

## Lucas K. Mentch

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Department of Statistics  
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| <b>Education</b>              | <i>Ph.D.</i> , Statistical Science<br>Cornell University, Ithaca, NY, USA<br>Advisor: Giles Hooker<br>Dissertation: Ensemble Trees and CLTs: Statistical Inference in Machine Learning.   | 2015  |
|                               | <i>M.S.</i> , Statistical Science<br>Cornell University, Ithaca, NY, USA  | 2013  |
|                               | <i>B.S.</i> , Mathematics<br>Bucknell University, Lewisburg, PA, USA  | 2010  |
| <b>Professional Positions</b> | Assistant Professor, University of Pittsburgh<br>(On leave 2015 - 2016)<br>Postdoctoral Researcher, SAMSI/NC State<br>Research Assistant, Cornell University<br>Teaching Assistant, Cornell University  | 2015 - Present<br>2015 - 2016<br>2013 - 2015<br>2011 - 2013 |
| <b>Research Interests</b>     | Statistical Learning Theory & Machine Learning, Random Forests and Ensemble Methods, Nonparametric Methods, Statistical Computing; Applications to Crime, Law, Forensic Science, and Sports   |   |
| <b>Publications</b>           | <b>Lucas Mentch</b> and Giles Hooker. “Formal Tests for Regression Structure in Random Forests.” <i>Journal of Computational and Graphical Statistics</i> . In press.<br><br>Mahya Mehrmohamadi, <b>Lucas Mentch</b> , Andrew Clark, and Jason Locasale. “Integrative modeling of tumor DNA methylation identifies a role for metabolism.” <i>Nature Communications</i> . In Press.<br><br>Giles Hooker and <b>Lucas Mentch</b> . “Bootstrap Bias Corrections for Ensemble Methods.” <i>Statistics and Computing</i> . In press.<br><br>Giles Hooker and <b>Lucas Mentch</b> . “Comments on: <i>A Random Forest Guided Tour</i> .” <i>TEST</i> . <b>25</b> (2), pp. 254-260, 2016.<br><br><b>Lucas Mentch</b> and Giles Hooker. “Quantifying Uncertainty in Random Forests via Confidence Intervals and Hypothesis Tests.” <i>The Journal of Machine Learning</i> |   |

*Research*, **17**(26), pp. 1-41, 2016.

Bar, Haim Y. and **Lucas Mentch**. “R-CMap - An Open-Source Software for Concept Mapping. To appear in *Evaluation and Program Planning, Special Issue: Concept Mapping at 25: Development, Applications, and Future Directions*.

Frey, M.R., Miller, A.L., **Mentch, L.K.**, and Grahm, J. “Score Operators of a Qubit with Applications”, *Quantum Information Processing*, **9**(5), 629, 2010.

Frey, M.R., Coffey, L.E., **Mentch, L.K.**, Miller, A.L., and Rubin, S.S. “Correlation Identification in Bipartite Pauli Channels”, *International Journal of Quantum Information*, **8**(7), 2010.

Frey, M.R., Coffey, L.K., **Mentch, L.K.**, Miller, A.L. and Rubin, S.S., “Pauli channels exhibit a transition effect in memory estimation above a parametric threshold”, *Proceedings of SPIE, Quantum Information and Computation VIII*, E.J. Donkor, A.R. Pirich, and H.E. Brandt, eds., April 2010.

#### *Under Review*

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Maria Cuellar, **Lucas Mentch**, and Cliff Spiegelman. “Flawed Designs Lead to Misdiagnoses and Wrongful Convictions.” *Under Review at The American Scientist*.

Duy Hoang Thai and **Lucas Mentch**. “Multiphase Segmentation for Simultaneously Homogeneous and Textural Images.” *Under Review at Applied Mathematics and Computation*.

#### *In Progress*

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“A Multi-Score Approach to Assessing the Quality of Latent Pattern Evidence.” *with Duy Thai, Robin Richter, Len Stefanski, Stephan Huckemann, and Carsten Gottschlich*.

“Hold-Out Ensembles for Group-wise Inference-Based Variable Selection.” *with Giles Hooker*.

“SuRFIn: An R Package for **S**ubsampled **R**andom **F**orest **I**nference.” *with Sarah Tan and Giles Hooker*.

“Ensemble Tests for Factors Impacting Early Species Arrivals.” *with Timothy Coleman, Dan Fink, David Winkler, Wesley Hochachka, Frank La Sorte, and Giles Hooker*.

#### *Non Peer-Reviewed*

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**Lucas Mentch**, Maria Cuellar, William Thompson, and Cliff Spiegelman. “The Next Page: Four experts explain why forensic analysis of crime scenes is not as reliable as you might think.” *OpEd, Pittsburgh Post Gazette*. March 13, 2016.

William Thompson, **Lucas Mentch**, Maria Cuellar, and Cliff Spiegelman. “Who should control Houston’s crime lab?” *OpEd, Houston Chronicle*. May 31, 2016.

Frey, M.R., Graham, J., **Mentch, L.K.**, and Miller, A.L., “Robust Probe for the Quantum Pauli Channel”, *Proceedings of the Physical and Engineering Sciences Section, 2010 Joint Statistical Meetings*, Vancouver, August 3-7, 2010.

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|----------------------------------|--|----------------|
| <b>Talks &amp; Presentations</b> | Joint Statistical Meetings, Invited Session  | August 2017    |
|                                  | Department of Forensic and Investigative Sciences,<br>West Virginia University           | February 2017  |
|                                  | Center for Statistics and Application in Forensic Evidence<br>Carnegie Mellon University | November 2016  |
|                                  | University of Pittsburgh Statistics Seminar  | September 2016 |
|                                  | Statistics and Machine Learning Research Group<br>Carnegie Mellon University             | September 2016 |
|                                  | Joint Statistical Meetings, Topic Contributed Session                                    | August 2016    |
|                                  | IMS New Researchers Conference   | July 2016      |
|                                  | SAMSI Undergraduate Workshop   | May 2016       |
|                                  | SAMSI Transition Workshop  | May 2016       |
|                                  | SAMSI Postdoc Seminar  | April 2016     |
|                                  | SAMSI Undergraduate Workshop   | February 2016  |
|                                  | SAMSI Undergraduate Tutorial   | February 2016  |
|                                  | SAMSI Postdoc Seminar  | October 2015   |
|                                  | ENAR Spring Meeting, Invited Session   | March 2015     |
|                                  | NC State University Statistics Seminar   | March 2015     |
|                                  | University of Pittsburgh Statistics Seminar  | February 2015  |
|                                  | Kansas State University Statistics Seminar   | February 2015  |
|                                  | University of Central Florida Statistics Seminar   | February 2015  |
|                                  | College of William and Mary Statistics Seminar   | January 2015   |
|                                  | Wake Forest University Statistics Seminar  | January 2015   |
|                                  | University of Arkansas Statistics Seminar  | December 2014  |
|                                  | University of Michigan Statistics Seminar  | November 2014  |
|                                  | Artificial Intelligence Seminar, Cornell University                                      | September 2014 |
|                                  | Graduate Student Seminar, Cornell University   | September 2014 |
|                                  | Cornell Lab of Ornithology Seminar   | September 2014 |
|                                  | Joint Statistical Meetings 2014, Contributed Session                                     | August 2014    |
|                                  | Joint Statistical Meetings 2013, Contributed Session                                     | August 2013    |
|                                  | Graduate Student Seminar, Cornell University   | April 2013     |
|                                  | Biostatistics Research Group, Cornell University   | March 2013     |

## Teaching

### *Primary Instructor*

(\* Indicates a new course that was newly developed)

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*STAT 1291\** - *Statistics and Data Science, University of Pittsburgh* Spring 2017  
Upper-level undergraduate course designed to provide students a thorough overview of the emerging field data science, focusing particularly on the development of statistical and machine learning procedures.

*STAT 1151 - Introduction to Probability, University of Pittsburgh* Fall 2016  
Standard undergraduate calculus-based probability course.

*ST 371 - Introduction to Probability, NC State University* Summer 2016  
Standard undergraduate calculus-based probability course.

### *Teaching Assistant*

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*BTRY 3520\** - *Statistical Computing, Cornell University* Spring 2012, Spring 2013  
Upper-level undergraduate statistical computing course using R. Topics included simulation, nonparametric density estimation and testing, optimization and root-finding, numerical integration, and MCMC.

ORIE 6700 - *Statistical Principles, Cornell University* Fall 2012  
 Mathematical statistics course required for first year Ph.D. students in statistics and operations research. Frequentist and Bayesian estimation methods, types of convergence, and statistical inference are covered in detail, at the level of *Bickel and Doksum, Mathematical Statistics, 2006*.

ILRST 2100 - *Introductory Statistics, Cornell University* Fall 2011  
 A standard introductory statistics course designed for non-math majors.

**Software**

- *SuRFin*: An R package to conduct statistical inference procedures via subsampled ensembles. *In progress*.
- *R-CMap*: An R package to conduct and illustrate concept mapping procedures. *In progress*. Joint work with Haim Bar.
- *Statistical Software*: R (expert); experience with SAS, SPSS, Minitab, JMP, STATA
- *Other Languages and Software*: Experience with JAVA, C, C++, Pascal, Matlab, Python, Maple, Mathematica, Microsoft Office

**Activities & Service**

- Faculty Sponsor: DATAs Statistics and Machine Learning Club, University of Pittsburgh
- Graduate Admissions Committee: University of Pittsburgh, Department of Statistics PhD Program
- Lecturer Hiring Committee: Department of Statistics, University of Pittsburgh
- Workshop Organizer: Banff International Research Station for Mathematical Innovation and Discovery (BIRS), January 2018
- Invited Session Organizer: 2017 Joint Statistical Meetings
- Delegate: NSF & NIH/BD2K Data Science Innovation Lab 2016: Mobile Health
- Session Chair: 2016 Joint Statistical Meetings
- Research Track Program Committee Member: 2016 ACM SIGKDD
- Panel Discussant: SAMSI Undergraduate Workshops, October 2015
- Reviewer: *Annals of Statistics* (2), *Journal of Machine Learning Research* (2), *Statistical Analysis and Data Mining* (2), *Statistics and Public Policy*, *SIGKDD* (5)

**Students**

*Role: Advisor*

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|-----------------|--------------------------|-----|-----------------|
| Timothy Coleman | University of Pittsburgh | PhD | 2021 (Expected) |
| Wei Peng        | University of Pittsburgh | PhD | 2020 (Expected) |
| Wuxin Yang      | University of Pittsburgh | PhD | 2019 (Expected) |

*Role: Committee Member*

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| Madonna Nobel | West Virginia University | MS | 2017 (Expected) |
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| <b>Awards &amp; Fellowships</b>                            | SAMSI Postdoctoral Research Fellowship                        | 2015 |
|  | SUNY Graduate Fellowship                                      | 2010 |
|  | Phi Beta Kappa  | 2010 |
|  | <i>Bucknell University Chapter</i>                            |      |
|  | Pi Mu Epsilon   | 2008 |
|  | <i>Mathematics Honor Society, Bucknell University Chapter</i> |      |
|  | William Bucknell Scholarship                                  | 2008 |
|  | The President's Award for Distinguished Academic Achievement  | 2007 |
|  | Alpha Lambda Delta  | 2006 |
| <i>Freshman Honor Society, Bucknell University Chapter</i> |   |      |

**Last Update**      March 27, 2017