

# MATTHEW BREHMER, PHD

CURRICULUM VITAE, NOV. 2018

## CONTACT

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## MAILING ADDRESS

Microsoft Building #99  
Office #3442  
14820 NE 36th Street  
Redmond, WA USA 98052

I am an expert in information visualization, which brings together data analysis, software development, user experience research, and design. I am currently a postdoctoral researcher at Microsoft Research, where I am a member of the EPIC (Extended Perception, Interaction & Cognition) and Human Computer Interaction groups, focusing on tools for expressive information design and visualization for mobile devices.

## EXPERTISE

### VISUALIZATION AND INTERFACE DESIGN

I design, develop, and deploy visualization tools and techniques for presenting and analyzing data, typically using technologies such as D3.js or R/Shiny.

EXAMPLES PROJECTS: Timeline Storyteller, Portfolio Sandbox, SoundConsensus, ShinyFork

RELATED PUBLICATIONS: J8, J6, J5, T3

### QUANTITATIVE HUMAN FACTORS RESEARCH

I design and conduct experiments as a way to understand human capabilities with respect to perception, attention, and interaction; the findings of these experiments often lead to actionable implications for interface and visualization design.

RELATED PUBLICATIONS: J8, C6, C4, T2, C3, T1

### QUALITATIVE HUMAN FACTORS RESEARCH

I evaluate existing data analysis and communication processes, work-in-progress designs, and deployed visualization tools by way of work domain analyses, interviews, chauffeured walkthroughs, and field studies.

RELATED PUBLICATIONS: J5, J2, W3, W2, TR1, T2

## APPLICATION DOMAINS

### DATA JOURNALISM AND STORYTELLING

Journalists, educators, and storytellers require expressive tools for presenting information to their audience. I have designed, developed, and promoted the use of such tools in the journalism community while considering methodologies for their evaluation.

RELATED PUBLICATIONS: J7, J6, C5, J4, W5, BC1

My PhD research included case studies of journalists who used the *Overview Project* to investigate large text document collections. Our findings provided transferable lessons for visualizing document collections and hierarchical data.

RELATED PUBLICATION: J2

### RESOURCE MANAGEMENT AND CONSERVATION

My PhD research included the design of visualization prototypes for analyzing and monitoring energy usage in portfolios of buildings. I consulted with prospective stakeholders and users, envisioning and implementing designs for interactively locating patterns and anomalies.

RELATED PUBLICATION: J5

## APPLICATION DOMAINS (CONT.)

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### PERSONAL HEALTH AND WELLNESS

My MSc pertained to the design and evaluation of C-TOC, a computerized cognitive assessment tool intended for early detection of dementia. I studied the use of C-TOC prototypes by healthy older adults and by adults with diagnosed mild cognitive impairments.

RELATED PUBLICATIONS: C4, J3, T2, W1

Prior to my MSc, I worked in the area of exercise video games: I studied the role of physical exertion on cognitive task performance. I also developed GAIM, an XNA/C# toolkit which allows players with different input devices to play active games together.

RELATED PUBLICATIONS: C2, C1, T1

### EDUCATION

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#### DOCTOR OF PHILOSOPHY, COMPUTER SCIENCE

2011 - 2016

University of British Columbia (UBC), Vancouver, Canada

THESIS: [Why Visualization? Task Abstraction for Analysis and Design](#)

SUPERVISORY COMMITTEE: Tamara Munzner (UBC Computer Science), Joanna McGrenere (UBC Computer Science), Ronald A. Rensink (UBC Psychology)

EXAMINING COMMITTEE: Jason Dykes (City University London), Alfred Hermida (UBC Journalism), Giuseppe Carenini (UBC Computer Science)

RELATED PUBLICATIONS: T3, J1, J2, J5, TR1, W2

#### MASTER OF SCIENCE, COMPUTER SCIENCE

2009 - 2011

Specialization in Human-Computer Interaction

University of British Columbia (UBC), Vancouver, Canada

THESIS: [Usability and the Effects of Interruption in C-TOC: Self-Administered Cognitive Testing on a Computer](#)

SUPERVISED BY: Joanna McGrenere (UBC Computer Science), Claudia Jacova (UBC Medicine)

THESIS READER: Peter Graf (UBC Psychology)

RELATED PUBLICATIONS: C4, J3, W1, T2

#### BACHELOR OF COMPUTING

2004 - 2009

Specialization in Cognitive Science with Professional Internship

Queen's University, Kingston, Canada

THESIS: [Assessing the Effect of Exercise Intensity on Cognitive Task Performance in an Exercise Video Game](#)

THESIS ADVISER: T.C. Nicholas Graham (Queen's School of Computing)

RELATED PUBLICATION: T1

### EMPLOYMENT HISTORY

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#### Postdoctoral Researcher

2016 - PRESENT

Microsoft Research  
Redmond, USA

#### Graduate Research Assistant

2009 - 2016

University of British Columbia Department of Computer Science  
Vancouver, Canada


## EMPLOYMENT HISTORY (CONT.)


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<b>Graduate Research Intern</b> Microsoft Research Redmond, USA	2015
<b>Mitacs Graduate Research Intern</b> Pulse Energy (now a division of EnerNOC) Vancouver, Canada	2013 - 2014
<b>Graduate Teaching Assistant</b> University of British Columbia Department of Computer Science Vancouver, Canada	2009 - 2011
<b>Research Assistant</b> Queen's University School of Computing Kingston, Canada	2009
<b>User Interface Design Intern</b> EMC Corporation (now Dell EMC) Toronto, Canada	2007 - 2008
<b>Information Technology Staff and Web Developer</b> Killam Properties, Inc. Halifax, Canada	2006

## TALKS







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Slides from these talks are available at [mattbrehmer.github.io/#talks](https://mattbrehmer.github.io/#talks).  
Talks with video recordings are indicated with the  icon.

<b>Visualizing Ranges over Time on Mobile Phones</b> IEEE VIS 2018, InfoVis Track (Berlin, Germany)  RELATED PUBLICATION: J8	2018 / 10 / 24
<b>Tools for Expressive Information Visualization Design</b> Microsoft Vancouver Data Visualization Symposium (Vancouver, Canada)	2018 / 08 / 01
<b>Timeline Storyteller, from Visualization Design Space to Deployment</b> The University of Calgary Data Empowerment Speaker Series (Calgary, Canada)	2018 / 06 / 18
<b>Data-Driven Storytelling at Microsoft</b> UBC School of Journalism Course on Special Topics in Contemporary Journalism: Data Viz (JRNL 520H) (Vancouver, Canada)	2017 / 10 / 24
<b>Timelines Revisited: A Design Space and Considerations for Expressive Storytelling</b> IEEE VIS 2017, TVCG Track (Phoenix, USA) RELATED PUBLICATION: J6	2017 / 10 / 03
<b>Expressive Storytelling With Timelines</b> Uber Visualization Night: A Journey Through Space and Time (Seattle, USA)	2017 / 08 / 31
<b>Timelines Revisited: Considerations for Expressive Storytelling</b> King's College London Department of Informatics (London, UK)	2017 / 07 / 11

## TALKS (CONT.)

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<a href="#">Timelines Revisited: Considerations for Expressive Storytelling</a> City University London giCentre (London, UK)	2017 / 07 / 10
<a href="#">The Timeline Storyteller Custom Visual for Power BI</a> Microsoft Data Insights Summit BI Power Hour (Seattle, USA) 	2017 / 06 / 13
<a href="#">Timelines Revisited: Considerations for Expressive Storytelling</a> Northeastern University NUVis Visualization Consortium (Boston, USA)	2017 / 04 / 28
<a href="#">Timelines Revisited: Considerations for Expressive Storytelling</a> Bentley University RealViz talk series (Waltham, USA) 	2017 / 04 / 27
<a href="#">What Story Does Your Timeline Tell?</a> OpenVisConf 2017 (Boston, USA) 	2017 / 04 / 24
<a href="#">Timelines Revisited: Considerations for Expressive Storytelling</a> Radcliffe Institute at Harvard University (Cambridge, USA)	2016 / 12 / 08
<a href="#">Why Visualization? Task Abstraction for Analysis and Design</a> Dissertation Defence (Vancouver, Canada) RELATED PUBLICATION: T3	2016 / 03 / 23
<a href="#">Storytelling with Timeline Data</a> Data-Driven Storytelling Dagstuhl Seminar (Wadern, Germany)	2016 / 02 / 11
<a href="#">Why Visualization? Task Abstraction for Analysis and Design</a> Microsoft Research (Redmond, USA) 	2016 / 02 / 01
<a href="#">Matches, Mismatches, and Methods: Multiple-View Workflows for Energy Portfolio Analysis</a> IEEE VIS 2015, InfoVis Track (Chicago, USA) 	2015 / 10 / 28
<a href="#">Multiple-View Workflows for Energy Portfolio Analysis</a> University of Washington (Seattle, USA)	2015 / 09 / 04
<a href="#">The Future of Data and Design ... In Visualization Research</a> Vancouver Data Visualization Meetup (Vancouver, Canada)	2015 / 05 / 19
<a href="#">Overview: The Design, Adoption, and Analysis of a Visual Document Mining Tool For Investigative Journalists</a> IEEE VIS 2014, InfoVis Track (Paris, France) 	2014 / 11 / 14
<a href="#">Visualizing Dimensionally-Reduced Data: Interviews with Analysts and a Characterization of Task Sequences</a> ACM BELIV 2014 (Paris, France) RELATED PUBLICATION: W3	2014 / 11 / 10
<a href="#">Pre-Design Empiricism for Information Visualization</a> ACM BELIV 2014 (Paris, France) RELATED PUBLICATION: W2	2014 / 11 / 10

## TALKS (CONT.)

- Visualization Task Abstraction from Multiple Perspectives** 2014 / 11 / 08  
IEEE VIS Doctoral Colloquium 2014 (Paris, France)
- A Multi-Level Typology of Abstract Visualization Tasks** 2013 / 10 / 15  
IEEE VIS 2013, InfoVis Track (Atlanta, USA)  
RELATED PUBLICATION: J1
- Investigating Interruptions in the Context of  
Computerized Cognitive Testing for Older Adults** 2012 / 05 / 10  
ACM CHI 2012 (Austin, USA)  
RELATED PUBLICATION: C4
- The Impact of Interruptions on Task Performance in Older Adults** 2011 / 05 / 14  
GRAND NCE AGM 2011 (Vancouver, Canada)  
RELATED PUBLICATION: W1

## PUBLICATIONS

Author copies of these publications are available at [mattbrehmer.github.io/#pubs](https://mattbrehmer.github.io/#pubs)

PUBLICATION TYPES: J = journal article, C = conference proceedings, W = workshop paper, BC = book chapter, TR = technical report, T = thesis, P = poster. METRICS: (journals, conferences): AR = acceptance rate, H5 = H5 index. My current H index is 10 (GOOGLE SCHOLAR, NOV. 2018).

### PEER-REVIEWED JOURNAL AND CONFERENCE PAPERS

- Visualizing Ranges over Time on Mobile Phones:  
A Task-Based Crowdsourced Evaluation** J8  
Matthew Brehmer, Bongshin Lee, Petra Isenberg, and Eun Kyoung Choe.  
In Volume 25, Issue 1 (Jan. 2019) of *IEEE Transactions on Visualization and Computer Graphics* [H5: 63] (Presented at IEEE VIS 2018, InfoVis Track) [AR: 25%].
- Charticulator: Interactive Construction of Bespoke Chart Layouts** J7  
Donghao Ren, Bongshin Lee, and Matthew Brehmer.  
In Volume 25, Issue 1 (Jan. 2019) of *IEEE Transactions on Visualization and Computer Graphics* [H5: 63] (Appeared at IEEE VIS 2018, InfoVis Track) [AR: 25%].  
🏆 BEST PAPER HONORABLE MENTION AWARD
- What's the Difference?: Evaluating Variants of Multi-Series Bar Charts  
for Visual Comparison Tasks** C6  
Arjun Srinivasan, Matthew Brehmer, Bongshin Lee, and Steven Drucker.  
In *Proceedings of the 2018 ACM Conference on Human Factors in Computing Systems (CHI)* [H5: 86] [AR: 26%].
- Timelines Revisited:  
A Design Space and Considerations for Expressive Storytelling** J6  
Matthew Brehmer, Bongshin Lee, Benjamin Bach, Nathalie Henry Riche, and Tamara Munzner.  
In Volume 23, Issue 9 (Sept. 2017) of *IEEE Transactions on Visualization and Computer Graphics* [H5: 63] (Presented at IEEE VIS 2017, TVCG Track).
- ChartAccent: Annotation for Data-Driven Storytelling** C5  
Donghao Ren, Matthew Brehmer, Bongshin Lee, Tobias Höllerer, and Eun Kyoung Choe.  
In *Proceedings of the 2017 IEEE PacificVis Symposium* [H5: 21].

- Matches, Mismatches, and Methods:** J5  
**Multiple-View Workflows for Energy Portfolio Analysis**  
Matthew Brehmer, Jocelyn Ng, Kevin Tate, and Tamara Munzner.  
In Volume 22, Issue 1 (Jan. 2016) of *IEEE Transactions on Visualization and Computer Graphics* [H5: 63] (Presented at IEEE VIS 2015, InfoVis Track) [AR: 21%].
- TimeLineCurator:** J4  
**Interactive Authoring of Visual Timelines from Unstructured Text**  
Johanna Fulda, Matthew Brehmer, and Tamara Munzner.  
In Volume 22, Issue 1 (Jan. 2016) of *IEEE Transactions on Visualization and Computer Graphics* [H5: 63] (Appeared at IEEE VIS 2015, VAST Track).
- C-TOC (Cognitive Testing on Computer):** J3  
**Investigating the Usability and Validity of a Novel Self-administered Cognitive Assessment Tool in Aging and Early Dementia**  
Claudia Jacova, Joanna McGrenere, Hyunsoo S. Lee, William Wang, Sarah Le Huray, Emily F. Corenblith, Matthew Brehmer, Charlotte Tang, Sherri Hayden, B. Lynn Beattie, and Ging-Yuek R. Hsiung.  
In *Alzheimer Disease and Associated Disorders* (July 2015).
- Overview: The Design, Adoption, and Analysis of a Visual Document Mining Tool For Investigative Journalists** J2  
Matthew Brehmer, Stephen Ingram, Jonathan Stray, and Tamara Munzner.  
In Volume 20, Issue 12 (Dec. 2014) of *IEEE Transactions on Visualization and Computer Graphics* [H5: 63] (Presented at IEEE VIS 2014, InfoVis Track) [AR: 23%].
- A Multi-Level Typology of Abstract Visualization Tasks** J1  
Matthew Brehmer and Tamara Munzner.  
In Volume 19, Issue 12 (Dec. 2013) of *IEEE Transactions on Visualization and Computer Graphics* [H5: 63] (Presented at IEEE VIS 2013, InfoVis Track) [AR: 25%]  
[NOTE: THE MOST CITED INFOVIS PAPER SINCE 2013 (>270 CITATIONS) - G. SCHOLAR, NOV. 2018].
- Investigating Interruptions in the Context of Computerized Cognitive Testing for Older Adults** C4  
Matthew Brehmer, Joanna McGrenere, Charlotte Tang, and Claudia Jacova.  
In *Proceedings of the 2012 ACM Conference on Human Factors in Computing Systems (CHI)* [H5: 86] [AR: 23%].
- The Haptic Crayola Effect:** C3  
**Exploring the Role of Naming in Learning Haptic Stimuli**  
Inwook Hwang, Karon MacLean, Matthew Brehmer, Jeff Hendy, Andreas Sotirkopoulos, and Seungmoon Choi.  
In *Proceedings of the 2011 IEEE World Haptics Conference*.
- Activate Your GAIM: A Toolkit for Input in Active Games** C2  
Matthew Brehmer, Nicholas Graham, and Tadeusz Stach.  
In *Proceedings of the 2010 ACM Future Play Conference*.
- Classifying Input for Active Games** C1  
Tadeusz Stach, Nicholas Graham, Matthew Brehmer and Andreas Hollatz.  
In *Proceedings of the 2009 ACM Conference on Advances in Computer Entertainment Technology (ACE)*.

## PEER-REVIEWED WORKSHOP PAPERS

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**Reflecting on the Evaluation of Visualization Authoring Systems** W5  
Donghao Ren, Bongshin Lee, Matthew Brehmer, and Nathalie Henry Riche.  
*In the Proceedings of the 2018 BELIV Workshop: Evaluation and Beyond - Methodological Approaches for Visualization.*

**Data Visualization on Mobile Devices** W4  
Bongshin Lee, Matthew Brehmer, Eun Kyoung Choe, Petra Isenberg, Ricardo Langer, and Raimund Dachsel.  
*In Extended Abstract Proceedings of the 2018 ACM Conference on Human Factors in Computing Systems (CHI).*

**Visualizing Dimensionally-Reduced Data:  
Interviews with Analysts and a Characterization of Task Sequences** W3  
Matthew Brehmer, Michael Sedlmair, Stephen Ingram, and Tamara Munzner.  
*In Proceedings of the 2014 ACM BELIV Workshop: Beyond Time and Errors - Novel Evaluation Methods for Visualization.*

**Pre-Design Empiricism for Information Visualization:  
Scenarios, Methods, and Challenges** W2  
Matthew Brehmer, Sheelagh Carpendale, Bongshin Lee, and Melanie Tory.  
*In Proceedings of the 2014 ACM BELIV Workshop: Beyond Time and Errors - Novel Evaluation Methods for Visualization.*

**A Tale of Two Studies: Investigating the Impact of Interruptions on Task  
Performance in Older Adults** W1  
Matthew Brehmer, Charlotte Tang, Joanna McGrenere, and Claudia Jacova.  
*In the Work-In-Progress Proceedings of the the 2011 GRAND NCE AGM.*

## OTHER PUBLICATIONS: BOOK CHAPTERS, TECHNICAL REPORTS, POSTERS, THESES

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**Evaluating Data-Driven Stories & Storytelling Tools** BC1  
Fereshteh Amini\*, Matthew Brehmer\*, Gordon Bolduan, Christina Elmer, and Benjamin Wiederkehr ( \* contributed equally ).  
*In Data-Driven Storytelling*, edited by Sheelagh Carpendale, Nicholas Diakopoulos, Christophe Hurter, Nathalie Henry Riche (CRC Press, 2018).

**Demonstrating the Value of Visualization:  
Highlights from the 2017 PacificVis Visual Data Storytelling Contest** P1  
Matthew Brehmer, Kyungwon Lee, Ivan Viola, Jinwook Seo, and Bongshin Lee.  
*In Poster Proceedings of the 2017 IEEE VIS Conference.*

**Why Visualization? Task Abstraction for Analysis and Design** T3  
Matthew Brehmer.  
University of British Columbia PhD Dissertation (April, 2016).

**Dimensionality Reduction in the Wild: Gaps and Guidance** TR1  
Michael Sedlmair, Matthew Brehmer, Stephen Ingram, and Tamara Munzner.  
University of British Columbia Technical Report TR-2012-03 (2012).

**Usability and the Effects of Interruption in C-TOC:  
Self-Administered Cognitive Testing on a Computer** T2  
Matthew Brehmer.  
University of British Columbia MSc Thesis (2011).

**Assessing the Effect of Exercise Intensity on Cognitive Task  
Performance in an Exercise Video Game** T1  
Matthew Brehmer.  
Queen's University B.Comp Thesis (2009).

## ACADEMIC COMMUNITY SERVICE

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ORGANIZING COMMITTEE: IEEE VIS 2018 (Co-Chair: VisInPractice), the Data Visualization on Mobile Devices Workshop at CHI 2018, IEEE PacificVis 2017-2018 (Co-Chair, Visual Data Storytelling Contest)

PROGRAM COMMITTEE: IEEE InfoVis (2017, 2018), EuroVis State of the Art Reports (2017), IEEE PacificVis (2017, 2018), FAT\*: Conf. on Fairness, Accountability, Transparency (2018), The Art of Networks III (2018), VIS Arts Program (2018), Information+ (2018), BELIV: Evaluation and Beyond - Methodological Approaches for Visualization (2018), Computation + Journalism (2019)

REVIEWER: IEEE InfoVis (2013 - 2016), IEEE VAST (2015), IEEE PacificVis (2017, 2019), IEEE TVCG (2015 - 2018), EuroVis (2014 - 2018), ACM CHI (2013 - 2019), ACM TOCHI (2013), Sage *Information Visualization* (2015 - 2016), ACM SIGGRAPH Asia (2012), GRAND NCE ACM (2012)

CONTRIBUTOR: The Harvard University / Sloan Foundation Timeline Consortium (2016 - present)

STUDENT VOLUNTEER: ACM CHI Conference (2011, 2013, 2015, 2016)

## UNIVERSITY SERVICE

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UNIVERSITY OF BRITISH COLUMBIA DEPARTMENT OF COMPUTER SCIENCE: Graduate Admissions and Recruitment Committee (2013-2015), Guest Lecturer (CPSC 547: Information Visualization, 2014-2017), Curriculum Development (CPSC 444: Advanced Human Computer Interaction Methods, 2010-2011), Teaching Assistant (CPSC 444: Advanced Human Computer Interaction Methods, 2010; CPSC 344: Introduction to Human Computer Interaction Methods, 2009)

UNIVERSITY OF BRITISH COLUMBIA COMPUTER SCIENCE GRADUATE STUDENTS' ASSOCIATION: Vice President (Social Affairs) (2010-2011), Graduate Student Orientation Committee (2012), Organizer of the Un-Distinguished Lecture Series (2010-2011, 2012-2013)

QUEEN'S UNIV. COMPUTING STUDENTS' ASSOC.: Orientation Leader (2005), First Year Rep. (2004-2005)

## AWARDS

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IEEE VIS: Best InfoVis Paper Honorable Mention (2018) for J7 (Charticulator)

UNIVERSITY OF BRITISH COLUMBIA: Student Service Award (2016), Volunteering Award (2015), Mitacs-Accelerate Research Internship Program Award (2013-2014), Natural Sciences & Engineering Research Council of Canada (NSERC) Postgraduate Scholarship (2011-2014), Four Year Doctoral Fellowship (2011-2015), Dept. of Computer Science Merit Scholarship (2009-2011)

QUEEN'S UNIVERSITY: Dean's Entrance Scholarship in Computing (2004-2005)

## REFERENCES

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Dr. Tamara Munzner, PROFESSOR, COMPUTER SCIENCE, UBC - [tmm@cs.ubc.ca](mailto:tmm@cs.ubc.ca) - 604-827-5200

Dr. Ken Hinckley, PRINCIPAL RESEARCHER, MICROSOFT - [kenh@microsoft.com](mailto:kenh@microsoft.com) - 425-703-9065

Dr. Bongshin Lee, SENIOR RESEARCHER, MICROSOFT - [bongshin@microsoft.com](mailto:bongshin@microsoft.com) - 425-704-0779