuroscience, Annual Conference. Nanosymposium Session Number 270. Chicago October 2019. DOI: 10.13140/RG.2.2.24339.63529

Barto DR*, **Uselman TW**, Jacobs RE, Bearer EL. Evolution from fear to anxiety: Live imaging of brain states and role of the serotonergic system. Society for Neuroscience, Annual Conference. Nanosymposium Session Number 270. Chicago October 2019. DOI: 10.13140/RG.2.2.26961.07528

Bearer EL*, Barto DR, **Uselman TW**, Jacobs RE. Neural Mechanisms Underlying Depression and Anxiety. Society for Neuroscience, Annual Conference. Nanosymposium Session Number 270. Chicago October 2019. DOI: 10.13140/RG.2.2.24339.63529

- **Poster**

Uselman TW*, Jacobs RE, Bearer EL. Longitudinal Mn(II)-enhanced MRI illuminates altered adult brain responses to threat after early life adversity. International Society for Magnetic Resonance in Medicine, Annual Conference. Honolulu, HI. May 2025. Program # 4105.

Uselman TW*, Jacobs RE, Bearer EL. Illuminating (dys)functional neuroarchitecture induced by early life adversity: Computational manganese-enhanced MRI (cMEMRI). Society for Neuroscience, Annual Conference. Chicago, IL. October 2024. PSTR411.21. https://www.sfn.org/-/media/SfN/Documents/NEW-SfN/Meetings/Neuroscience-2024/Abstracts-and-Sessions/Abstract-PDFs/SFN24_Abstracts-PDF-Posters_WED_AM.pdf

Uselman TW*, Jacobs RE, Bearer EL. Reconfiguration of adult brain-state dynamics in response to acute threat after early life adversity. Society for Neuroscience, Annual Conference. Washington, DC. November 2023.

Bearer EL*, Medina CS, **Uselman TW**, Jacobs RE. Harnessing cell biology to map the brain: Tracing connections from anterior cingulate or prelimbic neurons reveals starkly different post-synaptic targets. ASCB CellBio 2023. *Molecular Biology of the Cell.*

Uselman TW*, Jacobs RE, Bearer EL. Long term consequences of early life adversity on neural architecture: A brain-wide cell biological perspective. ASCB CellBio 2022. *Molecular Biology of the Cell*. Jan 13, 2023. 34(2):P1580. DOI: 10.1091/mbc.E22-12-0555

Bearer EL*, **Uselman TW**, Medina CS, Jacobs RE. Plasticity of prefrontal projections mapped by axonal transport. ASCB CellBio 2022. *Molecular Biology of the Cell*. Jan 13, 2023. 34(2):P1383. DOI: 10.1091/mbc.E22-12-0555

Uselman TW*, Jacobs RE, Bearer EL. Brain-wide network restructuring after chemogenetic locus coeruleus activation: implications of tonic noradrenergic activity for neurodegeneration. Experimental Biology Annual Conference. Philadelphia, PA. April 2022. *FASEB Journal*, 36:S1. DOI: 10.1096/fasebj.2022.36.S1.R3749

Uselman TW*, Jacobs RE, Bearer EL. Distal termini of projections from the locus coeruleus in the noradrenergic system are abnormal in animals who experienced early life adversity. CellBio 2021 Virtual Conference. *Molecular Biology of the Cell*. December 2021. 32(22):P420. DOI: 10.1091/mbc.E21-11-0545

Uselman TW*, Jacobs RE, Bearer EL. Brain-wide imaging of network dynamics after chemogenetic activation of the locus coeruleus by MEMRI: Implications of tonic noradrenergic activity on brain-behavior. Nov 2021. Society for Neuroscience, Annual Conference (online). P600.02.

Uselman TW*, Jacobs RE, Bearer EL. Early life adversity potentiates adult response to acute threat: A brain-wide imaging and behavior study. Nov 2021. Society for Neuroscience, Annual Conference (online). P601.03.

Bearer EL*, **Uselman TW**, Medina CS, Jacobs RE. A single acute fear experience redirects projections from the anterior cingulate: Evidence for a biological mechanism of anxiety and substance abuse disorders. Jan 2021. Society for Neuroscience, Annual Conference (online). P751.09

Uselman TW*, Jacobs RE, Bearer EL. Effects of early life adversity and monoaminergic systems on brain-wide coordination of neuronal activity. CellBio 2020 Virtual Conference. *Molecular Biology of the Cell*. December 2020. 31(26):P945. DOI: 10.1091/mbc.E20-10-0665

Bearer EL, Woltjer RL, Medina CS, Barto DR, **Uselman TW,** Jacobs RE. Decoupling App Expression from Plaque: Effects of Overexpression of AppSwInd, Presence of Plaque, and Role of Herpes Virus. June 2019. Alzheimer's and Dementia 15(7): P27. DOI: 10.1016/j.jalz.2019.06.418

Other Abstracts (non-published):

Platform Presentation. **Uselman TW***, Jacobs RE, Bearer EL. Reconfiguration of brain states after early life adversity. In Vivo Magnetic Resonance, Gordon Research Seminar. Proctor Academy, NH. 7/2024.

Poster Presentation. **Uselman TW***, Jacobs RE, Bearer EL. Reconfiguration of brain states after early life adversity. In Vivo Magnetic Resonance, Gordon Research Conference. Proctor Academy, NH. 7/2024.

Platform Presentation. **Uselman TW***, Jacobs RE, Bearer EL. Noradrenergic-based brain network reorganization: Implications in neurodegenerative and neuropsychiatric disorders. In Vivo Magnetic Resonance, Gordon Research Seminar. Proctor Academy, NH. 7/17/2022.

Poster Presentation. **Uselman TW***, Jacobs RE, Bearer EL. Early life adversity reorganizes brain-network structure during and after adult exposure to ethological threat: Implications for noradrenergic dysregulation. Cell Symposia: The Biology of Neuropsychiatric Disorders. Sitges, ES. 5/16/2022.

Poster Presentation. **Uselman TW***, Jacobs RE, Bearer EL. Live imaging of brain network dynamics in an acute threat response by MEMRI: Effects of early life adversity on noradrenergic system anatomy. University of New Mexico, Brain and Behavioral Health Institute, Virtual Research Day. 4/16/2021.

Poster Presentation. Bearer EL*, **Uselman TW**, Medina CS, Jacobs RE. Medial prefrontal cortical projections are altered by a single acute fear experience: Evidence for biological mechanisms of anxiety and substance abuse disorders. University of New Mexico, Brain and Behavioral Health Institute, Virtual Research Day. 4/16/2021.

Poster Presentation. **Uselman TW*,** Jacobs RE, Bearer EL. Live imaging of brain network dynamics in an acute threat response by MEMRI: Effects of early life adversity on noradrenergic system anatomy. Society for Neuroscience, Global Connectome (online). P244.03. Nov 2021.

Poster Presentation. Bearer EL*, **Uselman TW**, Medina CS, Jacobs RE. Medial prefrontal cortical projections are altered by a single acute fear experience: Evidence for biological mechanisms of anxiety and substance abuse disorders. Society for Neuroscience, Global Connectome (online). P276.02. Jan 2021.

Poster presentation. Effects of early life adversity and monoaminergic systems on brain-wide coordination of neuronal activity. **Uselman TW*,** Jacobs RE, Bearer EL. December 2020. CellBio 2020 Virtual Conference. 12/2/2020.

Oral Presentation. The evolution of brain states after fear and the effect of early life adversity. **T.W. Uselman***; D.R. Barto; R.E. Jacobs; E.L. Bearer. University of New Mexico Pathology Seminar Albuquerque, NM 12/19/2019

Oral Presentation – BSGP Student Research Day 2020 Albuquerque, NM 3/6/2019. **T.W. Uselman***; D.R. Barto; R.E. Jacobs; E.L. Bearer. The evolution of brain states after fear and the effect of early life adversity.

Lightning Talk, Presentation. MEMRI analysis of mice exposed to early life adversity (ELA); implications of SERT in affective disorders." University of New Mexico Biomedical Research Program. March 2019.

Lightning Talk, Presentation. Zinc regulation of autophagy in ischemic stroke. University of New Mexico Biomedical Research Program. January 2019.

Lightning Talk, Presentation. The neuroprotective role of PTPN5 (STEP). University of New Mexico Biomedical Research Program. October 2018.

Poster presentation. Inertial measurement of functional movement tests: a pilot investigation for the 30 second chair stand. **Uselman TW**, Keeley D. South West American College of Sports Medicine. Long Island, CA. September 2017.

Poster presentation. Mining Genome Expression Omnibus (GEO) datasets for analysis of TRP channels in glioma cell lines. Society for Neuroscience. San Diego, CA. November 2016.

Lightning talk & poster presentation. Mining Genome Expression Omnibus (GEO) datasets for analysis of TRP channels in glioma cell lines. University of Colorado Anschutz, BRAiN Program. Aurora, CO. July 2016.

Presentation and student panelist. Engage New Mexico: An Experience from Abroad. National Association of Foreign Student Advisers (NAFSA). Santa Fe, NM. November 2016.

Presentation and student panelist. Studying abroad in STEM field. New Mexico Alliance for Minority Participation. Las Cruces, NM. September 2016.

Poster presentation. Development of instructional materials for a rheology laboratory workshop. Undergraduate Research Symposium, NMSU. Las Cruces, NM. April, 2016.

Lightning talk & poster presentation. Immunohistochemical analysis of the D1 and D2 pathways of the striatum. University of Colorado Anschutz, BRAiN Program. Aurora, CO. July 2015.

HONORS & AWARDS

D-SPAN Fellow (F99 Phase) **July 2024 – present**
Diversity Specialized Predoctoral to Postdoctoral Advancement Neuroscience (D-SPAN) Award

Trainee Professional Development Award (TDPA), Society for Neuroscience **Nov 2023**

American Society for Investigative Pathology Experimental Pathologist-in-Training (EPIT) Merit Award **Oct 2023**

American Society for Investigative Pathology Trainee Scholar Award for Excellence in Neurodegenerative Disease Research **Apr 2022**

UNM Anderson School of Management Global Scaling Challenge **Apr 2021**
Best Scaling Idea (2nd Day) & Overall Grand Prize

Trainee Professional Development Award (TDPA), Society for Neuroscience **Jan 2021**

Anderson School of Management, Professional Aerospace Contractors Association (PACA) of New Mexico Scholarship **Aug 2020 – May 2021**

Student Research Grant (Research Travel Award), UNM GPSA **Nov 2019**

Sigma pi sigma Physics Honor Society **May 2017 – present**

Building Research Achievement in Neuroscience (BRAiN) Scholar **Jan 2015 – Dec 2017**
BP-ENDURE, National Institute of Health

Alex & Margaret Hood Scholarship **Aug 2017 – May 2018**

Atmar & Davis Memorial Scholarship **Jan – May 2016**

NMSU Provost Scholar National Bioethics Bowl Travel Award **Jan – May 2016**

Benjamin A. Gilman International Scholarship **Aug – Dec 2015**

NMSU Office of Education Abroad Scholarship **Aug – Dec 2015**

Knowledge Exchange Institute Grant **Aug – Dec 2015**

NMSU Transfer Achievement Scholarship **Aug 2013 – May 2016**

New Mexico Lottery Scholarship **Aug 2012 – Dec 2016**

NOTABLE COURSEWORK

Advanced Data Analysis I & II **Aug – Dec 2019**
- R code, the NESARC wave 1 dataset was subset, processed, and analyzed to investigate the association of recreational hallucinogen use with major depression using statistical testing. A poster presentation of the analyses concluded the course.
- Applied a variety of multivariate analyses, predictive algorithms, dimensionality reduction, and statistical experimental design. Machine learning project on building, cross-validating, and comparing various supervised (LDA/QDA, PCA + logistic regression with automated forward/backward model selection) versus unsupervised (agglomerative and divisive clustering, cluster optimization) classification models.

Biostatistical Methods Manuscript **Aug – Dec 2018**
- Statistical analysis of lymph node cytokine profiles in metastatic lung cancer patients in correlation to age, gender, and smoking conditions.

Engineering Design Project **Jan – May 2017**
- Lead engineer in design and drafting of a 3 speed transmission
- Applied stress and fatigue analysis while working toward power optimization

Modern Physics Laboratory Project ***Jan – May 2016***
- Lead experimental design and analysis of research project to validate/re-prove the Hall effect

Immersive Asian Philosophy Project (study abroad) **Aug – Dec 2015**
- Overview of various Asian philosophies at Mahidol University in Thailand, focus on meditation. including a presentation and written review of the scientific findings of meditation practice in biomedical research. Practiced various meditation techniques.

SOCIETAL MEMBERSHIPS

American Association for the Advancement of Science Student Member **Apr 2021 – present**

American Society for Investigative Pathology Student Member **Oct 2020 – present**

American Society for Cell Biology Student Member	**Aug 2020 – Dec 2023**
Sigma Pi Sigma Physics Honor Society (lifelong inductee)	**Sep 2017 – present**
Society for Neuroscience Student Member	**Jun 2015 – present**
American College of Sports Medicine	**Sep 2017 – Aug 2018**

EXTRACURRICULAR ACTIVITIES

UNM BSGP Peer Mentoring Network	**Sep 2021 – present**
New Mexico State Legislator UNM Day Tabled for UNM's Child Well-Being Initiative	**Jan 2020**
UBELONG International Volunteer Taught elementary English and French to Moroccan school children	**Dec 2016 – Jan 2017**
Lessons from Abroad Student Participant	**September 2016**
New Mexico Alliance for Minority Participation Conference – Student Panelist	**September 2016**
NAFSA Regional Conference (Santa Fe, NM) – Student Panelist	**October 2016**
Co-founder and President of student organization EngageNM Lead meetings, organized local and international community outreach events and presented at regional meetings (see above).	**Aug 2016 – May 2017**
National Bioethics Bowl (Cleveland, OH)	**Jan 2016 – May 2016**
Immersive Study Abroad in Bangkok, Thailand. Term papers and projects on the health benefits of meditation	**Aug 2015 – Dec 2015**
NMSU the "Big Event" City wide day of picking up trash in the City of Las Cruces	**April 2014 & 2015**
Collegiate Baseball (Luna CC, NMSU)	**Aug 2012 – Dec 2013**