Alexander Murray-Watters

Research Associate/Doctoral Candidate
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Education

2014 M.S. Logic, Computation and Methodology. Carnegie Mellon University. Pittsburgh, PA Thesis: *The DM Algorithm: A Causal Search Algorithm for the Discovery of MIMIC Models, with an Attempt to Recover a Protein Signalling Network from a High-Dimensional Ovarian Cancer Dataset*. Advisors: Dr. Clark Glymour and Dr. Richard Scheines https://www.andrew.cmu.edu/user/amurrayw/papers/masters_thesis-final.pdf

2013 Dual Degrees: B.S. in Economics & Statistics and B.A. in Philosophy. Additional coursework in computer science. Carnegie Mellon University. Pittsburgh, PA HSS Senior Honors Thesis (Dietrich College of Humanities and Social Sciences): *Causal Discovery and MIMIC Models*. Advisor: Dr. Clark Glymour https://www.andrew.cmu.edu/user/amurrayw/papers/thesis_final.pdf

Additional Education

2018 Mathematical Modeling and Simulation Summer School on Statistical Modeling and Data Analysis. Oberwolfach Research Institute for Mathematics (MFO)

Summer 2010, 2011, 2012, 2016. Additional coursework in mathematics. University of Nevada. Reno, NV

Research Interests	
Causal Search and Modeling	Machine Learning
Empirical Validation of Computational Simulation Models	Model Selection
Non-Probability Sampling	Quantitative Models of History

Academic Employment

Research Associate/Doctoral Candidate. (05/17-present). Perform consultations for statistical analyses. Conceptualize and write manuscripts and conference presentations. Develop and teach courses on programming in R and machine learning. Supervisor: Dr. Stefan Zins. Leibniz Institute for the Social Sciences (GESIS).

Research Associate/Systems Analyst. (8/14-5/17). Developed, improved, and applied causal search algorithms and machine learning methods for extracting biomedical/genomic knowledge from big data and high dimensional data. Identified appropriate statistical techniques and conducted analyses, involving the use of a super computer through University of Pittsburgh (Pitt). Conceptualized and wrote manuscripts. Developed instructional materials and syllabi for use in summer workshops on causal search. Supervisors: NIH Projects (2014-2017): Dr. Clark Glymour and Dr. Richard Scheines. DARPA Project (2014-2015): Dr. Peter Spirites. Center for Causal Discovery. Carnegie Mellon University (CMU).

Research Assistant (unpaid). (2012 – 2017). Created a MEMETIC model. Developed and ran Monte Carlo simulations (using R) that demonstrate a flaw in a common method in the field of psychology and law. Conceptualize and write manuscripts. Supervisor: Dr. Markus Kemmelmeier. Dept. of Sociology and Interdisciplinary Social Psychology Program, University of Nevada, Reno.

Graduate Teaching Assistant. (Fall 2013). Conducted 2 weekly recitation sections for 80-100 (Introduction to Philosophy), graded assignments, and developed weekly instructional materials including lecture material for recitation sessions when students had trouble with a concept. Supervisor: Dr. Mara Harrell. Dept. of Philosophy, CMU.

Graduate Research Assistant. (Summer 2013). Implemented algorithm from senior thesis in R. Wrote and ran simulations. Supervisor: Dr. Clark Glymour. CMU.

Undergraduate Research Assistant. (March 2012 – August 2012). NSF Research Training Grant. Algorithms, Experiments, and Implementation of Recommender Systems. Implemented a Gibbs sampler and fixed faulty code in R. Supervisor: Dr. Mike Finegold, Dept of Statistics, CMU

Volunteer Intern. (June-July 2007). University of Cambridge, England Dr. Keith Priestley's seismology lab. Assist with computer/IT issues and use of specialized software. Integrated cultural experience/interaction with university community and British politics.

Publications

Murray-Watters, A., Zins, S., Silber, H., Gummer, T., & Lechner, C. (to be submitted Dec 2018 for special issue). River Sampling – a Fishing Expedition: A Non-Probability Case Study. Special Issue: Recent Advances in Probability-Based and Nonprobability Survey Research. *Journal of Survey Statistics and Methodology*.

Murray-Watters, A & Murray, C. (currently under journal review). Research Participant Protection in Politically Hostile Environments: Lessons from Computer Science.

Murray-Watters, A. & Glymour, C. (2015). What Is Going on Inside the Arrows? Discovering the Hidden Springs in Causal Models. *Philosophy of Science*, 82 (4): 556-586. [Erratum: 2016. 83 (1): 170]. DOI: 10.1086/682962 and DOI: 10.1086/684247. http://www.journals.uchicago.edu/doi/abs/10.1086/682962

Murray-Watters, A. (2011). Inevitable? I Think Not. [*Foreign Affairs* - award winning student essay in response to prompt, "Is the decline of the West inevitable?" (1500 word maximum)] http://www.andrew.cmu.edu/user/amurrayw/papers/ForeignAffairsEssayCompetitionFinal12_2012.pdf

Murray-Watters, A. (March 2, 2009). North Korea plans missile launch. *The Tartan*, 103 (18), A-1.

Manuscripts in Preparation

Murray-Watters, A. Burning the Haystack to Save the Needle: Dimension Reduction and Privacy in Text and Network Data.

Murray-Watters, A. Zins, S., Ackermann-Piek, D. Undue Influence: Identifying "Problematic" Interviewers in Surveys.

Murray-Watters, A. Spotting Matryoshka: Clustering Memetic Image Data using Twitter's Election Integrety Dataset.

Murray-Watters, A., Zins, S, Sakshaug, J. Are These Things Even Consistent? Examining the Properties of Non-Probability Samples.

Murray-Watters, A., Lechner, C. M., Bluemke, M. easyPCA: An R Package for the Bass-ackwards Procedure.

Lechner, C. M., Bluemke, M, Ignácz, Z., Murray-Watters, A. easyLCA: An R packge for a Latent Class Analysis Variant of the Bass-ackwards Procedure.

Murray-Watters, A., Kemmelmeier, M., & Hales, A. Memetic Model of Methodological Multiplication: The Verdict Certainty Index and Its Statistical Fallacy. To be submitted to Perspectives on Psychological Science.

Murray-Watters, A. and Glymour, C. Working title: On Feedback Cycles.

Murray-Watters, A. SocHive: A Hive Plot Convenience Wrapper for Social Scientists Combining Social Network Data with Auxiliary Information.

Statistical/Software Development

Murray-Watters, A., Lechner, C. M., Bluemke, M. easyPCA: An R Package for the Bass-ackwards Procedure.

Lechner, C. M., Bluemke, M, Ignácz, Z., Murray-Watters, A. easyLCA: An R packge for a Latent Class Analysis Variant of the Bass-ackwards Procedure.

Murray-Watters, A. SocHive: A Hive Plot Convenience Wrapper for Social Scientists.

Murray-Watters, A. An implementation of the DM causal search algorithm. Available as part of the Tetrad program (in Java) or alternatively in R (version is no longer maintained). Tetrad: https://github.com/cmu-phil/tetrad R: https://github.com/amurrayw/detect.MIMIC-

Murray-Watters, A. A program for enumerating TETRAD constraints in a directed cyclic graph. Available at: https://github.com/amurrayw/tetrad_constraint_enquirer.

Jason Capehart, Seung Su Han, Alexander Murray-Watters, and Elizabeth Silver (authors in alphabetical order). Developed Natural Language Processing (NLP) software used to build first- and second- order Markov models based on text. For use with R. In process of submission to the CRAN (R repository). I implemented the group's extension of this software's application to build simulated text from a Markov model based on the blog of Professor Cosma Shalizi, titled "Pseudo-Three-Toed Sloth." Shalizi posted this slide on his blog (Dec. 7, 2011); titled "My Work Here is Done (Intro to Statistical Computing)." Available with Shalizi comments: http://bactra.org/weblog/843.html. Permanent link to results: http://vserver1.cscs.lsa.umich.edu/~crshalizi/sloth/pseudo-sloth.png

Professional Presentations

Murray-Watters, A., Zins, S., Silber, H., Gummer, T., & Lechner, C. (under review; for May 2019). *River Sampling – a Fishing Expedition: A Non-Probability Case Study*. Annual Conference of American Association for Public Opinion Research. Toronto, Canada.

Murray-Watters, A. (October, 2018). *Using Dimension Reduction to 'Anonymize' Data.* GESIS Research Day. Cologne, Germany

Murray-Watters, A. (September, 2018). *Alternative Views of Alternative Views: New Methodologies for Analyzing and Visualizing Big Data.* Studying Opinions and Populations in Online Text Data Workshop. Mannheim, Germany.

Murray-Watters, A. (March, 2018). *The Effective Combination and Display of Social Networks and Auxiliary Information*. Tagung des Arbeitskreises für mathematisch-statistische Methoden des statistischen Bundesamts. Wiesbaden, Germany.

Murray-Watters, A, and Murray, C. (April, 2017). *Technology, Risks and Protections of Vulnerable Research Participants.* 59th Annual Meeting of the Western Social Science Association. San Francisco, CA.

Murray-Watters, A. (April 2016). *Citizens United and Donation Networks in Nevada: A Graphical Analysis*. Annual Meeting of the Western Social Science Association. Political Science Section. Reno, NV. Replication files available: https://github.com/amurrayw/Nevada_Campaign_Donation_Networks

Murray-Watters, A. and Glymour, C. (November, 2014). *Discovering Endogenous Latent Structure.* Biennial Meeting of the Philosophy of Science Association. Chicago, IL.

Murray-Watters, A. (May 2013). *An Algorithm for Discovering MIMIC Models.* Meeting of the Minds (undergraduate research conference). Carnegie Mellon University.

Murray-Watters, A. (submitted & approved; Dec 2011). *US/ISAF Attributed Civilian Casualties and Insurgent Caused Violence.* Submitted for presentation at the annual conference of the Western Economic Association International. San Francisco, CA. July, 2012. (Statistical analysis utilizing the Wikileaks Afghan dataset.) In 2012, I received notice that due to an unusually high number of faculty/graduate submissions they had reversed their original position, and that this year they were not accepting any undergraduate submissions. However, along with their apology they awarded me a 1-year extension of my student membership.

Teaching

Alexander Murray-Watters and Jan-Philipp Kolb. 2018 and 2019. "Introduction to Data Analysis with R". GESIS Summer School. Doctoral level. Cologne, Germany.

Alexander Murray-Watters and Jan-Philipp Kolb. 2019. "Introduction to Machine Learning using R". GESIS short course. Doctoral level. Mannheim, Germany.

Graduate Teaching Assistant. (June 8 –11, 2015). Center for Causal Discovery Summer Workshop. Carnegie Mellon University. Pittsburgh, USA.

Graduate Teaching Assistant. Fall 2013. Introduction to Philosophy. Carnegie Mellon University. Pittsburgh, USA.

Current Independent Research Projects/Interests

Cyclic Theories of History and Causal Search. Under investigation (conducted literature review, conceptualized research question, seeking sources to create dataset). Examining Jack Goldstone, Peter Turchin, and Sergey Nefedov's different cyclic, non-linear dynamical theories of history for analysis using causal search.

The Scottish Independence Vote and Gellner's Theory of Nationalism. Under investigation (conducted literature review, conceptualized research question, identifying data to create dataset for analysis). Involves explaining the inconsistency between Ernest Gellner's account of nationalism and the current rise of the Scottish National Party (SNP) and the Scottish independence movement.

The Economics of Counterinsurgency in Afghanistan. Initial conceptual development; will follow with secondary data set collection and testing of model derived from comparable work on Iraq by Eli Berman, Jacob Shapiro and Joseph Felter (e.g., National Bureau of Economic Research Working Paper No. 14606; published in the Journal of Political Economy, 2011). Unpublished manuscript: *The Effect of US/ISAF Attributed Civilian Casualties on Insurgent Caused Violence*."

Advanced Quantitative and Social Science Coursework

Statistics and Computing	
Introduction to Probability & Statistics I & II	Statistical Computing
Modern Regression	Intro/Intermediate Programming
Data Mining	Intermediate/Advanced Programming
Statistical Graphics & Visualization	Advanced Data Analysis
Multilevel & Hierarchical Modeling	
Mathematics and Logic	
Differential and Integral	Calculus Calculus in 3-Dimensions
Concepts of Mathematics	Linear Algebra
Differential Equations	Real Analysis
Integration, Differential Equations, & Approximations	Formal Logic
Logic and Proofs	Topics in Logic I
Analytical Philosophy	
Economics	
Advanced Microeconomics Theory	Advanced Macroeconomics Theory
Behavioral Economics	Writing for Economists
Evolution of Economic Ideas and Analysis	Econometrics
Rational Choice	Junior Honors Seminar
Political Science, Culture, and History	
Social Structures, Public Policy & Ethics	Philosophy, Politics, and Economics
Introduction to World History	History: Feast & Famine
Elementary Chinese	Terrorism & Insurgency
Philosophy of Social Science	Philosophy of the Mind
Epistemology	Ancient Philosophy

Honors and Awards

Mathematical Modeling and Simulation Summer School on Statistical Modeling and Data Analysis. 2018. Oberwolfach Research Institute for Mathematics (MFO).

CMU Senior Leadership Award. 2013. Carnegie Mellon University.

Dietrich College Senior Honors Program. Carnegie Mellon University. 2013.

Foreign Affairs Student Essay Contest. 2011. Sponsored by the journal, Foreign Affairs, the Council of Foreign Relations, and the Association of Professional Schools of International Affairs. Six awards were given (first place and 5 honorable mentions); I received one of the 5 honorable mentions (from among 280 submissions from across the world). (See Publications section of this CV for essay details) Award announcement available on the journal's website: http://www.foreignaffairs.com/classroom/bulletin-board/erik-mortensen-wins-foreign-affairs-student-essay-contest-1

Odyssey Program Member, Carnegie Mellon University: Invited academic research program for students identified as graduate research potential. 2009-2011

Dean's List, with Honors, Humanities & Social Sciences, CMU (Spring 2009, Spring 2011, Fall 2012); with High Honors (Fall 2011)

First Place. Rotary Business Academy. Northern Nevada. Team leader of GNUWeb (website design & marketing competition). Student team: conceptualize, design & market a site for Rotary-identified client. $1,000 prize.
Site: http://acorn.he.net/~rotaryc/RBANevada/History/2007/GNUWeb/index.php

Professional Service

Reviewer, Conference submissions. *BigSurv18*

Community Service, Activity, and Leadership (selected examples)

The Tartan. Carnegie Mellon University. 2009-2011. Contributing writer

Nevada State Democratic Convention. 2008. Youngest elected delegate

Washoe County, Nevada Democratic Convention. 2016. Delegate.

Friends of the Washoe County Library. Annually. Ongoing book collection activity

Food Bank of Northern Nevada. Annually. Ongoing food collection activity

Volunteer Musician. Red Cross & Hurricane Katrina Victim Fund Raising Labor Day Weekend Marathon. Sept. 2005. 4 hours playing jazz (alto saxophone) at E.J.'s Jazz Café Reno, NV

Electronic Frontier Foundation. Current member

American Civil Liberties Union. Current member

Free Software Foundation. Current member

Professional Memberships

American Statistical Association (2012-present)

Association for Computing Machinery (ACM) – SIGKDD, SIGCAS, SimSig, and SIGEVO (2017-present)

American Political Science Association (2015-2018)

American Historical Association (2015-2018)

Western Social Science Association (2015-2018)

Western Economic Association International (2011-2013)

Skills and Interests

Programming Languages: R, Java, sed/AWK, C, Ruby, Python, Common Lisp, JavaScript

Operating Systems: Linux (Debian, Ubuntu, Fedora, Arch), UNIX, Windows XP/Vista/7, MAC OS X

Software: LaTeX, Sweave, Git, Eclipse, MiniTab, SPSS, STATA, Photoshop, Apache, LibreOffice, Microsoft Office

Languages: Native speaker of English; Level A1 knowledge of German; Some knowledge of Mandarin Chinese

Activities: Österreichischer Alpenverein; Recreational programming; Making.

Music: Alto saxophone (jazz and classical)

International Experience: Attended early primary school at Bun-Sgoil Bhorrodail, Isle of Skye, Scotland. Extensive travel throughout Scotland and England. Have lived in Germany for 1 year. Moderate travel in France and Italy.

Citizenship Dual Citizen - USA & European Union (UK/Scotland). Place of Birth: USA

References

Masters Research Advisor	Masters Research Co-Advisor
Clark Glymour, PhD Alumni University Professor Baker Hall 135L Dept. of Philosophy Carnegie Mellon University Phone: 412-268-2933 cg09@andrew.cmu.edu	Richard Scheines, PhD Dean Dietrich College of Humanities and Social Sciences Baker Hall 154 Carnegie Mellon University Phone: 412-268-2831 scheines@cmu.edu

Undergraduate Advisor

Cosma Shalizi, PhD
Associate Professor
Dept. of Statistics
Baker Hall 132
Carnegie Mellon University
5000 Forbes Ave.
Pittsburgh, PA 15213-3890
Phone: 412–268-7826
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