

# GABRIEL LOEWINGER

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## EDUCATION

### Harvard University

Ph.D., Biostatistics

- NIH Doctoral Fellowship Recipient (NRSA: F31)

Boston, MA

Expected: May 2022

### Pitzer College

B.A., Neuroscience with Honors. GPA: 3.9/4.0

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
- NIH Doctoral Fellowship: National Research Service Award Fellowship (F31) Aug 2020
- Rose Fellowship, Harvard School of Public Health Nov 2019
- NIH Technical Intramural Research Training Award Feb 2015
- Fulbright Research Fellowship May 2013
- Watson Fellowship May 2012
- Pitzer College Research Travel Award Sep 2010, 2011
- 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*.

**Loewinger G**, Patil P, Kishida K, Parmigiani G. Hierarchical resampling for bagging in multi-study prediction with applications to human neurochemical sensing. *bioRxiv:856385*. Submitted 2<sup>nd</sup> round of review at *Annals of Applied Statistics*.

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
- 7,000+ downloads

## SELECTED RESEARCH EXPERIENCE

### **Harvard School of Public Health**

*Graduate Researcher*

Boston, MA

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
- Developed 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
- Developed interpretable methods for high dimensional, sparse regression problems using 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**

*Research Fellow*

Bethesda, MD

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)

### **Watson Fellowship**

*Research Fellow*

Peru, Brazil, Thailand, Vietnam

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

### **Fulbright Fellowship**

*Research Fellow*

Kathmandu, Nepal

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

### **Colleges Behavioral Health Research**

*Researcher*

Claremont, CA

Sep 2010-May 2012

- Proposed, designed and conducted 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**

*Summer Research Fellow*

Los Angeles, CA

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*.

## COMMUNITY AND CAMPUS INVOLVEMENT

**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* (4.5 yrs. experience), *Python* (2 yrs. experience), *Julia* (2 yrs. experience)
- **Relevant Software and Computing:** *LaTeX*, High Performance Computing Cluster (4.5 yrs experience)
- **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