Danielle Albers Szafir

University of Wisconsin-Madison

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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 gain insight into 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.

Research Interests

Information Visualization, Computer Graphics, Perceptual Science, Bioinformatics, Human-Computer Interaction, Color Science, Computer Vision, Machine Learning and Data Mining, and Graphic Design.

Education

2009–2015 (Projected) **Ph.D. in Computer Sciences**, *University of Wisconsin-Madison*.
Dissertation: "Perceptually Informed Scalable Sequence Comparison."
Thesis Committee: Michael Gleicher (*chair*), Steven Franconeri, Bilge Mutlu, Robert Roth, and Kevin Ponto.
Minor studies in perceptual psychology and art history.
GPA: 3.82/4.00.

2009–2011 **M.S. in Computer Sciences**, *University of Wisconsin-Madison*.
GPA: 3.77/4.00.

2007–2009 **B.S. in Computer Science**, *University of Washington*.
NASA Space Grant Scholar, four-time Dean's List Member, and graduated at age 20.
Minor in mathematics.
GPA: 3.60/4.00.

Publications

Journal Publications

Danielle Albers Szafir, Alper Sarikaya, and Michael Gleicher. "Lightness Constancy in Surface Visualization." *Transactions on Visualization and Computer Graphics*, 2014 (revised and resubmitted).

Alper Sarikaya, **Danielle Albers**, Julie Mitchell, and Michael Gleicher. "Visualizing Validation of Protein Surface Classifiers." *Computer Graphics Forum*, 33(3), 2014. In the Proceedings of the Eurographics Conference on Visualization.

Danielle Albers, Colin Dewey, and Michael 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.

Michael Gleicher, **Danielle Albers**, Rick Walker, Ilir Jusufi, Charles Hansen, and Jonathan Roberts. "Visual Comparison for Information Visualization." *Information Visualization*, 10(4), 2011.

Refereed Conference Publications

Danielle Albers Szafir, Maureen Stone, and Michael Gleicher. "Adapting Color Difference for Design." *IS&T* 22^{nd} *Color and Imaging Conference*, 2014. **[Best Student Paper Award]**

Maureen Stone, **Danielle Albers Szafir**, and Vidya Setlur. "An Engineering Model for Color Discriminability as a Function of Size." *IS&T* 22^{nd} *Color and Imaging Conference*, 2014.

Danielle Albers, Michael Correll, and Michael Gleicher. "Task-Driven Evaluation of Aggregation in Time Series Visualization." *Proceedings of the 2014 Annual Conference on Human Factors in Computing Systems (CHI)*, 2014.

Michael Correll, **Danielle Albers**, Steve Franconeri, and Michael Gleicher. "Comparing Averages in Time Series Data." *Proceedings of the 2012 Annual Conference on Human Factors in Computing Systems (CHI)*, 2012.

Refereed Abstracts

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

Danielle Albers, Alper Sarikaya, and Michael Gleicher. "Lightness Constancy in Surface Visualization." *Poster Abstracts of IEEE VIS*, 2013. **[Best Poster Award]**

Alper Sarikaya, **Danielle Albers**, and Michael Gleicher. "Understanding Performance of Protein Structural Classifiers." *Poster Abstracts of IEEE VIS*, 2013.

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

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

Danielle Albers and Michael Gleicher. "Perceptual Principles for Scalable Sequence Alignment Visualization." *Proceedings of the* 7^{th} *Symposium on Applied Perception in Graphics and Visualization*, 2010.

Invited Talks

Danielle Albers Szafir. "Informing Visualization in the Humanities through Perception and Genomics." *Genres of Scholarly Knowledge Production*, 2014.

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

Workshops & Colloquia

Michael Correll, Eric Alexander, **Danielle Albers Szafir**, Alper Sarikaya, and Michael Gleicher. "Navigating Reductionism and Holism in Evaluation." *BELIV Workshop*, 2014.

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

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

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

Grants & Fellowships

Andrew W. Mellon Workshop Grant. "Digital Humanities Research Network," 2014.

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.

Experience

Academia

2010–Present **Graduate Researcher**, *Department of Computer Sciences*, University of Wisconsin-Madison.
Conducting research on data visualization under Professor Michael Gleicher, with a focus on improving the scalability and interpretability of visual analysis systems.

Collaborating with researchers across multiple disciplines to discover and apply novel findings integrating perception, cognition, and visualization to create analytics systems that help advance research in domains ranging from biology to the humanities.

2012, 2014 **Guest Lecturer**, *Department of Computer Sciences*, University of Wisconsin-Madison.
Lectured on perceptually-motivated visualization design with an emphasis on topics in biological sequence analysis for a graduate visualization course.

Redesigned curriculum for color in computer graphics for an undergraduate graphics course.

Autumn 2009 **Teaching Assistant**, *Human-Computer Interaction*, University of Wisconsin-Madison.
Assisted students with concepts from the first graduate-level human-computer interaction course offered by the University.

Autumn 2009 **Laboratory Instructor**, *Introduction to Programming*, University of Wisconsin-Madison.
Supervised four semester-long hands-on programming sessions and worked one-on-one with students for an introductory programming course (Mean instructor effectiveness rating: 4.58/5.00).

2008–2009 **Mathematics and English Instructor**, *Kumon of Redmond*, Redmond, WA.
Instructed K-12 and adult students in concepts from mathematics and English, working with small groups of students progressing through individualized curricula.

Undergraduate Research Mentorship

2014 **Andrew Hermus**, *Scalable Visualization for Text Analytics* (w. Eric Alexander)

2013 **Benjamin Reddersen**, *Rendering Techniques for Molecular Surface Visualization*

Industry

Autumn 2013 **Research Intern**, *Tableau Software*, Menlo Park, CA.
Worked with Vidya Setlur and Maureen Stone investigating interactions of color, task, and data in information visualization, resulting in multiple publications and an on-going collaboration with Tableau Research.

Summer 2012 **Software Development Intern**, *Google*, Madison, WI.
Designed and prototyped a web-based bioinformatics data storage and analytics platform leveraging cutting-edge cloud technologies and computational analysis techniques to manage biological data at massive scales.

Summer 2009 **Software Development Intern**, *Boston Scientific, CRM*, Redmond, WA.
Designed an application to automatically derive complete parameter-based test suites for Class 3 medical devices, automating testing for over 3,000 different device parameters.

2008–2009 **Software Development Intern**, *Apptio*, Bellevue, WA.
Served as the first intern for the company, debugging and developing analytic dashboards for predictive business intelligence applications.

Professional Activities & Service

Outreach

2010–Present **ACM-W Mentor**, *Department of Computer Sciences, University of Wisconsin-Madison*.
Mentored 15 undergraduate women in computer sciences with interests in computer graphics and visualization.

2009 **Majors Fair Representative**, *Department of Computer Sciences, University of Wisconsin-Madison*.
Provided information about computer science and gave demos of current undergraduate research projects to incoming freshmen.

2009 **Department Guide**, *Department of Computer Sciences, University of Washington*.
Guided elementary school students through a series of hands-on activities and presentations from computer science researchers.

Service

2014–Present **Digital Humanities Research Network Coordinator**, *University of Wisconsin-Madison*.
Coordinating bi-weekly meetings for a Mellon-funded working group on the digital humanities, bringing together researchers from over a dozen departments at the University of Wisconsin-Madison.

2012–Present **Visualization Reading Group Coordinator**, *University of Wisconsin-Madison*.
Created a weekly campus-wide discussion group for topics in visualization integrating researchers from computer science, English, journalism, environmental sciences, human ecology, and cartography.

2014 **Program Committee Member**, *BioVis: Symposium on Biological Data Visualization*.

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

2013–2014 **Reviewer**, *IEEE Information Visualization*.

2013 **Reviewer**, *BioVis: Symposium on Biological Data Visualization*.

Professional & Academic Memberships

2010–Present ACM Student Member

2010–Present IEEE Student Member

2008–Present Sigma Alpha Lambda Honor Society Member

2008–Present Phi Theta Kappa International Honor Society

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*.

Honors & Awards

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

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

2014 **Best Student Presentation Honorable Mention**, *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*.

Professional References

Michael Gleicher, Professor
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Tableau Software
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Kevin Ponto, Assistant Professor
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