Danielle Albers Szafir

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Research Statement

My research bridges data visualization and perception to drive the design of novel systems for analyzing large and complex datasets. I focus on expanding our knowledge of perception in order to evaluate how visualization design impacts users' abilities to accomplish their analytical goals. Through this process, I derive quantified insight into the role of perception in interpreting visualizations by gauging how real viewers in natural environments perceive encoded information. I use this knowledge to design systems and techniques that overcome scalability and interpretability limitations in existing designs. The resulting visualizations address research problems across a variety of domains, including genomics, proteomics, biochemistry, and the humanities.

Professional Experience

2015–Present **Founding Assistant Professor**
Department of Information Science, University of Colorado Boulder
Affliate Appointments: Department of Computer Science, Institute of Cognitive Science

2010–2015 **Research Assistant**
Department of Computer Sciences, University of Wisconsin-Madison

2013 **Research Intern**
Tableau Software, Menlo Park, CA

2012 **Software Development Intern**
Google, Madison, WI

2009 **Software Development Intern**
Boston Scientific, CRM, Redmond, WA

2008–2009 **Software Development Intern**
Apptio, Bellevue, WA

Education

2009–2015 **Ph.D. in Computer Sciences**
University of Wisconsin-Madison
Dissertation: "Utilizing Color for Perceptually-Driven Data Visualization."
Thesis Committee: Michael Gleicher, Steven Franconeri, Bilge Mutlu, Robert Roth, & Kevin Ponto.
Minor studies in perceptual psychology and art history.

2009–2011 **Master of Science in Computer Sciences**
University of Wisconsin-Madison

2007–2009 **Bachelor of Science in Computer Science**
University of Washington
NASA Space Grant Scholar, four-time Dean's List Member, graduated at age 20.
Minor in mathematics.

Honors & Awards

2014 **MERL Best Student Paper Award**
IS&T 22nd Color and Imaging Conference for "Adapting Color Difference for Design"

2014 **Invited Participant**
Genres of Scholarly Knowledge Production 2014

2014 **Honorable Mention for Best Presentation**
McPherson Eye Research Institute Symposium

2014 **Andrew W. Mellon Workshop Grant**
Digital Humanities Research Network

2013 **Best SciVis Poster Award**
IEEE VIS for "Lightness Constancy in Surface Visualization"

2013 **Invited Participant**
IEEE VIS Doctoral Colloquium

2010–2012 **Research Fellow**
BACTER Institute, University of Wisconsin-Madison

2007–2009 **NASA Space Grant Scholar**
NASA Space Grant, University of Washington Chapter

2007–2009 **Dean's List Member**
University of Washington

Publications

Journal Publications[1]

A. Sarikaya, M. Gleicher, and **D. Albers Szafir**."The Design of Visual Summaries." *IEEE Transactions of Visualization and Computer Graphics*, 2016. (under review)

M. Correll, **D. Albers Szafir**, S. Franconeri, and M. Gleicher. "Design Considerations for Visual Aggregation in Time Series Data." *ACM Transactions on Applied Perception*, 2016 (under review).

D. Albers Szafir, D. Stuffer, Y. Sohail, and M. Gleicher. "TextDNA: Visualizing Word Usage Patterns with Configurable Colorfields." *Computer Graphics Forum*, 2016. In the Proceedings of the Eurographics Conference on Visualization (Acceptance Rate: 26%)

D. Albers Szafir, S. Haroz, M. Gleicher, and S. Franconeri. "Four Types of Ensemble Coding for Data Visualizations." *Journal of Vision*, 16(11), 2016. (Impact Factor: 2.34)

D. Albers Szafir, A. Sarikaya, and M. Gleicher. "Lightness Constancy in Surface Visualization." *IEEE Transactions on Visualization and Computer Graphics*, 22(9), 2016.

A. Sarikaya, **D. Albers**, J. Mitchell, and M. Gleicher. "Visualizing Validation of Protein Surface Classifiers." *Computer Graphics Forum*, 33(3), 2014. In the Proceedings of the Eurographics Conference on Visualization. (Acceptance Rate: 25%)

D. Albers, C. Dewey, and M. Gleicher. "Sequence Surveyor: Leveraging Overview for Scalable Genomic Alignment Visualization." *IEEE Transactions of Visualization and Computer Graphics*, 17(5), 2011. In the Proceedings of the IEEE Information Visualization Conference. (Acceptance Rate: 25%)

Note that IEEE Information Visualization conference proceedings are published as an issue of IEEE Transactions on Visualization and Computer Graphics, and EuroVis conference proceedings are published as an issue of Computer Graphics Forum.

M. Gleicher, **D. Albers**, R. Walker, I. Jusufi, C. Hansen, and J. Roberts. "Visual Comparison for Information Visualization." *Information Visualization*, 10(4), 2011. (Impact Factor: 0.89)

Refereed Conference Publications[2]

C. Diaz, **D. Albers Szafir**, and D. Szafir. "Designing for Depth Perceptions in Augmented Reality." *Proceedings of the 2017 Annual Conference on Human Factors in Computing Systems (CHI)*, 2017. (under review)

D. Albers Szafir, M. Stone, and M. Gleicher. "Adapting Color Difference for Design." *IS&T 22nd Color and Imaging Conference*, 2014. **[Best Paper Award]**

M. Stone, **D. Albers Szafir**, and V. Setlur. "An Engineering Model for Color Discriminability as a Function of Size." *IS&T 22nd Color and Imaging Conference*, 2014.

D. Albers, M. Correll, and M. Gleicher. "Task-Driven Evaluation of Aggregation in Time Series Visualization." *Proceedings of the 2014 Annual Conference on Human Factors in Computing Systems (CHI)*, 2014. (Acceptance Rate: 23%)

M. Correll, **D. Albers**, S. Franconeri, and M. Gleicher. "Comparing Averages in Time Series Data." *Proceedings of the 2012 Annual Conference on Human Factors in Computing Systems (CHI)*, 2012. (Acceptance Rate: 23%)

Refereed Abstracts

D. Albers Szafir and M. Gleicher. "Visualization-Aware Color Design." *EuroVis*, 2016.

D. Albers, M. Correll, M. Gleicher, and S. Franconeri. "Ensemble Processing of Color and Shape: Beyond Mean Judgments." *Journal of Vision*, 14(9), 2014.

D. Albers, A. Sarikaya, and M. Gleicher. "Lightness Constancy in Surface Visualization." *Poster Abstracts of IEEE VIS*, 2013. **[Best Poster Award]**

A. Sarikaya, **D. Albers**, and M. Gleicher. "Understanding Performance of Protein Structural Classifiers." *Poster Abstracts of IEEE VIS*, 2013.

D. Albers, C. Dewey, and M. Gleicher. "Sequence Surveyor: Leveraging Overview for Large-Scale Genomic Alignment Visualization." *Proceedings of VizBi 2011: Visualizing Biological Data*, 2011.

D. Albers and M. Gleicher. "Poster: Perceptual Principles for Scalable Sequence Alignment Visualization." *2010 IEEE Information Visualization Poster Proceedings*, 2010.

D. Albers and M. Gleicher. "Perceptual Principles for Scalable Sequence Alignment Visualization." *Proceedings of the 7th Symposium on Applied Perception in Graphics and Visualization*, 2010.

Workshops & Colloquia

D. Albers Szafir & D. Szafir. "Cognitive Load in Visualization: Myths and Misconceptions." *Creation, Curation, Critique and Conditioning of Principles and Guidelines in Visualization (C4PGV).* 2016.

D. Albers Szafir. "Considering Connectivity for Visualization Design." *Human-Computer Interaction Consortium (HCIC).* 2016.

D. Albers Szafir. "Using Graphical Perception to Drive Visualization Design." *Visualization Summer Camp.* 2016.

Note that conferences are a primary publication venue in Computer & Information Sciences.

E. Alexander and **D. Albers Szafir**. "D3.js: Javascript for Data Visualization." *Second Annual Digital Humanities+Art Symposium: Going Public.* 2015.

M. Correll, E. Alexander, **D. Albers Szafir**, A. Sarikaya, and M. Gleicher. "Navigating Reductionism and Holism in Evaluation." *BELIV '14: Beyond Time and Errors—Novel Evaluation Methods for Visualization*, 2014.

D. Albers Szafir. "Thinking with Data." *Digital Humanities Research Network*, 2014.

D. Albers. "Perceptually Informed Scalable Sequence Comparison." *IEEE VIS Doctoral Colloquium*, 2013.

D. Albers and Michael Gleicher. "Seeing Double: Crowdsourced Models of Color Discrimination." *Midgraph: Midwest Graphics Workshop*, 2012.

Theses & Dissertations

D. Albers Szafir. "Utilizing Color for Perceptually-Driven Data Visualization." *University of Wisconsin-Madison*, 2015.

Invited Talks

"Enabling a Dialogue between People & Data: Lessons in Designing for Big Data." Big Data Bootcamp, Denver, Colorado, 2016.

"Perceptually-Driven Visualization of Complex Data." Rochester Institute of Technology, Rochester, New York, 2015.

"Perceptually-Driven Visualization of Complex Data." *Digital Arts Colloquium*, University of Iowa, Iowa City, Iowa, 2015.

"Perceptually-Driven Visualization of Complex Data." *Data @ ASU*, Arizona State University, Tempe, Arizona, 2015.

"Perceptually-Driven Visualization of Complex Data." *Information Science Seminar*, University of Colorado Boulder, Boulder, Colorado, 2015.

"Color & Size." *Developer's Seminar.* Tableau Software, Palo Alto, CA *(joint work w. Maureen Stone and Vidya Setlur)*.

"Informing Visualization in the Humanities through Perception and Genomics." *Genres of Scholarly Knowledge Production*, Umeå University, Umeå, Sweden, 2014.

Intramural Talks & Lectures

"Model-View-Controller." *Guest Lecture, ATLS 5419: Introduction to Virtual Reality*, University of Colorado Boulder, 2016.

"An Introduction to Data Visualization." *Science Learner's Lunch*, University of Colorado Boulder, 2015.

"Driving Scalable Visualization with Perception." *Guest Lecture, CSCI 4830: Big Data & HCI*, University of Colorado Boulder, 2015.

"Perceptually-Driven Information Visualization." *CU Libraries Research Seminar*, University of Colorado Boulder, 2015.

"The Graphics Pipeline." *Guest Lecture, ATLS 5419: Introduction to Virtual Reality*, University of Colorado Boulder, 2015.

"Introduction to Three.js." *Guest Lecture, ATLS 5419: Introduction to Virtual Reality*, University of Colorado Boulder, 2015.

"Perceptually-Driven Information Visualization." *Institute of Cognitive Science Seminar*, University of Colorado Boulder, 2015.

"Perceptually-Driven Information Visualization." *Human-Centered Computing Seminar*, University of Colorado Boulder, 2015.

"Interaction in Visualization." *Guest Lecture, CS 838: Visualization*, University of Wisconsin-Madison, Madison, Wisconsin, 2015.

"Insights at a Glance: Visualization at UW-Madison." *MERI at a Glance*, McPherson Eye Research Institute, Madison, Wisconsin, 2014.

"Color for Computer Graphics." *Guest Lecture, CS 559: Computer Graphics*, University of Wisconsin-Madison, Madison, Wisconsin, 2014.

"Image Compression." *Guest Lecture, CS 559: Computer Graphics*, University of Wisconsin-Madison, Madison, Wisconsin, 2014.

"Perceptually-Driven Sequence Visualization." *Guest Lecture, CS 838: Visualization*, University of Wisconsin-Madison, Madison, Wisconsin, 2012.

Funding

Grants

(Under Review) $174,925: NSF CRII. "Data-Driven Automation of Color Encodings for Data Visualization," 2016 (PI: D. Albers Szafir).

(Under Review) $66,115: Google. "Crafting Explanatory Narratives from Exploratory Visualizations," 2016 (PI: D. Albers Szafir).

$30,000: University of Colorado Boulder Innovative Seed Grant. "FieldView: Using Mobile Devices to Blend Data Collection and Analysis for Field Research," 2016 (PI: D. Albers Szafir).

$7,500: Andrew W. Mellon Workshop Grant. "Digital Humanities Research Network," 2014.

Fellowships

IEEE VIS Doctoral Colloquium, 2013.

BACTER Research Fellowship. Department of Energy's Institute for Bringing Computational Techniques to Energy Research (BACTER Institute) at the University of Wisconsin-Madison, 2010-2012.

NASA Space Grant Fellowship, 2007-2009.

Teaching

2016 **Co-Instructor**
INFO 1201: Computational Reasoning I, University of Colorado Boulder
Co-designed new course in introductory computer programming delivered to 135 undergraduates.

2009 **Teaching Assistant**
Human-Computer Interaction, University of Wisconsin-Madison

2009 **Laboratory Instructor**
Introduction to Programming, University of Wisconsin-Madison
Mean Instructor Rating: 4.58/5.00

2008–2009 **Mathematics and English Instructor**
Kumon of Redmond, Redmond, WA

Mentorship & Advising

Ph.D. Students

2016 **Matthew Whitlock**, University of Colorado Boulder

2016 **Michael Iuzzolino** (w. Daniel Szafir), University of Colorado Boulder

2016 **Dasha Pruss** (w. Michael Paul), University of Colorado Boulder

Ph.D. Thesis Committee Membership

2016 **Brett Roads**, Ph.D. Thesis, Advisor: Michael Mozer
The Design of Efficient Training and Decision-Support Systems for Visual Categorization
Department of Computer Science, University of Colorado Boulder

2015 **Khalid Alharbi**, Ph.D. Thesis, Advisor: Tom Yeh
A Deep and Longitudinal Approach to Mining Mobile Applications
Department of Computer Science, University of Colorado Boulder

Masters Students

2016 **Praveen Devaraj** (as Thesis Committee Chair), University of Colorado Boulder
Using Visualization to Enable Human-Machine Collaboration

2016 **Yogitha Madhasu**, University of Colorado Boulder
Visual Analytics for Inductive Scholarship

2016 **Pratima Sherkane**, University of Colorado Boulder
Predictive Decision-Making with Time Series Visualization

2016 **Shashidhar Prabhu**, University of Colorado Boulder
Visualizing Data in the Internet of Things

M.S. Thesis Committee Membership

2016 **Justin Chin**, M.S. Thesis, Advisor: Gregor Henze
Virtual Reality Visualizations for Building Energy Management
Department of Civil Engineering, University of Colorado Boulder

Undergraduate Students

2016 **Tetsumichi Umada**, University of Colorado Boulder
Using Visualization to Enable Human-Machine Collaboration

2016 **Ryan Mustari**, University of Colorado Boulder
Statistically Controlled Synthetic Data Generation

2016 **Alex Thompson**, University of Colorado Boulder
Visualizing Data in Augmented Reality

2016 **Connor Mcguinness**, University of Colorado Boulder (now at Uber)
Color Encodings for Ordinal Data

2015 **Yusef Suhail**, University of Wisconsin-Madison
Web-based N-Grams Visualization with TextDNA

2014 **Andrew Hermus**, University of Wisconsin-Madison
Scalable Visualization for Text Analytics (w. Eric Alexander)

2013 **Benjamin Reddersen**, University of Wisconsin-Madison
Rendering Techniques for Molecular Surface Visualization

Professional Activities & Service

Professional Outreach

2016 **Aspirations in Computing Colorado Affiliate Committee**
National Center for Women in Technology

2010–2015 **ACM-W Mentor**
Department of Computer Sciences, University of Wisconsin-Madison

2009 **Majors Fair Representative**
Department of Computer Sciences, University of Wisconsin-Madison

2009 **Department Guide**
Department of Computer Sciences, University of Washington

University Service

2016 **Co-Chair, Digital Humanities Certificate Committee**
University of Colorado Boulder

2016 **External Programs Coordinator**
Department of Information Science, University of Colorado Boulder

2016 **Faculty Search Committee**
Leeds School of Business, University of Colorado Boulder

2015 - 2016 **Graduate Program Committee**
Department of Information Science, University of Colorado Boulder

2015 - 2016 **Graduate Program Committee**
Department of Computer Science, University of Colorado Boulder

2015-2016 **Community and Diversity Committee**
College of Media, Communication, and Information, University of Colorado Boulder

2015-2016 **Research Data Advisory Committee**
University of Colorado Boulder

2015 **Curriculum Committee**
Department of Information Science, University of Colorado Boulder

2015 **Faculty Search Committee**
Department of Information Science, University of Colorado Boulder

2014–2015 **Digital Humanities Research Network Founding Member & Coordinator**
University of Wisconsin-Madison

2012–2015 **Visualization Reading Group Founder & Coordinator**
University of Wisconsin-Madison

2015 **Organizing Committee Member**
University of Wisconsin-Madison Digital Humanities+Art Symposium

Program Committees & Referee Service

2014–2016 **Program Committee Member**
BioVis: Symposium on Biological Data Visualization

2016 **Program Committee Member**
LDAV: IEEE Symposium on Large Data Analysis and Visualization

2016–2017 **Reviewer**
ACM Conference on Human Factors in Computing Systems (CHI)
Special Recognition: 2016

2013–2016 **Reviewer**
IEEE Information Visualization
Special Recognition: 2014, 2015

2016 **Reviewer**
LDAV: IEEE Symposium on Large Data Analysis and Visualization

2013–2016 **Reviewer**
BioVis: Symposium on Biological Data Visualization

2016 **Reviewer**
IEEE RO-MAN: IEEE Conference on Robot and Human Interactive Communication

2014, 2016 **Reviewer**
BMC Medical Informatics and Decision Making

2015–2016 **Reviewer**
IEEE Visual Analytics Science and Technology (VAST)

2016 **Reviewer**
Eurographics Conference on Visualization

2015 **Reviewer Ad Hoc**
National Science Foundation Information Integration and Informatics (III)

2015 **Reviewer**
Informatics

2015 **Reviewer**
Transactions on Cartography and Geographic Information Science

Professional & Academic Memberships

2010–Present ACM Member

2014–2015 IS&T Student Member

2012–2015 WHCI+D Member

2010–2015 IEEE Student Member

2008–Present Sigma Alpha Lambda Honor Society Member

2008–Present Phi Theta Kappa International Honor Society Member

Volunteer Positions

2009–2014 **Web Manager**
University of Wisconsin-Madison Women's Hockey Club

2011–2012 **Assistant Practice Coach**
Wisconsin Timberwolves Special Needs Hockey Team

2010 **GRE Tutor**
University of Wisconsin-Madison

2007–2008 **Ice Hockey Officiating Mentor**
Cascade Hockey Officiating Association

Professional References

Michael Gleicher, Professor
Department of Computer Sciences
University of Wisconsin-Madison
1210 W. Dayton Street
Madison, WI 53706
gleicher@cs.wisc.edu

Steven Franconeri, Associate Professor
Department of Psychology
Northwestern University
Swift Hall 102, 2029 Sheridan Road
Evanston, IL 60208
franconeri@northwestern.edu

Maureen Stone, Research Scientist
Tableau Software
837 N. 34th Street, Suite 200
Seattle, WA 98103
mstone@tableausoftware.com

Kevin Ponto, Assistant Professor
Design Studies Department
University of Wisconsin-Madison
330 N. Orchard Street
Madison, WI 53715
kbponto@wisc.edu