Whitney S. Griggs

Website | Google Scholar | wsgriggs@gmail.com

Education

David Geffen School of Medicine at UCLA. Los Angeles, CA. 2017 – present
MD (in progress).

California Institute of Technology. Pasadena, CA. 2019 – 2023
PhD in Biology. Advisors: Richard A. Andersen and Mikhail G. Shapiro
Dissertation: "Listening to the Internal Representation of Actions Within the Posterior Parietal Cortex" - Link

Whitman College. Walla Walla, WA. 2009 – 2013
BA (*cum laude).* Double major in Biochemistry, Biophysics, and Molecular Biology (honors) and Applied Mathematics.
Biochemistry, Biophysics, and Molecular Biology Honors Thesis – "Eliminating Intersubject Variability of Large Amplitude Gaze-Shift Metrics by Reducing Visual Field"
Applied Mathematics Thesis – "Penalized Spline Regression and its Applications" - Link

Research Experience

Graduate Researcher 2019 – 2023
California Institute of Technology
Advisors: Richard A. Andersen and Mikhail G. Shapiro
Developed non-invasive and minimally-invasive brain-machine interfaces to improve mobility and quality of life in people with neurological injuries. Researched how posterior parietal cortex encodes motor and value-based decisions using functional ultrasound neuroimaging, single-unit electrophysiology, and behavioral studies with nonhuman primate and human subjects.

Postbaccalaureate Fellow 2014 – 2017
Neuronal Networks Section, Laboratory of Sensorimotor Research, National Eye Institute, National Institutes of Health
Advisor: Okihide Hikosaka
Elucidated the neural pathways of reward, risk, salience, attention, and value encoding in rhesus macaque monkeys using single-unit electrophysiology, fast scan cyclic voltammetry, fMRI, and anatomical tracer studies. All experiments, excluding fMRI, focused on the response properties of subcortical areas (caudate head/tail, substantia nigra, superior colliculus, and thalamus) to abstract visual stimuli associated with different appetitive and aversive outcomes.

Research Intern Sep 2013 – Apr 2014
Washington State University
Advisor: Jun Xu
Explored X-linked conditions, including aggression, in mice using molecular, cellular, systems, and behavioral techniques including cell culturing, calcium imaging, qRT-PCR, and behavioral testing and analysis. Managed and mentored five first-year undergraduate students as they advanced the laboratory's research aims.

Undergraduate Research Assistant 2011 – 2013
Whitman College
Advisor: Thomas Knight
Examined the coordination of human eye and head movements during large-amplitude gaze shifts with the eventual goal of understanding how neurological diseases or injuries affect eye-head coordination. Designed and conducted human experiments, resolved hardware problems, wrote analysis programs in MATLAB, and analyzed data.

Other Work Experience

Problem Based Learning Instructor Summers 2020 and 2021
UCLA Summer Health Professions Education Program
Taught and mentored eight college juniors and seniors during a six-week program examining healthcare issues affecting medically underserved communities through problem-based learning cases, lectures, clinical experiences, small-group discussions, and a small-group research project.

Lecture and Anatomy Tutor Aug 2018 – May 2019
David Geffen School of Medicine at UCLA
Tutored first-year medical students to improve their understanding of foundational concepts from medical school lectures. Assisted groups of students learn human anatomy through guided quizzes on human cadavers.

Server, Kitchen Aide, and Housekeeper Summer 2013
Camp Denali and North Face Lodge Denali National Park, AK
Maintained a high level of kitchen cleanliness by washing dishes, helped cooks prepare and plate meals, and performed scheduled organizational and cleaning duties. Served dinner to guests and helped accommodate their special dietary needs. Completed variety of housekeeping roles including vacuuming all common areas daily, keeping guest cabins well stocked with firewood and kindling, and gathering trash/recycling from all staff and common areas.

Biology Writing Fellow Jan – May 2013
Biology Department, Whitman College,
Helped introductory biology students with their writing and presentation skills. This included teaching them to create appropriate figures, generate research ideas, and accurately describe and discuss their results.

Math Lab Consultant 2010 – 2013
Math Department, Whitman College.
Assisted students in Linux computer lab with computer programming (C++, MATLAB, Mathematica, and Python) assignments and technical difficulties.

Laboratory Aide 2010 – 2012
Biology Department, Whitman College.
Prepared instructional laboratories and microbial culture media, dyes, and stains. Helped with laboratory supply inventories and cleanliness throughout department.

Laboratory Assistant Aug – Dec 2011
Biology Department, Whitman College.
Answered questions regarding laboratory exercises from students, maintained cleanliness of the lab and equipment, prepared solutions, and ensured safety compliance in classrooms and on field trips.

Peer-reviewed Publications

C. Rabut*, S.L. Norman*, **W.S. Griggs***, J.J Russin, K. Jann, V. Christopoulos, C. Liu, R.A. Andersen, and M.G. Shapiro. Functional Ultrasound Imaging of Human Brain Activity through an Acoustically Transparent Cranial Window. *Science Translational Medicine.* May 2024, 16 (749): eadj3143. DOI: 10.1126/scitranslmed.adj3143. *co-first authors.

W.S. Griggs*, S.L. Norman*, T. Deffieux, F. Segura, B.-F. Osmanski, G. Chau, V. Christopoulos, C. Liu, M. Tanter, M.G. Shapiro, and R.A. Andersen. Decoding motor plans using a closed-loop ultrasonic brain–machine interface. *Nature Neuroscience*. November 2023. 27, 196–207. DOI: 10.1038/s41593-023-01500-7. *co-first authors.

S.L. Norman, D. Maresca, V.N. Christopoulos, **W.S. Griggs**, C. Demene, M. Tanter, M.G. Shapiro, and R.A. Andersen. Single Trial Decoding of Movement Intentions Using Functional Ultrasound Neuroimaging. *Neuron*. May 2021, 109(9):1554-1566.e4. DOI: 10.1016/j.neuron.2021.03.003.

H.F. Kim, **W.S. Griggs**, and O. Hikosaka. Long-Term Value Memory in the Primate Posterior Thalamus for Fast Automatic Action. *Current Biology*. August 2020, 30: 2091-2911. DOI: 10.1016/j.cub.2020.05.047.

A. Ghazizadeh, M.A. Fakharian, A. Amini, **W.S. Griggs**, D.A. Leopold, and O. Hikosaka. Brain Networks Sensitive to Object Novelty, Value, and Their Combination. *Cerebral Cortex Communications*. July 2020, 1:1. DOI: 10.1093/texcom/tgaa034.

W.S. Griggs, H. Amita, A. Gopal, and O. Hikosaka. Visual Neurons in the Superior Colliculus Discriminate Many Objects by their Historical Values. *Frontiers in Neuroscience*. June 2018, 12:396. DOI: 10.3389/fnins.2018.00396.

O. Hikosaka, A. Ghazizadeh, **W.S. Griggs**, and H. Amita. Parallel Basal Ganglia Circuits for Decision Making. *Journal of Neural Transmission*. March 2018, 125(3): 515-529. DOI: 10.1007/s00702-017-1691-1.

A. Ghazizadeh, **W.S. Griggs**, D. Leopold, and O. Hikosaka. Temporal–Prefrontal Cortical Network for Discrimination of Valuable Objects in Long-Term Memory. *PNAS*. February 2018, 115(9): E2135-E2144. DOI: 10.1073/pnas.1707695115.

W.S. Griggs, H.F. Kim, A. Ghazizadeh, M.G. Costello, K. Wall, and O. Hikosaka. Flexible and Stable Value Coding Areas in Caudate Head and Tail Receive Anatomically Distinct Cortical and Subcortical Inputs. *Frontiers in Neuroanatomy*. November 2017, 11:106. DOI: 10.3389/fnana.2017.00106.

A. Ghazizadeh, **W.S. Griggs**, and O. Hikosaka. Object-Finding Skill Created by Repeated Reward Experience. *Journal of Vision*, August 2016, 16(10): 17. DOI: 10.1167/16.10.17.

A. Ghazizadeh, **W.S. Griggs**, and O. Hikosaka. Ecological Origins of Object Salience: Reward, Uncertainty, Aversiveness and Novelty. *Frontiers in Neuroscience*, August 2016, 10:378. DOI: 10.3389/fnins.2016.00378.

Other Publications

W.S. Griggs. Long-term neurological impacts of SARS-CoV-2. *Visual Abstract Hot Topics,* McGraw-Hill, 2021. AccessNeurology. https://neurology.mhmedical.com/updatescontent.aspx?gbosid=588171.

W.S. Griggs. Neural Signals of Acute Social Isolation. *Visual Abstract Hot Topics*, McGraw-Hill, 2020. AccessNeurology. https://neurology.mhmedical.com/updatescontent.aspx?gbosid=555612.

W.S. Griggs. New Approach to Treating Chronic Pain. *Visual Abstract Hot Topics*, McGraw-Hill, 2020. AccessNeurology. https://neurology.mhmedical.com/updatescontent.aspx?gbosid=555004.

Talks

W.S Griggs, C. Rabut, S.L. Norman, J. Russin, K. Jann, V. Christopoulos, C. Liu, R.A. Andersen, and M.G. Shapiro. A Window to the Brain: Ultrasound Imaging and Decoding of Human Neurovascular Activity Through an Acoustically-Transparent Cranioplasty. Technology in Medicine Conference. Irvine, CA. February 24, 2024

- Best Talk Award

W.S. Griggs. A Functional Ultrasound Brain-Machine Interface: From monkey to human. UCLA-Caltech Medical Scientist Training Program Annual Conference. Los Angeles, CA. September 29, 2023. Invited talk.

W.S. Griggs, S.L. Norman, C. Rabut, T. Deffieux, F. Segura, B.-F. Osmanski, G. Chau, V. Christopoulos, C. Liu, M. Tanter, M. Shapiro, and R. Andersen. A Functional Ultrasound Brain-Machine Interface: Real-Time Decoding of Direction and Task State. International BCI Society Meeting. Brussels, Belgium. June 9, 2023.

W.S. Griggs. An Ultrasonic Brain-Machine Interface: Using Math and Sound to Listen to the Brain. Whitman College Mathematical Sciences Foundry. Walla Walla, WA. February 13, 2023. Invited talk.

W.S. Griggs. Restoring Function with Brain-Machine Interfaces. David Geffen School of Medicine AANS Journal Club. Los Angeles, CA. February 2, 2023. Invited talk.

W.S. Griggs, S.L. Norman, C. Rabut, T. Deffieux, V. Christopoulos, M. Tanter, C. Liu, M. Shapiro, and R. Andersen. A Functional Ultrasound Brain-Machine Interface: Real-Time Decoding of Eight Movement Directions. CNS 2022 Annual Meeting. San Francisco, CA. October 12, 2022. DOI: 10.1227/neu.0000000000002375_514

W.S. Griggs, S.L. Norman, C. Rabut, T. Deffieux, V. Christopoulos, M. Tanter, C. Liu, M. Shapiro, and R. Andersen. Real-time Decoding of Movement Intention Using an Ultrasonic Brain-Machine Interface. GRC In-Vivo Ultrasound Imaging. Ventura, CA. August 17, 2022.

- Best Talk Award

W.S. Griggs, S.L. Norman, C. Rabut, T. Deffieux, V. Christopoulos, M. Tanter, C. Liu, M. Shapiro, and R. Andersen. Using functional ultrasound neuroimaging to understand the mesoscopic functional organization of posterior parietal cortex. GRS Neurobiology of Cognition. Newry, ME. July 24, 2022.

W.S. Griggs and T. Knight. Whitman Faculty-Student Research Presentation. Seattle Public Library. Seattle WA. November 16, 2013.

P. Osseward*, **W.S. Griggs***, and T. Knight. Kinematics of Coordinated Eye-Head Movements in Humans during Large-Amplitude, Visually Guided and Memory Tasks. Whitman Undergraduate Conference. Walla Walla, WA. April 10, 2012. *Co-presenters.

Posters

W.S. Griggs, C. Rabut, S.L. Norman, J.J. Russin, K. Jann, V. Christopoulos, C. Liu, R. Andersen, and M. Shapiro. A Window to the Brain: Ultrasound Imaging and Decoding of Human Neural activity Through a Permanent Acoustic Window. BrainMind Salon: LA's Neurotech Frontier. Los Angeles, CA. February 1, 2024.

W.S. Griggs, S.L. Norman, C. Rabut, T. Deffieux, V. Christopoulos, M. Tanter, C. Liu, M. Shapiro, and R. Andersen. A Functional Ultrasound Brain-Machine Interface: Real-Time Decoding of Eight Movement Directions. Society for Neuroscience 2022 Annual Meeting. San Diego, CA. November 14, 2022.

W.S. Griggs, S.L. Norman, C. Rabut, T. Deffieux, V. Christopoulos, M. Tanter, C. Liu, M. Shapiro, and R. Andersen. A Functional Ultrasound Brain-Machine Interface: Real-Time Decoding of Eight Movement Directions. International Human Single Neuron Meeting. November 10, 2022.

W.S. Griggs, S.L. Norman, C. Rabut, T. Deffieux, V. Christopoulos, M. Tanter, C. Liu, M. Shapiro, and R. Andersen. A Functional Ultrasound Brain-Machine Interface: Real-Time Decoding of Eight Movement Directions. CNS 2022 Annual Meeting. San Francisco, CA. October 10, 2022. Digital Poster.

W.S. Griggs, S.L. Norman, C. Rabut, T. Deffieux, V. Christopoulos, M. Tanter, C. Liu, M. Shapiro, and R. Andersen. A Functional Ultrasound Brain-Machine Interface: Real-Time Decoding of Eight Movement Directions. UCLA-Caltech Medical Scientist Training Program Annual Conference. Los Angeles, CA. September 23, 2022.

W.S. Griggs, S.L. Norman, C. Rabut, T. Deffieux, V. Christopoulos, M. Tanter, C. Liu, M. Shapiro, and R. Andersen. A Functional Ultrasound Brain-Machine Interface: Real-Time Decoding of Eight Movement Directions. GRC In-Vivo Ultrasound Imaging. Ventura, CA. August 15, 2022.

W.S. Griggs, S.L. Norman, C. Rabut, T. Deffieux, V. Christopoulos, M. Tanter, C. Liu, M. Shapiro, and R. Andersen. Using functional ultrasound neuroimaging to understand the mesoscopic functional organization of posterior parietal cortex. GRC Neurobiology of Cognition. Newry, ME. July 28, 2022.

W.S. Griggs, S.L. Norman, C. Rabut, T. Deffieux, V. Christopoulos, M. Tanter, C. Liu, M. Shapiro, and R. Andersen. Decoding reward value from posterior parietal cortex using functional ultrasound neuroimaging. Tianqiao and Chrissy Chen Institute for Neuroscience Retreat. Pasadena, CA. May 13, 2022.

W.S. Griggs, S.L. Norman, C. Rabut, T. Deffieux, V. Christopoulos, M. Tanter, C. Liu, M. Shapiro, and R. Andersen. Decoding reward value from posterior parietal cortex using functional ultrasound neuroimaging. Neurobiology of Reward and Decision-Making Conference. Lake Arrowhead, CA. May 10, 2022.

W.S. Griggs, S.L. Norman, C. Rabut, C. Demene, V. Christopoulos, M. Tanter, M. Shapiro, and R. Andersen. Functional ultrasound neuroimaging reveals heterogenous organization of directional response fields in lateral intraparietal cortex of nonhuman primates. Society for Neuroscience 2021 Annual Meeting. Virtual conference. November 10, 2021.

W.S. Griggs, S.L. Norman, C. Rabut, C. Demene, T. Deffieux, V. Christopoulos, M. Tanter, M. Shapiro, and R. Andersen. Functional ultrasound neuroimaging reveals heterogenous organization of posterior parietal cortex in non-human primates. SfN Global Connectome. Virtual conference. January 12, 2021.

W.S. Griggs, V. Christopoulos, S.L. Norman, D. Maresca, C. Demene, T. Deffieux, M. Tanter, M. Shapiro, and R. Andersen. Functional Ultrasound in Behaving Nonhuman Primates Reveals Nonhomogeneous Organization of Posterior Parietal Cortex Subregions. International Workshop on Functional Ultrasound Imaging of the Brain. Cargèse, Corsica, France. October 28, 2019.

W.S. Griggs, H.F. Kim, A. Ghazizadeh, and O. Hikosaka. Different Inputs to Caudate Head and Tail for Different Types of Reward Values. Society for Neuroscience 2016 Annual Meeting. San Diego, CA. Nov. 16, 2016.

W.S. Griggs, A. Ghazizadeh, and O. Hikosaka. Exploring the Origins of Learned Salience: Valuable, Risky, Novel, and Aversive. Society for Neuroscience 2015 Annual Meeting. Chicago, IL. Oct. 17, 2015.

W.S. Griggs, P. Osseward**,** and T. Knight. Kinematics of Coordinated Eye-Head Movements in Humans during Large-Amplitude, Visually Guided and Memory Tasks. Murdock College Science Research Program Conference. Seattle, WA. Nov. 11, 2011.

Patents

S.L. Norman, C. Rabut, **W.S. Griggs**, R.A. Andersen, M.G. Shapiro, and C. Liu. Provisional US Patent Application. A Method for Observing Brain States Using Functional Ultrasound Imaging and a Sonolucent Material (filed June 2023, pending).

W.S. Griggs, S.L. Norman, M.G. Shapiro, and R.A. Andersen. US Patent Application No. 18/505,827. Method for Pre-training and Stabilizing Ultrasonic Brain-Machine Surfaces (filed November 2023, pending).

Awards, Honors, and Scholarships

Josephine De Karman Fellow 2022 – 2023
1-year dissertation year fellowship providing $25,000 merit-based award to recognize and assist students whose scholastic achievements reflect the high standards of the late Dr. Theodore Von Karman. Selected as one of 6 fellows from more than 120 applicants from across select California schools (<5% acceptance rate).

Ruth L. Kirschstein National Research Service Award (NRSA F30) 2021 – present
National Eye Institute, National Institutes of Health
4-year graduate fellowship providing partial support for PhD and MD tuition ($21K/year), stipend ($24.3K/year), and training expenses ($4.2K/year).

National Defense Science and Engineering Graduate (NDSEG) Fellowship 2021
Department of Defense
3-year graduate fellowship covering full Caltech graduate tuition (~$50K/year), stipend ($38.5K/year), health insurance ($1.2K/year), and travel ($5K). Selected as one of 159 fellows from 7942 applicants (<3% acceptance rate). Declined in favor of NIH F30 award.

Abshire Faculty-Student Research Award Fall 2012 – Spring 2013
Whitman College
0.5 or 1-year award given to faculty/student research team. Provides student stipend and research allowance. Awards selected based on the quality of the research proposal, the student's role with specific attention to the intellectual nature of the student's work, and the academic accomplishments of the student.

Walter A Brattain Scholarship 2009 – 2013
Whitman College
4-year merit-based scholarship award ($10K/year) to entering students who have achieved high academic excellence during high school.

Volunteering and Other Activities

Pre-Medical School Advising May 2020 – present
Whitman College, UCLA, and Prescribe It Forward
Provide mentorship for pre-medical students across the nation as they embark on their journey to becoming medical students. Provide multiple rounds of in-depth constructive feedback on their application materials. Provide virtual video calls as needed to discuss each pre-medical student's background, curricular and extracurricular activities, and progress towards medical school.

Admissions Liaison October 2019
UCLA and California Institute of Technology.
Function as Caltech Liaison and organize all student-run portions of Caltech interview day. Organize informal social events, lunch, and dinner for applicants. Introduced one-on-one meetings between current students and applicants to enhance each applicant's interview day and ensure applicants talked with a current student in their field of interest.

Caltech Rise Program June – July 2020
California Institute of Technology
Help public high school students gain greater competency in math foundations, improve skills in math and science, and prepare students for college-level math and science. Provide focused preparation for math sections of ACT and SAT standardized tests.

Interviewer and Tour Guide 2017 – 2019
David Geffen School of Medicine at UCLA
Interviewed medical school applicants and assessed their fit with the medical school mission and core values. Led tours of the medical school for medical school applicants to introduce them to the school and help address their questions.

Addiction and Recovery Student Interest Group Leader 2018 – 2019
David Geffen School of Medicine at UCLA
Led this student interest group as a first- and second-year medical student. Organized events to educate medical students about addiction and the recovery process. Organized inaugural UCLA-Beit T'Shuvah Immersion Experience where medical students experienced a typical day in a residential addiction treatment center.

Volunteer and Treasurer 2014 – 2017
Project Sunshine - Bethesda, MD Chapter
Volunteered in local children's healthcare facilities, such as Children's Inn at NIH, to bring 'sunshine' and fun activities to hospitalized children.

Special Olympics 2013 – 2014
Pullman, WA
Attended weekly practices to assist and encourage Special Athletes as they completed sport-specific drills. Chaperoned for regional and state-level championships.

Whitman College Mentor Program 2009 – 2013
Green Park Elementary School, Walla Walla, WA
Met weekly as a mentor and role model for an at-risk elementary school student, which involved aiding with schoolwork and modeling good behavior during recess.

AmeriCorps Volunteer Summers 2008 – 2010
Utah Conservation Corps. Logan, UT and Escalante, UT.
Built and maintained trails and nature preserves on public lands in Utah, Idaho, and Wyoming. Maintained sites including removal of vegetation and boulders, construction of bridges and water control devices, and leveling of trail surfaces including modifications to allow handicapped access. Participated in 10-week land management and environmental ethics field course.

Eagle Scout 2002 – 2008
Troop 1, Boy Scouts of America**.** Logan, UT.
Elected to Order of the Arrow, Spring 2004. Earned rank of Eagle Scout, February 2007. My project was to recruit and coordinate a team to repurpose parts from defective bedrails that the Utah State University Assistive Technology Lab used to develop and build assistive devices for people with various motor disabilities.

Workshops

Allen Institute for Brain Science Neuropixels Workshop September 23-24, 2021
Learned how to run acute electrophysiology experiments with Neuropixels probes and how to analyze the data using open-source software, including Kilosort, ecephys, and Phy. Consisted of both interactive seminars and virtual lab demos.

NIH Academy Certificate Member Oct 2014 – May 2015
Bethesda, MD.
Participated in workshops and roundtable discussions examining diversity and health disparity issues in the US. Enhanced my knowledge of gaps in health outcomes and discussed methods to address health disparity issues.