

GABRIEL LOEWINGER

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EDUCATION

Harvard University

Ph.D., Biostatistics

- National Institutes of Health PhD Fellowship Recipient (NRSA: F31)

Boston, MA

Expected: May 2022

Pitzer College

B.A., Neuroscience with Honors

Claremont, CA

May 2012

RESEARCH INTERESTS

- Statistics, Machine Learning, Applied Optimization, Neuroscience, Chemical Dependence

HONORS, FELLOWSHIPS AND GRANTS

- Harvard Medical School Computational Neuroscience Symposium Best Abstract Award Oct 2020
- National Institutes of Health PhD Fellowship: National Research Service Award (F31) Aug 2020
- Rose Fellowship, Harvard School of Public Health Nov 2019
- National Institutes of Health Postbaccalaureate Intramural Research Training Award Feb 2015
- Fulbright Research Fellowship May 2013
- Thomas J. Watson Fellowship May 2012
- Amgen Scholarship (UCLA) Mar 2011
- Claremont Colleges Summer Neuroscience Research Fellowship Mar 2011

PUBLICATIONS AND MANUSCRIPTS

Loewinger G, Acosta R, Mazumder R, Parmigiani, G. Optimal Ensemble Construction for Multi-Study Prediction with Applications to COVID-19 Excess Mortality Estimation. *arXiv:2109.09164*. Under Review.

Loewinger G, Patil P, Kishida K, Parmigiani G. Hierarchical Resampling for Bagging in Multi-Study Prediction with Applications to Human Neurochemical Sensing. *bioRxiv:856385*. Under review (2nd round).

Rush B, Marcus O, García S, Loizaga-Velder A, **Loewinger G**, Spitalier A, Mendive F (2021). Protocol for Outcome Evaluation of Ayahuasca-Assisted Addiction Treatment: The Case of Takiwasi Center. *Frontiers in Pharmacology*, 12.

Márquez I, **Loewinger G**, Vargas J, López J, Díaz E, Esber G (2021). Surprise-Induced Enhancements in the Associability of Pavlovian Cues Facilitate Learning across Behavior Systems. *Under Review*.

Augustin S, **Loewinger G**, O'Neal T, Kravitz A, Lovinger D (2020). Dopamine D2 Receptor Signaling on iMSNs is Required for Initiation and Vigor of Learned Actions. *Neuropsychopharmacology*. 45, 2087–2097.

Johnson K, Voyvodic L, **Loewinger G**, Mateo Y, Lovinger D (2020). Operant Self-Stimulation of Thalamic Terminals in the Dorsomedial Striatum is Constrained by Metabotropic Glutamate Receptor 2. *Neuropsychopharmacology*. 45, 1454–1462.

Loewinger G, Sharma B, Karki D, Khatiwoda P, Kainee S, Poudel K (2016). Low Knowledge and Perceived Hepatitis C Risk Despite High Risk Behaviour among Injection Drug Users in Kathmandu, Nepal. *The International Journal of Drug Policy*. 33:75-82.

Loewinger G*, Oleson E*, Cheer J (2013). Using Dopamine Research to Generate Rational Cannabinoid Drug Policy. *Drug Testing and Analysis*. 5(1):22-26.

Wassum K, Ostlund S, **Loewinger G**, Maidment N (2013). Phasic Mesolimbic Dopamine Release Tracks Reward Seeking During Expression of Pavlovian-to-Instrumental Transfer. *Biological Psychiatry*. 73(8):747-755.

Loewinger G, Beckert M, Tejeda H, Cheer J (2011). Methamphetamine-Induced Dopamine Terminal Deficits in the Nucleus Accumbens are Exacerbated by Reward-Associated Cues and Attenuated by CB1 Receptor Antagonism. *Neuropharmacology*. 62(7):2192-2201.

OPEN-SOURCE SOFTWARE

studyStrap | CRAN Package

- Sole developer of the *studyStrap* R package, freely available on CRAN, which implements numerous machine learning methods for training prediction algorithms with multiple training datasets
- 7,300+ downloads

SELECTED RESEARCH EXPERIENCE

Harvard School of Public Health

Boston, MA

Graduate Researcher

May 2018-Present

- Advised by Professor Giovanni Parmigiani and collaborated with thesis committee members, Professors Rahul Mazumder (MIT) and Rajarshi Mukherjee (Harvard)
- Developed machine learning methods for integration of multiple datasets to improve prediction performance
- Created domain adaptation ensemble methods for large dataset prediction problems using hierarchical resampling techniques with applications to human neurochemical concentration prediction
- Developed nonlinear optimization-based methods for transfer learning with applications to estimation of COVID-19 excess mortality
- Devised interpretable methods for high dimensional, sparse multi-task regression problems using mixed-integer optimization
- Spearheaded collaborations, served as sole statistician on 3 neuroscience projects and 1 observational study

National Institutes of Health (NIAAA) | Laboratory of Dr. David Lovinger

Bethesda, MD

Postbaccalaureate IRTA Research Fellow

Feb 2015-June 2017

- Proposed, designed and conducted an experiment to study dopamine activity in decision making
- Wrote extensive Python code to analyze neurochemical and behavioral data
- Conducted applied statistical analyses (e.g., principal component analysis and linear mixed effects models)

Fulbright Fellowship

Kathmandu, Nepal

Research Fellow

Aug 2013-Oct 2014

- Designed research methodology and questionnaire for study of HIV risk among drug users
- Secured funding from the United Nations Office on Drugs and Crime
- Hired, trained and led 3 researchers, using Nepali language skills, to conduct over 700 participant interviews
- Conducted extensive statistical analysis of survey response data (e.g., generalized linear models)
- Wrote and submitted final research report to the United Nations Office on Drugs and Crime

Thomas J. Watson Fellowship

Peru, Brazil, Thailand, Vietnam

Research Fellow

Aug 2012-July 2013

- Traveled alone and conducted qualitative research on alternative treatments for chemical dependence
- Established research contacts in international settings and conducted participant interviews in 3 languages

Colleges Behavioral Health Research

Claremont, CA

Researcher

Sep 2010-May 2012

- Proposed, designed and led a study on alcohol policy and student drinking behavior
- Secured funding from Dean of Students offices at Pitzer and Harvey Mudd Colleges
- Collected ~500 surveys and analyzed results with structural equation modeling
- Research resulted in policy changes at Pitzer college through addition of a Good Samaritan clause

UCLA, Semel Institute | Laboratory of Dr. Nigel Maidment

Los Angeles, CA

Summer Amgen Research Fellow

May 2011-Aug 2011

- Ran behavioral and in vivo fast-scan cyclic voltammetry experiments
- Conducted extensive neurochemical and behavioral data analysis with structural equation modeling

University of Maryland, School of Medicine | Laboratory of Dr. Joe Cheer

Baltimore, MD

Researcher

Aug 2009-Jan 2010

- Proposed, designed and conducted a study assessing methamphetamine neurotoxicity in rats
- Conducted extensive applied statistical analysis of neurochemical and behavioral data (e.g., linear mixed effects models)

University of Maryland, School of Medicine | Laboratory of Dr. Geoffery Schoenbaum

Baltimore, MD

Research Assistant

May 2009-Aug 2009

- Assisted with behavioral pharmacology experiments in rats

TEACHING

Harvard School of Public Health

Boston, MA

Graduate Teaching Assistant

May 2018-Present

- **Introductory Statistics for Medical Research**
 - One of 7 teaching assistants for a master's level biostatistics course of ~160 students. Taught sessions on R programming and graded exams
- **Statistics for Medical Research II**
 - One of 5 teaching assistants for a master's level biostatistics course of ~110 students. Taught sessions on R programming and graded homework
- **Practice and Culminating Experience for Quantitative Methods**
 - The only teaching assistant for a master's level biostatistics course of ~35 students. Advised students on statistical components of their capstone research project
- **Consulting Seminar**
 - The only teaching assistant for a doctoral level biostatistics course of ~5 students. Graded homework
- **Applied Regression Analysis**
 - One of 3 teaching assistants for a master's level biostatistics course of ~60 students. Taught weekly section of ~20 students, held weekly office hours and graded homework and exams

RESEARCH TALKS

Applied Statistics Talk: *Extracting Latent Neural Time Series Signals: Phasic and Tonic Components of Fiber Photometry Data*

Graduate Student Seminar Series, Harvard Biostatistics

Apr 2021

Doctoral Thesis Research: *Machine Learning Methods for In Vivo Neurochemical Estimation*

Read Montague Lab, Virginia Tech | *Invited Talk*

May 2019

Summer Student Research Symposium, Harvard Biostatistics

Aug 2018

NIH IRTA Fellowship Research: *Accumbal dopamine transients are valence-dependent*

David Lovinger Lab Meeting Presentation

May 2016, 2017

Fulbright Pre-Departure Orientation: *Conducting Research in South Asia*

Fulbright Conference, Washington, DC | *Invited Talk*

Jun 2015

Fulbright Research: *The Association Between Drug Rehabilitation Attendance and Hepatitis C Risk Behavior*

Martin Chautari, Social Science Center, Kathmandu, Nepal

Sep 2014

Fulbright Commission, Kathmandu, Nepal

Aug 2014

South and Central Asia Fulbright Research Conference, Chennai, India

Feb 2014

Watson Research: *Alternative Treatments for Chemical Dependence*

Returning Fellows' Conference, Amherst, MA

Aug 2013

Undergraduate Thesis Research: *Phasic Mesolimbic Dopamine Release is Associated with Pavlovian Cue-Induced Potentiation of Instrumental Activity*

Keck Science Center, Claremont, CA

Sep 2011

POSTERS

Loewinger G, Patil P, Mazumder R, Kishida K, Parmigiani G. Multi-Study Machine Learning Methods for In Vivo Estimation of Dopamine in Humans (2020). *Brigham Health/Harvard Medical School Computational Data Neuroscience Symposium*.

Loewinger G, Esber G, Caprioli D, Mateo Y, Lovinger D (2016). Dopamine at indifference: Accumbal dopamine transients are valence-dependent. *Society for Neuroscience Meeting*.

Loewinger G, Wassum K, Ostlund S, Maidment N (2011). Mesolimbic Dopamine Release is Associated With Pavlovian Cue-Induced Stimulation of Instrumental Activity. *Keck Science Center Thesis Poster Session*.

Loewinger G, Wassum K, Ostlund S, Maidment N (2011). Mesolimbic Dopamine Release is Associated With Pavlovian Cue-Induced Stimulation of Instrumental Activity. *Amgen Scholars Poster Session*.

Wassum K, Ostlund S, **Loewinger G**, Maidment N (2011). Phasic dopamine signaling during Pavlovian to instrumental transfer. *Society for Neuroscience Meeting*.

Beckert M, **Loewinger G**, Tejeda H, Bernstein D, Cheer J (2010). Endocannabinoid modulation of methamphetamine neurotoxicity. *Society for Neuroscience Meeting*.

LEADERSHIP AND ACADEMIC SERVICE

Harvard Biostatistics Entering Student Mentor May 2021-Present

- Mentored entering doctoral student

Harvard Biostatistics Multi-Study Learning Journal Club Jan 2021-Present

- Established weekly journal club focused on domain generalization and domain adaptation

Harvard Biostatistics HIV Working Group Co-Organizer Sep 2019-May 2020

- Organized weekly working group seminar series: selected and invited speakers

Pitzer College Neuroscience Club Cofounder Sep 2011-May 2012

- Secured club funding advised new students on the neuroscience major

Claremont Colleges Brazilian Jiu Jitsu Club Cofounder Sep 2011- May 2012

- Secured funding to provide students free access to a local academy's Brazilian Jiu Jitsu classes
- Taught weekly classes on campus

SKILLS

- **Programming:** *R*, *Python*, *Julia*
- **Relevant Software and Computing:** *LaTeX*, High Performance Computing Cluster
- **Applied Statistical Modeling:** Extensive applied statistical experience with
 - Cross-sectional (e.g., generalized linear models)
 - Longitudinal (e.g., generalized estimating equations, generalized linear mixed models)
 - Time series (e.g., Gaussian processes, splines)
 - Survival analyses
- **Optimization:** Extensive experience with applied linear, non-linear, and mixed-inter optimization using *Julia* *JuMP* and *CVXR* with open-source as well as commercial optimization solvers (e.g., *Gurobi*, *MOSEK*)
- **Languages:** Nepali (advanced), Spanish (intermediate), Portuguese (intermediate)
- **Interests:** Brazilian Jiu Jitsu, Chess, Vipassana Meditation

RELEVANT COURSEWORK

Harvard University and MIT

- Statistical Methods I-II, Statistical Inference, Probability, Advanced Regression and Statistical Learning, Machine Learning, Analysis of Multivariate and Longitudinal Data, Bayesian Methodology, Dimension Reduction, Introduction to Epidemiology, Social and Biological Networks, Machine Learning through a Modern Optimization Lens, Advanced Optimization, Nonlinear Optimization