

Charles Ludowici, Ph.D.

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Skills and Tools

Experiments - Design and analysis, A/B tests, clustered designs

Statistical inference - Linear regression, generalized linear models, hypothesis testing, mixture models, splines, generalized additive models, mixed models

Machine learning - SVMs, multinomial logistic regression, gradient boosted trees, reinforcement learning (deep Q learning), random forests

Data science - R, Python, SQL, MATLAB, NumPy, pandas, Scikit-learn, TensorFlow Jupyter, Git

Math - Probability, statistics, linear algebra, multivariable calculus

Education

PhD (Science, Psychology)

The University of Sydney: 2016 - 2020

Focus: Quantitative (novel statistical models and tests)

Thesis: *Temporal Selection in Dynamic Displays: Sensory Information Persists Despite Masking*

Bachelor of Arts (Honours)

The University of Sydney: 2011 - 2015

Grade: First Class Honours

Thesis: *Scaffolding Individual Differences in Category Learning*

Example Work

Causal inference using GAMs in R on company profit data from an A/B test. ([link](#))

A tutorial on building a mixed (hierarchical) model in Python from scratch ([link](#))

Experience

Postdoctoral Scientist, The University of California, Berkeley: 02/2020 - present

- Designed behavioral experiments and statistical models (GAMs) that allowed me to be the first to observe how the visual system adapts eye movements to the presence of asymmetric central vision loss, a common property of visual disease
- Built a machine learning model of eye movements in NumPy to validate an analysis comparing eye tracking machines
- Building, merging and modeling datasets containing millions of observations of human behavior and eye-movements using R, Python and SQL, regression and classification
- Designing and conducting experiments for research on visual function in ocular disease
- Responsible for training junior researchers and technical screening of lab hires
- **Tools:** Regression, reinforcement learning, multinomial logistic regression, splines, frequentist hypothesis tests, signal processing, GAMs, Matlab, Python, R

Visiting Scholar, Harvard University: 02/2019 - 06/2019

- Data analysis and experimental design for research investigating why radiologists may miss cancer when viewing medical images
- **Tools:** Matlab, R, frequentist hypothesis tests

PhD Candidate, The University of Sydney : 2016 - 2020

- Designed and implemented novel mixture models, statistical tests and experimental methods that disproved long-standing theories of visual processing
- Lead author on publications and presentations. Responsible for analysis, visualization, causal inference, responding to peer review, and structuring reproducible modeling and visualization code for hosting on GitHub
- Research funded by an Australian federal government scholarship
- **Tools:** Mixture models, novel analyses based on mixture distributions, mixed models, regression, Bayesian and frequentist hypothesis tests, R, Python, Matlab

TA and Lecturer, The University of Sydney: 2016 - 2018

- Statistics and Research Methods for Psych (PSYC2012)
- Quantitative Research Methods in Health (HSBH3018)

Research Assistant, The University of Sydney : 2014 - 2016

- Designed and led the analysis (in R) of a stratified experiment investigating children's understanding of other people's behavior
- Analyzed data from experiments that investigated how people learn complicated relational information
- Wrote and visualized statistical results for academic papers and conference presentations
- **Tools:** ANOVA, linear and logistic regression, mixed models, R