

# Elizabeth Silver

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## CONTACT INFORMATION

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## RESEARCH INTERESTS

Data science, causal inference from observational data, Bayesian network structure learning, genetic regulatory networks, confounded experiments, machine learning.

## EDUCATION

**Carnegie Mellon University**, Pittsburgh, PA.  
*Ph.D. in Logic, Computation & Methodology.* **Expected graduation date: Dec 2016**  
*M.S. in Machine Learning.* **Expected graduation date: Dec 2016**  
*M.S. in Logic, Computation & Methodology.* **July 2013**  
**The University of Melbourne**, Melbourne, VIC, Australia.  
*B.A. (Hons.) Major: History & Philosophy of Science.* **June 2009**  
*B.Sc. Majors: Genetics, Psychology.* **June 2008**

## PROJECTS

**Dissertation: Transfer Learning for Genetic Regulatory Networks** **Current**  
Reviewing and extending algorithms for transfer learning of large causal network structure.  
Real data application: learning whole-genome transcriptional regulatory networks for sets of related organisms and sets of related cell types.

**Data Analysis Project for M.S. in Machine Learning** **Spring 2016**  
Used four causal search algorithms to learn genetic regulatory networks on single-cell RNA-Seq data from mouse embryonic stem cells. Performed rigorous evaluation against ChIP-seq gold standard.

**Data-Driven Digital Engagement** (*Data Science for Social Good fellowship*) **Summer 2015**  
Worked with a team to model engagement with the Australian Conservation Foundation's email campaigns. Used data on constituents' behavior and targeted experiments to optimize email success.

**Data-driven knowledge graphs** (*in collaboration with Pearson Education*) **2013–2014**  
Developed a method to automatically learn a 'knowledge graph' (i.e. the dependency graph of mathematical skills) from student performance on tests, given a measurement model.

**M.S. Thesis: How to Analyze Confounded Clinical Trials** **July 2013**  
Compared & evaluated several methods for analyzing clinical trials, when those trials are confounded by non-adherence, unblinding, and measurement error.

## PROFESSIONAL EXPERIENCE

**Carnegie Mellon University**, Pittsburgh, PA. *Research Assistant* **2011–2016**

1. Currently writing documentation for Tetrad (automated causal inference software) for the Center for Causal Discovery.
2. Assisted with the DARPA 'Big Mechanism' grant, aimed at automated modeling of biological mechanisms extracted from scientific papers.
3. Collaborated with Pearson Education (see PROJECTS).
4. Organized three-day workshop on Case Studies of Causal Discovery with Model Search.
5. Designed website for the fMRI project.

**Data Science for Social Good**, Chicago, IL. *Data Science Fellow* **Summer 2015**  
See PROJECTS. Worked with a team and directly with clients in a highly collaborative environment.

**Vertical Knowledge LLC**, Chagrin Falls, OH. *Data Science Internship* **Summer 2014**  
Analyzed real estate data for clients' business ventures, & internal company data to measure efficiency

## LANGUAGES

R, Python (especially Pandas), SQL, Bash.

PROFESSIONAL  
DEVELOPMENT

**Conference presentations:**

- ‘Cross-Species Transfer Learning of Genetic Regulatory Networks.’ GHC, Phoenix (Poster) **2014**  
‘Discovering Prerequisite Relationships among Knowledge Components.’ EDM, London (Poster) **2014**  
‘Clinical trials, unblinding & non-adherence.’ NIPS workshop on Causality, Lake Tahoe **2013**  
‘Adherence in medical trials: 1948–1980’. AAP, Melbourne, Australia **2008**  
‘Towards measuring dose-response curves in Phase III RCTs’. ESPACOMP, Lyons (Poster) **2007**

SERVICE

**Students for Urban Data Systems, Member & community outreach, and** **2015–16**  
**Alliance for Police Accountability, Research team member**

Set up partnership between SUDS and the local, grass-roots Alliance for Police Accountability.

Initiated two research projects to support the APA’s advocacy work in Pittsburgh:

1. Helped create an interactive map of all 127 police departments in Allegheny County, highlighting the overlapping jurisdictions.
2. Investigating factors influencing sentencing in DA-negotiated plea deals (ongoing).

**Pittsburgh GiveCamp, Hackathon participant**

**2014**

Helped build a program to optimize bus routes for a local high school’s work-study program.

**Higher Achievement Pittsburgh, Mentor**

**2013–2014**

Tutored middle schoolers in math and programming (using Scratch).

**Pitt-CMU Graduate Philosophy Conference, Organizing committee member**

**2011, 2012**

Worked with a team of seven people to plan & run a two-day conference; redesigned the website.