

Research interests

Broadly—Designing / building / evaluating user interfaces and information visualizations.

Lately—Communicating uncertainty in everyday sensing and prediction; building usable statistical tools (especially for Bayesian analysis of experimental data); personal informatics.

I am excited when technology baffles its users. Every new confusion surrounding how a system *is* carries fresh insight into how it *should be*.

Employment

2016– **Assistant Professor**
University of Michigan School of Information

Education

2010–2016 **PhD, Computer Science & Engineering, University of Washington**
Advisors: Julie Kientz and Shwetak Patel
Thesis: Designing for user-facing uncertainty in everyday sensing and prediction

2010–2012 **Master of Science, Computer Science & Engineering, University of Washington**
Advisors: Julie Kientz and Shwetak Patel

2008–2010 **Master of Mathematics, Computer Science, University of Waterloo**
Advisor: Michael Terry
Thesis: Techniques and heuristics for improving the visual design of software agreements

2004–2008 **Bachelor of Computer Science, University of Waterloo**
Minor in Fine Art (Studio Specialization)
Honours with Distinction

Awards & honours

2016 **Best Paper Award for “Mobile manifestations of alertness ...” (MobileHCI 2016)**

2016 **Best Paper Honorable Mention for “Researcher-centered design of statistics ...” (CHI 2016)**

2015 **Best Paper Honorable Mention for “Beyond Weber’s Law ...” (InfoVis 2015)**

2015 **Best Paper Award for “Unequal representation and gender stereotypes ...” (CHI 2015)**

2013 **Best Paper Award for “There’s no such thing as gaining a pound ...” (UbiComp 2013)**

2013 **Google Travel Award for CHI ‘13**

2012 **Best Paper Award for “Lullaby: A capture & access system ...” (UbiComp 2012)**

- 2011–2013 **NSERC Postgraduate Scholarship (Doctoral)**
- 2008–2010 **NSERC Alexander Graham Bell Canada Graduate Scholarship (Master’s)**
- 2008–2010 **President’s Graduate Scholarship, University of Waterloo**
- 2008 **NSERC Undergraduate Student Research Assistantship**
- 2004–2008 **Descartes Scholarship, University of Waterloo**

Publications

In human–computer interaction, top-tier conferences (< 30% acceptance rate) are as—or more—impactful than journals; see <http://dx.doi.org/10.1145/1743546.1743569>.

— Journal articles (fully reviewed, archival)

- J04 2018 **Imagining replications: Graphical prediction & discrete visualizations improve recall & estimation of effect uncertainty**
Jessica Hullman, *Matthew Kay*, Yea-Seul Kim, and Samana Shrestha
IEEE Transactions on Visualization and Computer Graphics (to appear; proc. INFOVIS 2017)
- J03 2017 **Semi-automated tracking: A balanced approach for self-monitoring applications**
Eun Kyoung Choe, Saeed Abdullah, Mashfiqui Rabbi, Edison Thomaz, Daniel A. Epstein, *Matthew Kay*, Felicia Cordeiro, Gregory D. Abowd, Tanzeem Choudhury, James Fogarty, Bongshin Lee, Mark Matthews, and Julie A. Kientz
IEEE Pervasive Computing 16(1), 1536–1268
- J02 2016 **Beyond Weber’s Law: A second look at ranking visualizations of correlation**
Matthew Kay and Jeffrey Heer
IEEE Transactions on Visualization and Computer Graphics 22 (1) (proc. INFOVIS 2015)
Best paper honorable mention (top 2 papers)
- J01 2015 **Consumer sleep technologies: A review of the landscape**
Ping-Ru T Ko, Julie A Kientz, Eun Kyoung Choe, *Matthew Kay*, Carol A Landis, and Nathaniel F Watson
JCSM: Journal of clinical sleep medicine 11(12), 1455–1461
- Conference papers (fully reviewed, archival)
- C15 2018 **Uncertainty displays using quantile dotplots or CDFs improve transit decision-making**
Michael Fernandes, LoganWalls, Sean Munson, Jessica Hullman, and *Matthew Kay*
CHI ’18: Conference on human factors in computing systems
- C14 2017 **Self-experimentation for behavior change: Design and formative evaluation of two approaches**
Jisoo Lee, Erin Walker, Winslow Burtleson, *Matthew Kay*, Matthew P. Buman, and Eric B. Hekler
CHI ’17: Conference on human factors in computing systems
- C13 2016 **Cognitive rhythms: Unobtrusive and continuous sensing of alertness using a mobile phone**
Saeed Abdullah, Elizabeth Murnane, Mark Matthews, *Matthew Kay*, Julie Kientz, Geri Gay, and Tanzeem Choudhury
UBICOMP ’16: Conference on ubiquitous computing

- C12 🌸 2016 **Mobile manifestations of alertness: Connecting biological rhythms with patterns of smartphone app use**
Elizabeth Murnane, Saeed Abdullah, Mark Matthews, *Matthew Kay*, Julie Kientz, Geri Gay, Tanzeem Choudhury, and Dan Cosley
MOBILEHCI '16: Conference on Human-Computer Interaction with Mobile Devices and Services
Best paper award (top 2 papers)
- C11 🌸 2016 **Researcher-centered design of statistics: Why Bayesian statistics better fit the culture and incentives of CHI**
Matthew Kay, Gregory Nelson, and Eric Hekler
CHI '16: Conference on human factors in computing systems, 23% AR
Best paper honorable mention (top 5%)
- C10 2016 **When (ish) is my bus? User-centered visualizations of uncertainty in everyday, mobile predictive systems**
Matthew Kay, Tara Kola, Jessica Hullman, and Sean Munson
CHI '16: Conference on human factors in computing systems, 23% AR
- C09 2015 **SleepTight: Low-burden, self-monitoring technology for capturing and reflecting on sleep behaviors**
Eun Kyong Choe, Bongshin Lee, *Matthew Kay*, Wanda Pratt, and Julie A. Kientz
UBICOMP '15: Conference on ubiquitous computing, 30% AR
- C08 🌸 2015 **Unequal representation and gender stereotypes in image search results for occupations**
Matthew Kay, Cynthia Matuszek, and Sean Munson
CHI '15: Conference on human factors in computing systems, 23% AR
Best paper award (top 1%)
- C07 2015 **How good is 85%? A survey tool to connect classifier evaluation to acceptability of accuracy**
Matthew Kay, Shwetak N. Patel, and Julie A. Kientz
CHI '15: Conference on human factors in computing systems, 23% AR
- C06 🌸 2013 **There's no such thing as gaining a pound: Reconsidering the bathroom scale user interface**
Matthew Kay, Dan Morris, mc schraefel, and Julie A. Kientz
UBICOMP '13: Conference on ubiquitous computing, 23% AR
Best paper award (top 1%)
- C05 2013 **PVT-Touch: Adapting a reaction time test for touchscreen devices**
Matthew Kay, Kyle Rector, Sunny Consolvo, Ben Greenstein, Jacob O. Wobbrock, Nathaniel F. Watson, and Julie A. Kientz
PERVASIVEHEALTH '13: Conference on pervasive computing technologies for healthcare, 34% AR
- C04 🌸 2012 **Lullaby: A capture & access system for understanding the sleep environment**
Matthew Kay, Eun Kyong Choe, Jesse Shepherd, Benjamin Greenstein, Nathaniel F. Watson, Sunny Consolvo, and Julie A. Kientz
UBICOMP '12: Conference on ubiquitous computing, 19% AR
Best paper award (top 1%)
- C03 2010 **Textured agreements: Re-envisioning electronic consent**
Matthew Kay and Michael Terry
SOUPS '10: Symposium on usable privacy and security, 25% AR

- C02 2010 **Perceptions and practices of usability in the Free/Open Source Software (FOSS) community**
Michael Terry, *Matthew Kay*, and Ben Lafreniere
CHI '10: Conference on human factors in computing systems, 22% AR
- C01 2008 **Ingimp: Introducing instrumentation to an end-user open source application**
Michael Terry, *Matthew Kay*, Brad Van Vugt, Brandon Slack, and Terry Park
CHI '08: Conference on human factors in computing systems, 22% AR
- Book chapters
- BO1 2016 **Nonparametric statistics in human-computer interaction**
Jacob O. Wobbrock and *Matthew Kay*
in *Modern Statistical Methods for HCI*, eds. Judy Robertson and Maurits Kaptein
Springer International Publishing
- Magazine articles
- MO2 2017 **How do you know if 85% accuracy is good enough for your application?**
Matthew Kay, Shwetak N. Patel, and Julie A. Kientz
GETMOBILE: Mobile Computing and Communications 21(2), 5–8
- MO1 2014 **Challenges in personal health tracking: The data isn't enough**
Matthew Kay
XRDS: Crossroads, the ACM Magazine for Students 21(2), 32–37
- Workshop papers & abstracts (lightly reviewed)
- AO6 2017 **Validation of a touchscreen psychomotor vigilance task for Android devices**
Demi Ocano, Nathaniel F. Watson, *Matthew Kay*, Julie A. Kientz, and Michael Grandner
SLEEP 40 (Abstract supplement): A88
- AO5 2013 **Initial validation of an Android-based psychomotor vigilance task**
Matthew Kay, Michael Grandner, Jared Bauer, Rebecca Lang,
Nathaniel F. Watson, and Julie A. Kientz
SLEEP 36 (Abstract supplement)
- AO4 2012 **Evaluating Zeo and Fitbit for tracking sleep behaviors**
Matthew Kay, Eun Kyoung Choe, and Julie A. Kientz
UBICOMP '12 workshop on evaluating off-the-shelf technologies for personal health monitoring
- AO3 2012 **Lullaby: Capturing the unconscious in the sleep environment**
Matthew Kay, Eun Kyoung Choe, Jesse Shepherd, Benjamin Greenstein,
Nathaniel F. Watson, Sunny Consolvo, and Julie A. Kientz
CHI '12 workshop on personal informatics
- AO2 2011 **Lullaby: Environmental sensing for sleep self-improvement**
Matthew Kay, Eun Kyoung Choe, Jesse Shepherd, Benjamin Greenstein,
Sunny Consolvo, Patrick Gage Kelley, and Julie A. Kientz
CHI '11 workshop on personal informatics
- AO1 2010 **Communicating software agreement content using narrative pictograms**
Matthew Kay and Michael Terry
ALT.CHI '10 (CHI '10 extended abstracts)

- Other articles
- OO2 2013 **Ubicomp 2012 conference report**
Sidhant Gupta and *Matthew Kay*
IEEE Pervasive Computing 12(1)
- OO1 2012 **The changing nature of (ubiquitous) computing**
Matthew Kay
XRDS blogs, in Crossroads, the ACM Magazine for Students 19(1)
- Posters
- PO2 2014 **How good is 85%? Connecting classifier performance to acceptability of accuracy**
Matthew Kay, Shwetak N. Patel, and Julie A. Kientz
HCIC '14: Human Computer Interaction Consortium Workshop
- PO1 2009 **Textured agreements: Re-envisioning electronic consent**
Matthew Kay and Michael Terry
SOUPS '09: Symposium on usable privacy and security

Publicly available research code & data

Since about 2014 I have made it a habit to release datasets and analysis code (in R) with all papers where I am first author (previous work may not have ethics approval for this).

- 2018 **Data and analysis for “Uncertainty displays ...” [C15]**
Michael Fernandes, LoganWalls, Sean Munson, Jessica Hullman, and *Matthew Kay*
<https://github.com/Michael-Fernandes/uncertainty-displays-for-transit>
- 2017 **Materials for “Imagining replications ...” [J04]**
Jessica Hullman, *Matthew Kay*, Yea-Seul Kim, and Samana Shrestha
https://github.com/jhullmanuw/imagining_replications_infovis2017
- 2016 **Data and analysis for “Research-centered design of statistics ...” [C11]**
Matthew Kay, Gregory Nelson, and Eric Hekler
<https://github.com/mjskay/bayes-for-chi>
- 2016 **Data and analysis for “When (ish) is my bus? ...” [C10]**
Matthew Kay, Tara Kola, Jessica Hullman, and Sean Munson
<https://github.com/mjskay/when-ish-is-my-bus>
- 2015 **Data and analysis for “Beyond Weber’s Law ...” [J02]**
Matthew Kay and Jeffrey Heer
<https://github.com/mjskay/ranking-correlation>
- 2015 **Data and analysis for “Unequal representation and gender stereotypes ...” [C08]**
Matthew Kay, Cynthia Matuszek, and Sean Munson
<https://github.com/mjskay/gender-in-image-search>
- 2015 **Code for “How good is 85%? A survey tool ...” [C07]**
Matthew Kay, Shwetak N. Patel, and Julie A. Kientz
<https://github.com/mjskay/acceptability-of-accuracy>

R packages

- 2015– **tidybayes: Bayesian analysis + tidy data + geoms**
Matthew Kay
<http://mjskay.github.io/tidybayes/>
- 2014– **ARTool: R package for aligned rank transform for nonparametric factorial ANOVAs**
Matthew Kay and Jacob O. Wobbrock
<https://cran.r-project.org/package=ARTool>
Installations: [>5700](#)

Talks & panels

All first-author conference papers listed above were also given as presentations at their respective conferences and are not listed again in this section.

- Discussion panels
- 2016 **How can we improve empirical research on understanding visual information?**
with Steve Haroz, Pierre Dragicevic, Ronald Rensink, and Jessica Hullman
InfoVis 2016
- 2014 **Research design and collaboration**
with Jason Bobe and Eric Hekler
Quantified Self Public Health Symposium 2014
- Talks & lectures
- 2017 **Information visualization for data science**
BDSI 2017: Big Data Summer Institute at the University of Michigan
- 2014 **On weight scales, sensing, and accuracy: Improving the user interface of user-facing uncertainty in ubiquitous computing**
University of Waterloo
- 2013 **Personal informatics & sleep**
UW CSE Summer Academy for Advancing Deaf & Hard of Hearing in Computing
- 2012 **Lullaby: A capture and access system for the sleep environment**
UW CSE Industry Affiliates' Day 2012
- Class guest lectures
- 2017 **Visualization for scientific communication**
NUTR 802: Professional development and technical writing
- 2016 **Quantitative methods**
ARTDES 650.1: Research Methods
- 2014 **Critique**
CSE 440: User Interface Design, Prototyping, and Evaluation
- 2014 **Designing for mobile web, responsive web, and mobile apps**
HCID 520: User Interface Software and Technology

2013 **Challenges in personal informatics**
CSE 440: Introduction to HCI

Service

—— To the research community

2016 **ACM Interactions Editor-in-Chief Search Committee Member**

2015–2016 **CSCW 2016 Co-webmaster**

2014 **UbiComp 2014 Program Committee Student Volunteer**

—— As a conference workshop or special interest group (SIG) organizer

2017 **Moving Transparent Statistics Forward at CHI**

Matthew Kay, Steve Haroz, Shion Guha, Pierre Dragicevic, and Chat Wacharamanatham
Workshop at CHI '17 (upcoming)

2017 **Designing for Uncertainty in HCI: When Does Uncertainty Help?**

Miriam Greis, Jessica Hullman, *Matthew Kay*, Michael Correll, and Orit Shaer
Workshop at CHI '17 (upcoming)

2016 **Special Interest Group on Transparent Statistics in HCI**

Matthew Kay, Steve Haroz, Shion Guha, and Pierre Dragicevic
SIG at CHI '16

2014 **Disasters in personal informatics: The unpublished stories of failure and lessons learned**

Jon E. Froehlich, Jakob Eg Larsen, *Matthew Kay*, and Edison Thomaz
Workshop at UBICOMP '14

2014 **Biological rhythms and technology**

Mark Matthews, Erin Carroll, Saeed Abdullah, Jaime Snyder, *Matthew Kay*,
Tanzeem Choudhury, Geri Gay, and Julie A. Kientz
Workshop at CHI '14

—— At University of Michigan

2017 **SIGCHI Chapter Faculty Mentor**

—— At University of Washington CSE

2014–2015 **dub Speaker Series Student Committee Member**

Responsible for coordinating speakers for the weekly dub group HCI speaker series

SPRING 2015 **Paul Allen Computing Challenge Judge**

Judged ~30 personal informatics-related research posters from high school student teams

WINTER 2014 **Prospective Graduate Student Admissions Reviewer**

Reviewed prospective graduate student applications for UW CSE

SUMMER 2013 **Speaker at Summer Academy for Advancing Deaf & Hard of Hearing in Computing**

Presented research to deaf and hard of hearing high school students

SPRING 2013 **Graduate Student Satisfaction Survey Coordinator**

Organized the annual survey of grad student happiness and reported on its results

- SPRING 2012 **Prospective Student Committee After-party Coordinator**
Organized after-party for visiting prospective grad students
- FALL 2011 **New Graduate Student Orientation Co-coordinator**
Organized panels, talks, and activities to introduce new students to UW CSE and Seattle
- SPRING 2011 **Prospective Student Committee Graduate Student Whip**
Ensured graduate students scheduled time to meet prospectives
- At University of Waterloo CS
- SPRING 2010 **Human-Computer Interaction Tutorial Leader**
Designed and ran two introductory HCI tutorials for high school girls interested in CS
- As a conference program committee member
- 2018 CHI
- As a reviewer (for conferences)
- 🌸 **Special Recognitions** for exceptional reviews.
- 2013–2018 CHI 🌸 (2016) 🌸 (2018)
- 2017 EuroVis
- 2017 Digital Health
- 2016–2017 CSCW 🌸 (2016) 🌸 (2017)
- 2013–2017 CHI Works-in-Progress / Late-Breaking Work
- 2016–2017 InfoVis
- 2016 MobileHCI
- 2016 BELIV
- 2016 HealthWear
- 2014–2016 UbiComp
- 2015–2016 UIST 🌸 (2015) 🌸 (2016)
- 2014 Pervasive Health
- 2010 GI
- As a reviewer (for journals)
- 2017 ACM IMWUT
- 2017 Risk Analysis
- 2017 IEEE Transactions on Visualization and Computer Graphics
- 2016 Human-Computer Interaction
- 2016 Human Factors
- 2015 IEEE Pervasive Computing

Press

- 2015 **For “Unequal representation and gender stereotypes ...” [C08]**
The New York Times, Claire Cain Miller, When algorithms discriminate, Jul 9 2015, <http://nyti.ms/1JX8Wwv>
- CBC Radio Spark*, Nora Young, Women at work in image search, May 3 2015, <http://www.cbc.ca/1.3057841>
- Fast Company*, Lydia Dishman, The hidden gender bias in Google image search, Apr 22 2015, <http://www.fastcompany.com/3045295/strong-female-lead/the-hidden-gender-bias-in-google-image-search>
- BBC Newsbeat*, Amelia Butterly, Google image search for CEO has Barbie as first female result, Apr 16 2015, <http://www.bbc.co.uk/newsbeat/article/32332603/google-image-search-for-ceo-has-barbie-as-first-female-result>
- @*ChelseaClinton*, What happens when you Google image search “CEO”? 10 rows down you find the first female face—Barbie, Apr 15 2015, <https://twitter.com/ChelseaClinton/status/588394572545466369>
- Pacific Standard*, Nathan Collins, Image searches misrepresent women in the workplace, Apr 13 2015, <http://www.psmag.com/nature-and-technology/image-searches-misrepresent-women-in-the-workplace>
- The Cut*, Molly Oswaks, This is the first female face Google finds when you search ‘CEO’, Apr 13 2015, <http://thecut.io/1yoCPE6>
- The Washington Post*, Jennifer Langston, The uncomfortable truth about how we view working women in one simple Google search, Apr 9 2015, <http://wapo.st/1EzDMKP>
- The Atlantic*, Adrienne LaFrance, Be careful what you Google, Apr 10 2015, <http://www.theatlantic.com/technology/archive/2015/04/be-careful-what-you-google/390207/>
- The Verge*, T.C. Sottek, Google search thinks the most important female CEO is Barbie, Apr 9 2015, <http://www.theverge.com/tldr/2015/4/9/8378745/i-see-white-people>
- PCWorld*, Zach Miners, The first woman CEO to appear in a Google images search is ... CEO Barbie, Apr 9 2015, <http://www.pcworld.com/article/2908592/the-first-woman-ceo-to-appear-in-a-google-images-search-is-ceo-barbie.html>
- GeekWire*, Molly Brown, Study puts Google image search results to the gender bias test, Apr 9 2015, <http://www.geekwire.com/2015/study-puts-google-image-search-results-to-the-gender-bias-test/>
- 2012 **For “Lullaby: A capture & access system ...” [C04]**
97.3 *KIRO FM News*, The Lullaby could help you get a better night’s sleep some day, Sept 11 2012, <http://mynorthwest.com/?nid=577&a=9946148&p=1011>
- Mashable*, Device uncovers the secret things you do in your sleep, Sept 10 2012, <http://mashable.com/2012/09/10/lullaby-sleep-lab/>
- NBCNews.com*, Francie Diep, Lullaby puts a sleep lab in your bedroom, Sept 7 2012, http://www.nbcnews.com/id/48947316/ns/technology_and-science-innovation/t/lullaby-puts-sleep-lab-your-bedroom

Teaching experience

— at the University of Michigan

FALL 2017 **SI 649 / EECS 548: Information Visualization**
Students: ~60

WINTER 2017 **SI 330: Data Manipulation**
Students: ~50

FALL 2016 **SI 649 / EECS 548: Information Visualization**
Co-taught with Eytan Adar. Students: ~60

— Curriculum development at University of Washington CSE

2014 **CSE 440: Introduction to HCI**
Assisted James Fogarty in redesigning the fourth year Human-Computer Interaction curriculum for the Fall 2014 and Winter 2015 offerings

— as a Teaching Assistant at University of Washington CSE

WINTER 2015 **CSE 440: Introduction to HCI**
Professor: Maya Cakmak. Students: 50
Led weekly group critiques, marked assignments

WINTER 2011 **CSE 510: Human-Computer Interaction**
Professor: James Fogarty. Students: 16
Marked labs and reading reports

FALL 2010 **CSE 321: Software Design and Implementation**
Professor: David Notkin. Students: 42
Tutored students one-on-one, marked, ran labs/recitations

— as a Teaching Assistant at University of Waterloo CS

WINTER 2010 **CS 349: User Interfaces**
Professor: Michael Terry. Students: 128
Tutored students one-on-one, marked, covered some lectures

FALL 2009 **CS 489: Human-Computer Interaction**
Professor: Michael Terry. Students: 31
Provided feedback at group critiques, marked, covered some lectures

SPRING 2009 **CS 349: User Interfaces**
Professor: Byron Becker. Students: 50
Tutored students one-on-one, marked

WINTER 2009 **CS 489: Human-Computer Interaction**
Professor: Edward Lank. Students: 13
Provided feedback at group critiques, marked, covered some lectures

FALL 2008 **CS 489: Human-Computer Interaction**
Professor: Michael Terry. Students: 23
Provided feedback at group critiques, marked, covered some lectures

Research assistantships & internships

- 2014–2016 **Research Assistant, Intel Science & Technology Center for Pervasive Computing at UW**
Supervisor: Julie Kientz
Exploring pervasive technology for health and behaviour change
- FALL 2013 **Research Intern, Microsoft Research Cambridge**
Supervisors: Kenton O'Hara, James Scott
Designed and prototyped novel hardware for smartphone interaction
- SUMMER 2012 **Research Intern, Microsoft Research Redmond**
Supervisors: Dan Morris, m.c. schraefel
Studied of user perceptions of consumer health sensing data with a focus on weight
- WINTER 2011 **Research Assistant, Intel Labs Seattle**
Supervisors: Ben Greenstein, Sunny Consolvo
Built and evaluated Lullaby, a system for tracking environmental factors that disturb sleep
- 2008–2010 **Graduate Research Assistant, University of Waterloo**
Supervisor: Michael Terry
Designed and evaluated user interfaces for software agreements
- 2007–2008 **Undergraduate Research Assistant, University of Waterloo**
Supervisor: Michael Terry
Developed and user-tested narrative pictograms for informed consent