

Adam Loy

Curriculum Vitae

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Department of Mathematics and Statistics
Carleton College
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Experience

Assistant Professor, Carleton College	2017–present
Assistant Professor, Lawrence University	2014–2017
Visiting Assistant Professor, Lawrence University	2013–2014
Research Assistant, Iowa State University	2012–2013
Teaching Assistant, Iowa State University	2007–2012
Adjunct Instructor, Des Moines Area Community College	2010

Education

Ph.D., Statistics, Iowa State University	2013
M.S., Statistics, Iowa State University	2009
B.A., Mathematics/Statistics, Luther College	2007

Honors & Awards

- Best Research Paper for Impact and Quality Award for “Understanding Corn Belt farmer perspectives on climate change to inform engagement strategies for adaptation and mitigation,” *Journal of Soil and Water Conservation*, 2018
- Student paper competition winner for “Are You Normal? The Problem of Confounded Residual Structures in Hierarchical Linear Models,” ASA Sections on Statistical Computing and Graphics, 2013
- Second place in the 2013 Data Expo for “A Tale of Four Cities: Exploring the Soul of Biloxi, Detroit, Milledgeville, and State College,” ASA Sections on Statistical Computing and Graphics, 2013
- Award for Undergraduate Mentoring in Statistics, Iowa State University, 2012
- Preparing Future Faculty Associate, Iowa State University, 2012
- Teaching Excellence Award, Iowa State University, 2010
- Second place in the 2009 Data Expo for “Delayed, Canceled, On Time, Boarding. . . Flying in the USA,” ASA Sections on Statistical Computing and Graphics, 2009
- Jebe Fellowship, Iowa State University, 2007
- Phi Beta Kappa, National Honor Society, 2007
- Omicron Delta Epsilon, International Honor Society for Economics, 2007

- Pi Mu Epsilon, National Mathematics Honorary Society, 2006

Teaching

Courses Taught

Course	Term
Carleton College	
Math 215: Introduction to Statistics	W18, S18
Math 245: Applied Regression Analysis	S18
Math 265: Probability	F17
Math 275: Introduction to Statistical Inference	W17
Lawrence University	
FRST 101: Freshman Studies II	W15, W16
CMSC 205: Data-Scientific Programming	W17, S17
Math 107: Elementary Statistics	W14, S14, W15, S16, F16*
Math 207: Introduction to Probability and Statistics	F13*, F14*
Math 217: Applied Statistical Methods	S15
Math 240: Probability	F15, F16
Math 430: Statistical Modeling	W17
Math 440: Probability Theory	W14, W16
Math 445: Statistical Theory	S14, S16, S17
Iowa State University	
Statistics 101: Principles of Statistics	F09, S10, SS10, S11
Statistics 104: Introduction to Statistics	SS11
Statistics 105: Introduction to Statistics for Engineers	F10, F11, S12
Des Moines Area Community College	
Math 157: Statistics	F10
Business 211: Business Statistics	F10

F = Fall, W = Winter, S = Spring, SS = Summer, * = two sections

Tutorials & Directed Studies

- Ryan Eardley, Generating Interactive Reports in R, Spring 2017
- Eva Tourangeau, Data-Scientific Programming in Python, Spring 2017
- Annabelle Tsai, Applied Statistical Methods (Stat2), Fall 2016
- Liqi Chen, Jason Park, and Teresa Park, Introduction to Probability, Winter 2016
- Galen Dods and Shelby Guinn, Exploratory Data Analysis in R, Fall 2015
- Tim Dahlstrom, Time Series Analysis, Fall 2014
- Troy Miller, Probability Theory, Fall 2014
- Introduction to Statistical Computing in R, Spring 2014 (15 students)

Independent Studies

- Cassandra Li, Statistical Learning, Spring 2017
- Aletta Su and Olivia Lin, Generalized Linear Models, Spring 2017

- Abedin Rafique and Siyi Sun, Bayesian Data Analysis, Fall 2016
- Bimal Rajbhandari and Deepta Jyoti, Financial Mathematics, Fall 2016
- Jeannine Schulz, Linear Models, Spring 2016
- Phong Le, Data Science in R, Spring 2016
- Hallie Nguyen and Troy Miller, Statistical Learning in R, Spring 2016
- Alex Damisch, Cluster Analysis and Algorithmic Development in R, Winter 2016
- Henry Ward, Poll Tracking in R, Fall 2015, Winter 2016
- Colin Huggins, Applying Markov Decision Processes to Student Retention, Spring 2015
- Erin McNeely, Bayesian Reliability, Fall 2014, Winter 2015
- Qianyu Chen and Zhuyi Yao, Bayesian Statistics, Spring 2014
- Alice Fisher, An Exploration of Pedagogy for Elementary Mathematics, Spring 2014
- Spenser Steele, Bootstrap Methods, Spring 2014

Advising.....

Google Summer of Code: Alexandre Almeida. Google Summer of Code provided funding for a Alexandre to help develop an R package improving and extending Q-Q plots in the ggplot2 framework. Summer 2017.

Summer Research: Alex Damisch. Lawrence University provided funding for Alex to develop Shiny applications that can be used in elementary statistics courses. In addition to being easy to use, the intent is for these apps to help motivate the use of R. A list of these apps can be found at aloy.github.io/projects/. Summer 2015.

Summer Research: Spenser Steele. Lawrence University provided funding for Spenser to develop an R package implementing bootstrap procedures for linear mixed-effects models. The package has since been published on CRAN: <https://cran.r-project.org/web/packages/lmeresampler/>. Summer 2014.

Internship: Biyue Dai. Biyue worked to develop improved enrollment-projection models to be used by the administration of Lawrence University for strategic planning. During the course of this internship, Biyue learned about logistic regression models and Markov chain models, as well as the R statistical programming language. Fall 2013, Winter 2014.

Midwest Undergraduate Data Analytics Competition. Advised a team of four undergraduates from Iowa State University during a 24-hour data analytics competition. April 2012.

Data Visualization Student Challenge. Co-mentored a team of undergraduates from Iowa State University in a data visualization competition sponsored by the United States Department of Transportation. The goal of the competition was to produce a visualization that would aid transportation investment and decision making. Fall 2012.

Workshops Taught.....

A Week of R. Team-taught a four-day workshop introducing faculty and graduate students to the R programming language. The sessions included: Introduction to R, A Day of R Graphics, Data wRestling, and (Extended) Linear Models in R. Iowa State University. May 2013.

A Week of R. Team-taught a five-day workshop introducing faculty and graduate students to the R programming language. The sessions included: Introduction to R, Advanced Graphics in R, Data Formatting and Reshaping in R, (Extended) Linear Models in R, and R Packages. Iowa State University. June 2012, August 2012.

Introduction to R Workshop. Team-taught a one-day workshop introducing faculty and graduate students to the R programming language. Iowa State University. June 2010, August 2010.

Grants

- Berk, D. and **Loy, A.** The West Foundation. This grant provided funds to renovate Lawrence University's statistics computer lab to accommodate students in introductory statistics courses and enabled the use of hybrid and flipped classroom approaches. \$50,000. (January 2017).
- Kuiper, S., **Loy, A.**, Chihara, L., Associated Colleges of the Midwest Faculty Career Enhancement (ACM FaCE) grant. *Harnessing Big Data: Planning for Collaborative Courses in Data Science*. This provided funds to develop material that will incorporate data science into introductory and intermediate statistics courses. \$9,300. (May 2016).
- Recipient of curricular development funds from the Teagle Hybrid Learning Project to help develop material that will incorporate data science into the statistics curriculum at Lawrence University. \$9,300. (May 2016).

Publications

* Indicates an undergraduate student coauthor

Journal Articles

- Loy, A.**, Hofmann, H., and Cook, D. (2017). Model Choice and Diagnostics for Linear Mixed-Effects Models Using Statistics on Street Corners. *Journal of Computational and Graphical Statistics* **26**(3), 478–492.
- Loy, A.**, Follett, L., and Hofmann, H. (2016). Variations of Q-Q Plots—The Power of our Eyes! *The American Statistician* **70**(2), 202–214.
- Loy, A.** and Hofmann, H. (2015). Are You Normal? The Problem of Confounded Residual Structures in Hierarchical Linear Models. *Journal of Computational and Graphical Statistics* **24**(4), 1191–1209.
- Wright Morton, L., Hobbs, J., Arbuckle, J. G., Jr., and **Loy, A.** (2015). Upper Midwest Climate Variations: Farmer Responses to Excess Water Risks. *Journal of Environmental Quality* **44**(3), 1191–1209.
- Arbuckle, J. G., Jr., Hobbs, J., **Loy, A.**, Wright Morton, L., Prokopy, L. S., and Tyndall, J. (2014). Understanding Corn Belt Farmer Perspectives on Climate Change to Inform Engagement Strategies for Adaptation and Mitigation. *Journal of Soil and Water Conservation* **69**(6), 505–516.
- Loy, A.** and Hofmann, H. (2014). HLMdiag: A Suite of Diagnostics for Hierarchical Linear Models in R. *Journal of Statistical Software* **56**(5), 1–28.
- Arbuckle, J. G., Jr., Prokopy, L. S., Haigh, T., Hobbs, J., Knoot, T., Knutson, C., **Loy, A.**, Mase, A. S., McGuire, J., Wright Morton, L., Tyndall, J., and Widhalm, M. (2013). Climate Change Beliefs, Concerns, and Attitudes toward Adaptation and Mitigation among Farmers in the Midwestern United States. *Climatic Change* **117**(4), 943–950.
- Loy, A.** and Hofmann, H. (2013). Diagnostic Tools for Hierarchical Linear Models. *Wiley Interdisciplinary Reviews: Computational Statistics* **5**(1), 48–61.

Hofmann, H., Cook, D., Kielion, C., Schloerke, B., Hobbs, J., **Loy, A.**, Mosley, L., Rockoff, D., Huang, Y., Wrolstad, D., and Yin, T. (2011). Delayed, Canceled, On Time, Boarding . . . Flying in the USA. *Journal of Computational and Graphical Statistics* **20**(2), 287–290.

Book Reviews

Loy, A. (Forthcoming). Book review of *Predicting Presidential Elections and Other Things, Second Edition*. *The American Statistician*.

Other Articles & Technical Reports

Church, S., Haigh, T., Widhalm, M., Prokopy, L. S., Arbuckle, J. G., Jr., Hobbs, J., Knoot, T., Knutson, C., **Loy, A.**, Mase, A. S., McGuire, J., Wright Morton, L., and Tyndall, J. (2015). *Farmer Perspectives on Agricultural Practices, Information, and Weather Variability in the Corn Belt: A Statistical Atlas, Volume 2*. Tech. rep. CSCAP 0184-2015. West Lafayette, IN: Purdue University Research Repository.

Loy, A. (2015). Embracing Data Science. *The UMAP Journal* **36**(4). Invited guest editorial, 285–292.

Loy, A., Hobbs, J., Arbuckle, J. G., Jr., Wright Morton, L., Prokopy, L. S., Haigh, T., Knoot, T., Knutson, C., Mase, A. S., McGuire, J., Tyndall, J., and Widhalm, M. (2013). *Farmer Perspectives on Agriculture and Weather Variability in the Corn Belt: A Statistical Atlas, Volume 1*. Tech. rep. CSCAP 0153-2013. Ames, IA: Cropping Systems Coordinated Agricultural Project (CAP): Climate Change, Mitigation.

Loy, A. and Hofmann, H. (2009). Visual Monitoring of Data Streams. In: *JSM Proceedings, Section on Statistical Graphics*. American Statistical Association. Washington, DC.

Manuscripts in Preparation

Almeida, A., **Loy, A.**, and Hofmann, H. ggplot2 Compatible Quantile-Quantile Plots in R. Under revision for *The R Journal*.

Loy, A., Kuiper, S., and Chihara, L. Supporting Data Science in the Statistics Curriculum. Under revision for the *Journal of Statistics Education*.

Greenberg, M.H., Fant, J., Paudyal, **Loy, A.**, and Kagen, S. Validation of the Arthritis Measurement Test: A Novel Patient-Reported Outcomes Measurement for Arthritis. Submitted.

Kagen, S. and **Loy, A.** Remote Monitoring of Patients with Rhinitis and Asthma: Validation of Two New Symptom-Control Questionnaires.

Loy, A. and Steele, S*. Bootstrapping Clustered Data in R Using lmeresampler.

Maurer, K., Osthus, D., and **Loy, A.** A Tale of Four Cities: Exploring the Soul of State College, Detroit, Milledgeville, and Biloxi. Tentatively accepted for publication in *Computational Statistics*.

Presentations

“Statistics in the Data Science Curriculum.” Invited panel discussion, The 2018 Liberal Arts Data Science Workshop, Sarasota, FL, January 2018.

“Training Statisticians to Be Effective Instructors.” Invited panel discussion, Joint Statistical Meetings, Baltimore, MD, August 2017.

“Infusing Data Science into the Statistics Curriculum.” Roundtable discussion, Joint Statistical Meetings, Baltimore, MD, August 2017.

“Modules for Infusing Data Science into the Statistics Curriculum.” Preconference workshop, United States Conference on Teaching Statistics (USCOTS), State College, PA, May 2017.

“Modules for Infusing Data Science into the Statistics Curriculum.” Reviewed poster presentation, United States Conference on Teaching Statistics (USCOTS), State College, PA, May 2017.

- "Making Decisions with Data: Planning for Collaborative Courses in Data Science." Grant report with Shonda Kuiper, Teagle Hybrid Learning Conference, Oak Brook, IL, April 2017.
- "Q-Q plots: To De-trend, or Not to De-trend." Invited colloquium talk, Department of Mathematics and Statistics, Carleton College, Northfield, MN, January 2017.
- "Variations of Q-Q Plots—The Power of our Eyes!" Contributed poster, Joint Statistical Meetings, Chicago, IL, August 2016.
- "Q-Q plots: To De-trend, or Not to De-trend." Invited colloquium talk, Department of Mathematics and Computer Science, Ripon College, Ripon, WI, April 2016.
- "Q-Q plots: To De-trend, or Not to De-trend." Invited colloquium talk, Department of Mathematics and Computer Science, Beloit College, Beloit, WI, February 2016.
- "Better Diagnostics for Linear Mixed-Effects Models Using Visual Inference." Invited seminar talk, Graphics Working Group, Iowa State University, Ames, IA, December 2014.
- "Visual Inference for Linear Mixed-Effects Models." Contributed poster, Joint Statistical Meetings, Boston, MA, August 2014.
- "Understanding Farmer Perspectives on Climate Change and Adaptation to Increased Weather Variability." Guest lecture for Environmental Studies 300, Lawrence University, Appleton, WI, March 2014.
- "A Discussion of Visual Inference." Invited talk, Department of Mathematics, Oberlin College, Oberlin, OH, December 2013.
- "A Discussion of Visual Inference." Invited talk, Department of Mathematics and Statistics, Grinnell College, Grinnell, IA, December 2013.
- "Escaping Asymptopia: How Visual Inference Can Help Solve Finite Sample Problems." Invited talk, Department of Mathematics, Lawrence University, Appleton, WI, November 2013.
- "Are You Normal? The Problem of Confounded Residual Structures in Hierarchical Models." Topic contributed talk, Joint Statistical Meetings, Montréal, Canada, August 2013.
- "A Tale of Four Cities: Exploring the Soul of Biloxi, Detroit, Milledgeville, and State College." Data Expo poster with Karsten Maurer and Dave Osthus (second place), Joint Statistical Meetings, Montréal, Canada, August 2013.
- "Midwestern Farmers' Six Perspectives on Climate Change: Toward Effective Communication Strategies for Adaptation and Mitigation." Poster with J.G. Arbuckle Jr., J. Hobbs, L. W. Morton, L. S. Prokopy, and J. Tyndall, Climate and Sustainable Cropping Systems Coordinated Agricultural Project (CSCAP) Annual Meeting, Purdue, IN, July 2013.
- "A Discussion of Visual Inference for Model Checking." Invited talk, Department of Mathematics, Lawrence University, Appleton, WI, January 2013.
- "A Discussion of Visual Inference for Model Checking." Invited talk, Department of Mathematics, Hope College, Holland, MI, January 2013.
- "A Discussion of Visual Inference for Model Checking." Invited talk, Department of Mathematics, University of Wisconsin–La Crosse, La Crosse, WI, October 2012.
- "Visualization of Preliminary Results from the CSCAP Farmer Survey." Seminar talk, Graphics Working Group, Iowa State University, Ames, IA, October 2012.

“HLMdiag: An Implementation of Diagnostics for Hierarchical Linear Models in R.” Contributed talk, Joint Statistical Meetings, San Diego, CA, August 2012.

“Diagnostics for Mixed Linear Models.” Seminar talk, Graphics Working Group, Iowa State University, Ames, IA, September 2010.

“Influence Diagnostics for Mixed-Effects Models.” Seminar talk, Graphics Working Group, Iowa State University, Ames, IA, April 2010.

“Delayed, Canceled, On Time, Boarding . . . Flying in the USA.” Topic contributed talk, Joint Statistical Meetings, Vancouver, Canada, August 2010.

“Delayed, Canceled, On Time, Boarding . . . Flying in the USA.” Data Expo poster with the Iowa State University Graphics Working Group (second place), Joint Statistical Meetings, Washington, DC, August 2009.

“Visual Monitoring of Data Streams.” Contributed talk, Joint Statistical Meetings, Washington, DC, August 2009.

“Visual Monitoring of Data Streams.” Contributed poster, Celebrating 75 Years of Statistics at Iowa State, Ames, IA, June 2009.

Software

ggplotr: An R package providing ggplot2 compatible quantile plots. Alexandre Almeida and Heike Hofmann coauthored this package during Google Summer of Code 2017.

lmeresampler: An R package implementing bootstrap procedures for nested linear mixed-effects models fit using either the lme4 or nlme packages. Spenser Steele* coauthored this package.

HLMdiag: An R package providing a suite of diagnostic tools for hierarchical linear models fit using either the lme4 or nlme packages.

Consulting

Community Early Learning Center. Created and maintained a MySQL database to store sociodemographic and assessment data for the five partner organizations, enabling them to utilize longitudinal data in their analyses. Prior to the database, the partner organizations treated each year in isolation. This database will be used for research by developmental psychologists at Lawrence University and the University of Wisconsin–Fox Valley. 2014–present.

KagenAir. Compared two new mobile app-based system-control questionnaires for rhinitis and asthma to validated questionnaires. The goal of the project is to demonstrate that the app-based questionnaires are measuring rhinitis and asthma with a comparable level of accuracy. 2015–2016.

Jeff Clark (Geology). Explored a data set of meander geometry measurements from rivers around the world in five distinct environments (arid, temperate, tropical, periglacial, and bedrock) in an effort to determine if geometric features differ across environments. 2014–2015.

Lori Hilt (Psychology). Advised in the selection of models to analyze a psychology experiment. Reshaped data for use with statistical software. 2013–2014.

Statistics in the Community (StatCom). Provided pro bono statistical consulting including survey preparation, data management and manipulation, tabular and graphical summaries, and analysis.

Completed projects include: the Ericson Public Library Community Survey and the Perry Public Library Community Survey. 2011–2013.

Professional Memberships

- American Statistical Association

Service

College and Departmental Service.....

- Institutional Review Board (IRB) member, Carleton College, 2018–present
- Mathematics and Statistics colloquium and events committee member, Carleton College, 2018–2019
- Visiting position in Statistics search committee member, Carleton College, 2018–2019
- Data Science Working Group, Lawrence University, 2015–2017
- Benefits Advisory Committee, Lawrence University, 2015–2017
- Phi Beta Kappa Secretary, Lawrence University, 2016–2017
- Huebner Pre-Law Fellowship Review Panel, Lawrence University, 2016–2017
- Honors Thesis Committee Member (2), Lawrence University
- Search Committee Member, Lawrence University
 - Visiting position in Statistics, Winter/Spring 2017
 - Tenure-track position in Mathematics, Winter 2017
 - Systems and data services librarian (diversity point person), Summer/Fall 2016
 - Visiting position in Mathematics, Spring 2016
 - Tenure-track position in Biology, Fall 2015
 - Visiting position in Mathematics, Winter 2014

Professional Service.....

- Discussant, Professional Opportunities at Smaller Colleges and Universities, Joint Statistical Meetings, August 2016
- Director, Wisconsin Chapter of the American Statistical Association, 2015–2017
- Referee for *Journal of Statistics Education* (5 reviews), *Journal of Computational and Graphical Statistics*(1), *Journal of Statistical Software* (1), *The American Statistician* (2), *Computational Statistics* (3), *Journal of Soil and Water Conservation* (1)
- Textbook proposal reviewer for Wiley (1) and CRC (2)

Community Service.....

- Community Early Learning Center, Research Committee Member, 2014–2017