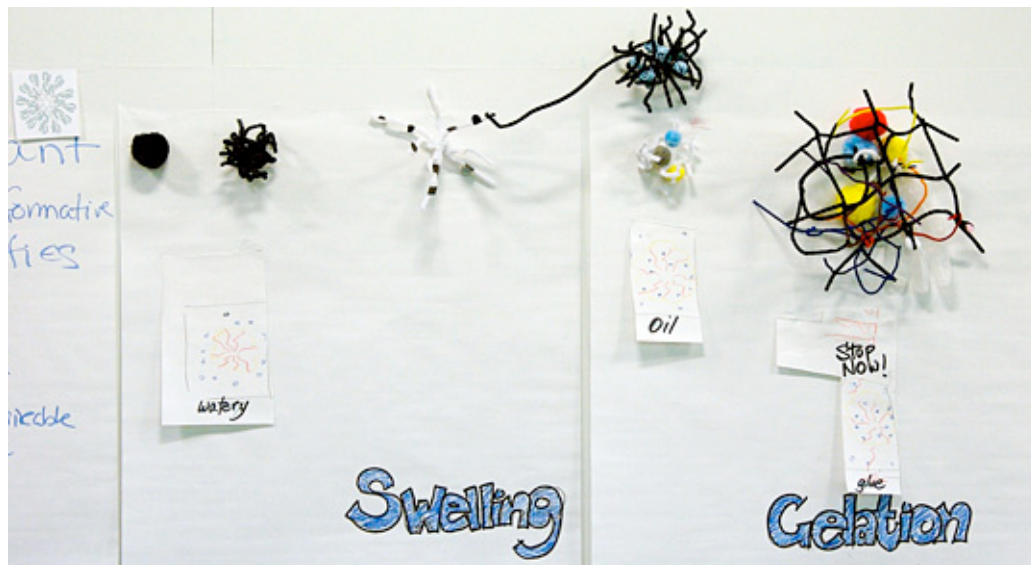


Image and Meaning

Keeping Visual Expression on the Front Burner



Why is visual expression so important in science? Frankel and DePace point out that visual representations, from simple diagrams to complex animations and interactive graphics, have tremendous potential for teaching science and facilitating public understanding and engagement. But they argue that scientists themselves can benefit from visual thinking.

As computers pump vast quantities of data into fast-growing fields like genomics, visualization tools that can handle massive datasets with ease of use and fast results are becoming increasingly important for data exploration and discovery. “Data is becoming so vast and complex that we can’t easily browse it,” DePace said. “We have to construct new ways of visually representing data to discover new things.”

Frankel maintains that the act of creating a visual model for the purpose of communicating is itself a step toward deeper understanding. “When you think about how to visually express an idea, or your data, you have a new approach to thinking about your science,” she says. “You have to whittle away at what is not necessarily important to say — to create a hierarchy of information.”

Images are now everywhere in science: Journals have added electronic versions that make room for all kinds of visual content, including simulations and videotapes. “This is the new way of reporting scientific discovery,” Frankel said, “so it’s essential that scientists understand how to use visual content to clearly express their work.”

When Old Recipes Won’t Do

These new, technology-driven visual forms have been layered onto a tradition of informal visual communication in science, DePace noted, where the blackboard lecture is the forerunner of today’s slide presentation. But before personal computers came along, most formal visual communication was accomplished by technicians and artists who created

Workshop Insights

“This workshop focused my mind on a place I want to go next: the design of collaborative workspaces.”

— David Dailey, Slippery Rock University

“My strongest impression is of the importance of looking at visualizations in an interdisciplinary fashion. This is a process. The experience has allowed me to make a lot of connections and ask many more questions.”

— Robert de Groot, Southern California Earthquake Center

plots, graphs, diagrams and anatomical or botanical renderings for journal articles or drawings for textbooks.

Now that scientists are creating their own diagrams and images for publication, they are having to do so without training in design or principles of aesthetics, art and communication. “They get a lot of practice but no feedback, so it’s difficult for them to really improve,” she said.

Workshop participants complained that the scientific images in publications and presentations today employ a confusing array of color palettes, graphic conventions and styles; they are often cluttered and can introduce confusion and error. Several scientists attending the workshop were surprised to find that images they considered successful were hard for other participants to understand.

Blending Ingredients for Visual Success

Better modes of visual expression are also needed because science has changed, becoming computation-intensive and complex. The solo scientist working a problem in his head may soon be an anachronism. DePace predicted that many of tomorrow’s large, cross-disciplinary teams will include a visualization specialist, helping researchers find patterns in their data and communicate those insights in a visual language. And Frankel predicts that fields will increasingly share visual technologies. Already, astronomers are using imaging systems developed in medicine.

Participants in the IM2.3 workshop found themselves embracing a collaborative model of visual discovery and scientific communication.

“The organizers put a bunch of people from several different areas in the same room, and they tried to solve a problem. Trying to figure out how people think and approach the same idea constantly distracted me,” said Robert de Groot, a manager of education programs for the Southern California Earthquake Center. “This is a good thing!”