



Visualization in Science and Education

Gordon Research Conference

Scientific Visualization for Decision-Making

August 6 - 11, 2017

Chairs

Mike Stieff and Ann
Batiza

Vice Chairs

Kim A. Kastens and Ryan J. Wyatt

Bates College

2 Andrews Road
Lewiston, ME, US

Venue and Travel Information

Conference Description



The 2017 Gordon Research Conference on Visualization in Science and Education will continue a tradition of bringing together a diverse community of practitioners and researchers engaged in the production, study, and application of visualizations to advance and promote scientific understanding. The theme for the 2017 conference is "Scientific Visualization for Decision-Making". This interdisciplinary meeting will explore the various ways that data are visualized and leveraged to help diverse stakeholders make informed decisions based on scientific evidence. Speakers will discuss the cognitive underpinnings of human decision-making and how it is affected by the availability of visualizations. Presentations will include cutting-edge research on how visualizations support both the day-to-day decisions made by investigators and case studies of visualizations proven critical for scientific discovery. Novel research will also be presented that demonstrates how the design of a visualization influences decisions made by policymakers and the general public. For more information, please visit the [conference chairs' web site](#).

Conference Links



- » [Conference History](#)
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Conference Program



Sunday

2:00 pm - 9:00 pm	Arrival and Check-in
6:00 pm - 7:00 pm	Dinner
7:30 pm - 7:40 pm	Introductory Comments by GRC Site Staff / Welcome from the GRC Chair

7:40 pm - 9:30 pm	<p>Using Scientific Visualizations to Support Decision-Making in Daily Life</p> <p><i>Often members of the general public must make decisions to support or oppose a public policy or decide how to modify their personal behavior based on scientific data. This session will examine how members of the public reach conclusions about personal behavior ranging from medical and environmental issues to disaster preparedness, in which scientific visualizations can inform personal assessments of risk and responsibility.</i></p> <p>Discussion Leaders: Mike Stieff (University of Illinois at Chicago, USA) and Ann Batiza (Batiza Energy Education Innovations, USA)</p>
7:40 pm - 7:45 pm	Opening Remarks
7:45 pm - 7:50 pm	Introduction by Discussion Leader
7:50 pm - 8:30 pm	<p>Hannah Fairfield (The New York Times, USA)</p> <p>"In Journalism, It's Dataviz for the Win"</p>
8:30 pm - 8:40 pm	Discussion
8:40 pm - 9:20 pm	<p>Bryan Kennedy (Science Museum of Minnesota, USA)</p> <p>"Which One's the X-Axis? Engaging Museum Visitors in Meaningful Experiences with Data Visualization"</p>
9:20 pm - 9:30 pm	Discussion
Monday	
7:30 am - 8:30 am	Breakfast
8:30 am - 9:00 am	Group Photo
9:00 am - 12:30 pm	<p>How Visualizations Can Influence Decisions During Scientific Research</p> <p><i>Visualizations are ubiquitous in scientific settings where they help scientists and engineers gain insight into their work. Historical accounts document how visualizations often provided critical information to facilitate important discoveries, such as the structure of the the double helix and the impact of natural selection on speciation. This session will present studies that critically examine how visualizations have helped advance both incremental progress and paradigm shifts in understanding.</i></p> <p>Discussion Leader: Gael McGill (Harvard Medical School / Digizyme, USA)</p>
9:00 am - 9:10 am	Introduction by Discussion Leader

9:10 am - 9:50 am	Janet Iwasa (University of Utah School of Medicine, USA) "Designing Molecular Animations for Research and Outreach"
9:50 am - 10:05 am	Discussion
10:05 am - 10:35 am	Coffee Break
10:35 am - 10:40 am	Introduction by Discussion Leader
10:40 am - 11:20 am	Shigeru Kondo (Osaka University, Japan) "How to Present an Unbelievable Experimental Result"
11:20 am - 11:35 am	Discussion
11:35 am - 12:15 pm	Tom Kwasnitschka (GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany) "A Walk on the Seafloor: Using VR for Marine Geology and Habitat Mapping"
12:15 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	Poster Session
6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	<p>Using Visualization Design to Influence the Quality of a Viewer's Decisions</p> <p><i>Designers take into account numerous factors when creating scientific visualizations, paying attention to issues of cognitive and representational fidelity as well as aesthetics. This session will explore how particular design elements influence the quality and efficiency of decisions that viewers make. In contrast to focusing on the viewer, speakers in this session will focus on the designer, to explore how alternative approaches to a visualization lead to different decision outcomes.</i></p> <p>Discussion Leader: Katy Borner (Indiana University, USA)</p>
7:30 pm - 7:35 pm	Introduction by Discussion Leader
7:35 pm - 8:15 pm	JoAnn Kuchera-Morin (University of California, Santa Barbara, USA) "Using the Creative Process as a Computational Framework for Unfolding Complex Systems"

8:15 pm - 8:30 pm	Discussion
8:30 pm - 8:35 pm	Introduction by Discussion Leader
8:35 pm - 9:15 pm	Miriah Meyer (University of Utah, USA) "Designing Effective Visualizations"
9:15 pm - 9:30 pm	Discussion
Tuesday	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	<p>The Influence of Scientific Visualizations on Decision-Making in Professional Settings</p> <p><i>Professionals are increasingly using scientific visualizations to inform their work in diverse industries from medicine to architecture. This session will explore how scientific visualizations not only improve productivity but also spur innovation and creativity in the workplace. Speakers will demonstrate new designs for visualizations used for diagnostics and logistics.</i></p> <p>Discussion Leader: Vivian Trakinski (American Museum of Natural History, USA)</p>
9:00 am - 9:10 am	Introduction by Discussion Leader
9:10 am - 9:50 am	Hany Farid (Dartmouth College, USA) "Photo Forensics"
9:50 am - 10:05 am	Discussion
10:05 am - 10:35 am	Coffee Break
10:35 am - 10:40 am	Introduction by Discussion Leader
10:40 am - 11:20 am	Eliot Fishman (Johns Hopkins University, USA) "Advanced Medical Imaging - It's All in the Numbers"
11:20 am - 11:35 am	Discussion
11:35 am - 12:15 pm	Larry Mayer (University of New Hampshire, USA) "Interactive 4-D Visualization in Support of Ocean Mapping and Decision Making"
12:15 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	Poster Session

6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	<p>How Cognitive Factors Influence Decision-Making with Visualizations</p> <p><i>Individuals make decisions routinely in their private and professional lives by drawing on multiple sources of information that may or may not include visualizations. This session will explore research that investigates the cognitive factors and dynamics that influence the decision-making process with particular attention to the use of scientific visualizations.</i></p> <p>Discussion Leader: Thomas Shipley (Temple University, USA)</p>
7:30 pm - 7:35 pm	Introduction by Discussion Leader
7:35 pm - 8:15 pm	<p>Steve Franconeri (Northwestern University, USA)</p> <p>"Thinking with Data Visualizations, Fast and Slow"</p>
8:15 pm - 8:30 pm	Discussion
8:30 pm - 8:35 pm	Introduction by Discussion Leader
8:35 pm - 9:15 pm	<p>Priti Shah (University of Michigan, USA)</p> <p>"Visualizations and Reasoning About Scientific Evidence"</p>
9:15 pm - 9:30 pm	Discussion
Wednesday	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	<p>Visualizing Big Data to Support Decision-Making by General Audiences</p> <p><i>With increasing computational power and storage capacity, scientists are generating more data than ever before; however, visualizing these data in efficient and effective ways remains challenging. This session will examine the particular challenges designers face when creating visualizations that leverage big data. Speakers will discuss the evolution of a visualization's design for different types of audiences and their research on the efficacy of particular designs.</i></p> <p>Discussion Leader: Jen Christiansen (Scientific American, USA)</p>
9:00 am - 9:10 am	Introduction by Discussion Leader
9:10 am - 9:50 am	<p>Kim Albrecht (metaLAB (at) Harvard, Germany)</p> <p>"Insightful Images"</p>

9:50 am - 10:05 am	Discussion
10:05 am - 10:35 am	Coffee Break
10:35 am - 10:40 am	Introduction by Discussion Leader
10:40 am - 11:20 am	David Herring (Climate Program Office, National Oceanic and Atmospheric Administration, USA) "Envisioning Earth: Data Visualizations for Informed Decision-Making"
11:20 am - 11:35 am	Discussion
11:35 am - 12:15 pm	David Laidlaw (Brown University, USA) "Big-Metal Virtual Reality Magic: Tours Versus Expeditions"
12:15 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	Poster Session
6:00 pm - 7:00 pm	Dinner
7:00 pm - 7:30 pm	Business Meeting <i>Nominations for the Next Vice Chair; Fill in Conference Evaluation Forms; Discuss Future Site and Scheduling Preferences; Election of the Next Vice Chair</i>
7:30 pm - 9:30 pm	Building Adult Proficiency in Using Scientific Visualizations for Decision-Making <i>Decision-making skills emerge from natural development processes and are honed from a lifetime of experience. During this session we will hear from those who are focused on optimizing the use of visualizations by adults to support decision-making regarding complex issues that impact their lives.</i> Discussion Leader: Martin Storksdieck (Oregon State University, USA)
7:30 pm - 7:35 pm	Introduction by Discussion Leader
7:35 pm - 8:15 pm	Andrew Kruczkiewicz (Columbia University, USA) "Using Art to Enhance Climate-Smart Decision-Making in the Humanitarian Sector"
8:15 pm - 8:30 pm	Discussion
8:30 pm - 8:35 pm	Introduction by Discussion Leader

8:35 pm - 9:15 pm	Phillip Kellman (University of California, Los Angeles, USA) "Perceptual Learning, Cognition, and Expertise: Implications for Scientific Visualization"
9:15 pm - 9:30 pm	Discussion
Thursday	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	<p>Helping Students Build Proficiency in Using Scientific Visualizations for Decision-Making</p> <p><i>The power of visualizations to enhance student learning in STEM classrooms is well documented. Visualizations can make imperceptible phenomena more accessible to students and help students connect invisible mechanisms or systems interactions to macro-level emergent effects. This session builds on the long-standing research regarding visualization in education to examine how the design of student interactions with visualizations can help learners better interpret evidence for decision-making or even increase their spatial-thinking skills.</i></p> <p>Discussion Leader: Leigh Peake (Gulf of Maine Research Institute, USA)</p>
9:00 am - 9:10 am	Introduction by Discussion Leader
9:10 am - 9:50 am	<p>Bob Kolvoord (James Madison University, USA) "Mapping a Difference: How Does Geospatial Visualization Impact Students' Spatial Thinking Skills"</p>
9:50 am - 10:05 am	Discussion
10:05 am - 10:35 am	Coffee Break
10:35 am - 10:40 am	Introduction by Discussion Leader
10:40 am - 11:20 am	<p>Camillia Matuk (New York University, USA) "Investigating Students' Science Learning Through Inquiry-Based Graphing Activities"</p>
11:20 am - 11:35 am	Discussion
11:35 am - 12:15 pm	<p>Stephanie Pfirman (Barnard College / Columbia University, USA) "Education for Decision-Making Through Interactive Simulations"</p>
12:15 pm - 12:30 pm	Discussion

12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	Poster Session
6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	<p>How Scientific Visualizations Influence Public Policy Decisions</p> <p><i>Policymakers in both public and private sectors are facing increasingly urgent decisions regarding crises precipitated by climate change, resource limitations, human migration, war, and economic uncertainty. This session will explore how scientific visualizations help policymakers make more informed and confident decisions—to not only respond to immediate crises, but to improve human well-being with increased sustainability. During this final discussion, we will consider how we might use lessons learned from this conference to promote better decision-making through optimal design of scientific visualizations and environments for their use.</i></p> <p>Discussion Leader: Carrie McDougall (Office of Education, National Oceanic and Atmospheric Administration, USA)</p>
7:30 pm - 7:35 pm	Introduction by Discussion Leader
7:35 pm - 8:15 pm	<p>Stephanie Romanach (U.S. Geological Survey, USA)</p> <p>"Decision Support Tools for Improved Natural Resource Management"</p>
8:15 pm - 8:30 pm	Discussion
8:30 pm - 9:00 pm	<p>Ryan Wyatt (Morrison Planetarium, California Academy of Sciences, USA) and Kim Anne Kastens (Lamont-Doherty Earth Observatory, Columbia University, USA)</p> <p>"Scientific Visualization for Decision-Making"</p>
9:00 pm - 9:10 pm	Discussion
9:10 pm - 9:30 pm	General Discussion
Friday	
7:30 am - 8:30 am	Breakfast
9:00 am	Departure

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