VASHA DUTELL

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https://scholar.google.com/citations?user=tvQjbgYAAAAJ

EDUCATION

PhD, Vision Science, 2021
University of California, Berkeley
Thesis Title: *"Spatiotemporal Signal Characteristics and Processing During Natural Vision"*

MS, Biology (Bioinformatics), 2014
University of Oregon

BS, Computer and Information Science, 2012
BS, Physics, 2012
University of Oregon

RESEARCH EXPERIENCE

Postdoctoral Fellow, MIT Computer Science & AI Lab (CSAIL) January 2022 - Present
Developing models of human peripheral vision, adapting optimization and deep learning methods to improve models of static and dynamic texture perception and peripheral visual processing. Advisors: Dr. Ruth Rosenholtz & Dr. William Freeman

PhD Student, University of California Berkeley August 2015 - December 2021
Investigated the spatiotemporal statistics of dynamic natural visual signals, and their relationship to the human visual and motor systems, focusing on low-level statistics such as the Power Spectrum. Device design, programming, and data collection for mobile eye-tracking with human subjects. Advisors: Drs. Bruno Olshausen & Martin S. Banks

Research Intern, Nvidia May 2018 - August 2018
Designed and trained a self-supervised generative neural network for image and video metamers, to improve computation speed in a model based on human peripheral vision.

Data Science Consultant, C. Light Technologies May 2018 - Feb 2019
Applied deep neural network models and machine learning to detect biomarkers for neurological diseases based on patient's drift and microsaccade eye motion.

PhD Rotation Student, University of California Berkeley January 2016 - May 2016
Studied the response of retinal amacrine cells to ChR2 stimulation using patch-clamp recordings. Performed simultaneous electrophysiology and calcium imaging, measuring velocity tuning of these cells. Advisor: Dr. Marla Feller

Bioinformatician, Stowers Institute for Medical Research January 2014 - August 2015

Studied the mouse olfactory receptor repertoire and its variability and expression among sex and strains using RNA-seq, differential expression, time course, coexpression, cluster, pathway, and single cell analyses. Advisor: Dr. Ron Yu

Research Assistant, University of Oregon Neuroscience Institute June 2012 - September 2012
Investigated auditory processing in rodents, spatially mapping frequency response in auditory cortex with temporally-encoded intrinsic imaging. Improved accuracy and increased processing speed over 3 fold. Advisor: Dr. Mike Wehr

PEER-REVIEWED PUBLICATIONS

Harrington, A., **DuTell, V.**, Tewari, A., Hamilton, M., Stent, S., Rosenholtz, R., and Freeman, W. *Exploring the Perceptual Straightness of Adversarially Robust and Biologically-Inspired Visual Representations* (NeurIPS 2022 Workshop: Shared Visual Perception in Humans and Machines, In-press)

Brown, R., **DuTell, V.**, Walter, B., Rosenholtz, R., Shirley, P., McGuire, M., and Luebke, D. *Efficient Dataflow Modeling of Peripheral Encoding in the Human Visual System* (Transactions on Perception, In-press)

Hsu, A., Syme, M., **DuTell, V.**, and Marzen, S. *Optimal Reservoir Recipes in Continuous-Time* (Under Revision)

Dutell, V., Gibaldi, A., Focarelli, G., Olshausen, B., and Banks, M. I*ntegrating High Fidelity Eye, Head and World Tracking in a Wearable Device.* Behavioral Research Methods (2022)

Dutell, V., Gibaldi, A., Focarelli, G., Olshausen, B., and Banks, M. I*ntegrating High Fidelity Eye, Head and World Tracking in a Wearable Device. ETRA '21 Adjunct: Symposium on Eye Tracking Research and Applications (2021)* ***Best Paper Honorable Mention***

Gibaldi, A., **Dutell, V**., and Banks, M. *Solving Parallax Error for 3D Eye Tracking. ETRA '21 Adjunct: Symposium on Eye Tracking Research and Applications (2021)*

Duyck, K*., **Dutell, V***., Ma, L., Paulson, A., and Yu, C.R. *Strain specific gene expression in the mouse vomeronasal organ. BMC genomics 18.1 (2017): 965.* *(Equal Contribution)

Koonce, P., **Dutell, V**, Farrington, J., Sukhoy, V., and Stoytchev, A. *Toward learning to solve insertion tasks: A developmental approach using exploratory behaviors and proprioception*. Proceedings of AAAI (2011)

PEER-REVIEWED POSTERS & TALKS

Vision Science Society (May 2022)
Poster: Brown, R., **DuTell, V.**, Walter, B., Rosenholtz, R., Shirley, P., McGuire, M., and Luebke, D. *Efficient Dataflow Modeling of Peripheral Encoding in the Human Visual System*

Eye Tracking Research and Applications ActivEye Workshop (May 2021)
Talk: DuTell, V., Gibaldi, A., Focarelli, G., Olshausen, B., and Banks, M. *Integrating High Fidelity Eye, Head and World Tracking in a Wearable Device*

Vision Science Society (June 2020)
Talk: DuTell, V., Gibaldi, A., Focarelli, G., Olshausen, B., and Banks, M. *The Spatiotemporal*

Power Spectrum of Natural Human Vision

Society for Neuroscience (2016)

Talk & Poster: Vlasits, A., Morrie, R.D., Tran-Van-Minh, A., Bleckert, A., Gainer, C., **Dutell, V**., DiGregorio D.A., Feller, M. *Synaptic input distribution plays a role in the dendritic computation of motion direction in the retina.*

INVITED POSTERS & TALKS

University of Nevada, Reno: Early Career Seminar Speaker (October 2021)

Talk: A Day in the Life of the Human Retina: Hardware Design, Data Collection, and Spatiotemporal Frequency Properties of the Dynamic Visual Input

Computational Vision Summer School (July 2019)

Poster: Dutell, V., Gibaldi, A., Banks, M., Olshausen, B. *Spatiotemporal Statistics of Retinal Time-Varying Signals*

European Summer School on Visual Neuroscience (September 2018)

Poster: Dutell, V., Olshausen, B. *Efficient Coding of Natural Visual Signals*

Okinawa Computational Neuroscience Course (July 2017)

Poster: Dutell, V, Tomani, C, Olshausen, B. *Population Heterogeneity in Efficient Coding of Natural Visual Signals*

Stowers Institute Scientific Advisory Board Symposium (May 2014, 2015)

Poster: Dutell, V.**,** Paulson, A., Ma, L., Yu, R. *Differential Gene Expression in Varied Sex and Strain of Mouse*

MSI Bioinformatics Masters Research Symposium (June 2014)

Talk: Avishan, K., Dutell, V., Leggett, N. *Differential mRNA expression in Mbnl Knockout Mice.*

University of Oregon Undergraduate Research Symposium (2012)

Talk: Dutell, V., Freeman, P., Luiten, D. *Measuring Chaos in a Double Pendulum.*

NASA Oregon Space Grant Student Symposium (2011)

White Paper, Talk, Poster: Dutell, V., *Simulating Ionizing Radiation in a Lunar Micro Rover*.

SELECTED AWARDS & FELLOWSHIPS

Postdoctoral Fellowship - MIT CSAIL METEOR Fellowship (2022-Present)
PhD Fellowship - National Defense Science & Engineering Graduate Fellowship (2017-2022)
Outstanding Talk Award - UC Berkeley Vision Science (2017, 2019, 2020)
Education Travel Award - UC Berkeley Vision Science (2018)
Outstanding Graduate Student Instructor Award - UC Berkeley Vision Science (2017)
Student Opportunity Travel Award - UC Berkeley (2017)
Student Technology Fund Award - 17F-FT-62 (2017)
NIH Training Grant Award - T32EY007043-40 (2017)

TEACHING EXPERIENCE & QUALIFICATIONS

Certificate of Teaching and Learning in Higher Education July 2019

Graduate Student Instructor Teaching & Resource Center, UC Berkeley

Completed a comprehensive set of pedagogy coursework, course design, student and faculty teaching reviews, and development of teaching portfolio.

Binocular & Spatial Vision (VS 219) Spring 2016, 2017
Graduate Student Instructor, School of Optometry & Vision Science, UC Berkeley
Delivered and guided weekly mixed lecture and hands-on laboratory courses covering perception of space, direction, and distance. Evaluated deliverables & held office hours.

Oculomotor Function & Neurology (VS 217) Spring 2016, 2017
Graduate Student Instructor, School of Optometry & Vision Science, UC Berkeley
Delivered and guided weekly mixed lecture and hands-on laboratory courses on neural basis of eye position and movement. Evaluated deliverables & held office hours.

Collaborative Research in Computational Neuroscience Summer 2016
Teaching Assistant, Redwood Center for Theoretical Neuroscience, UC Berkeley
Aided graduate students and postdocs in lectures, tutorials, and workshops.

Introductory General Biology (Bi 211), Fall 2013
Graduate Student Instructor, Department of Biology, University of Oregon
Delivered and guided weekly hands-on laboratory sections and review sessions on general Biology. Evaluated deliverables & held office hours.

Physics Laboratory Courses (Ph 204, Ph 205, Ph 206, Ph 290, Ph 391) 2009 - 2012
Teaching Lab Assistant, Department of Physics, University of Oregon
Managed Physics teaching laboratory, training new graduate students and faculty in course materials for several concurrent laboratory courses.

REVIEWER ACTIVITY

NeurIPS / SVRHM
Behavioral Research and Methods
International Journal of Human-Computer Interaction
PLOS Computational Biology

ACADEMIC SERVICE

Postdoc Representative - MIT CSAIL Postdoc & Graduate Student Council (2022-Present)
Student Invited Speaker Series Committee Member - UC Berkeley Vision Science (2017-2021)
Admissions Committee Student Member - UC Berkeley Vision Science (2018)
Bay Area Vision Research Day Committee Chair - UC Berkeley Vision Science (2016)

SCIENCE OUTREACH

Science Fair Judge May 2022
Massachusetts State Fair
Volunteer Judge for Massachusetts High School Science Fair

Outreach Instructor June 2018 - March 2020
Bay Area Scientists in Schools (BASIS), UC Berkeley
Leading interactive lessons for elementary school children on human and animal vision.

Project Leader May 2018 - August 2018

Summer Math and Science Honors (SMASH) Academy, UC Berkeley

Led a group of 6 high school students in a scientific research project exploring trichromacy in human vision.