

Graphic design for scientists

Drawing a clear and compelling figure is vital in science communication, so Karen Cheng and Marco Rolandi set up a help desk for scientists and engineers to consult with design students.

In 1611, Galileo Galilei created an astonishing series of drawings depicting the Earth's moon to demonstrate the power of his new invention — the telescope — to his patron, Cosimo de' Medici¹. As a true Renaissance man, Galileo had a degree in drawing from the Accademia delle Arti del Disegno in Florence, as well as a degree in natural philosophy from the University of Pisa.

This key connection between the sciences and the visual arts is now in danger of being lost. Figures have a prominent role in scientific publications and often take up the majority of time when preparing a manuscript. Scientists and engineers would greatly benefit from having the appropriate design knowledge to draw effective figures.

We formed a unique collaboration that spans visual design, scientific education and research in nanotechnology. Our activities include a tutoring centre for scientists called the Design Help Desk², a project funded by the National Science Foundation (DRL-1008568) that investigates the impact of visual design on scientific

figures (<http://go.nature.com/541us8>), and a high-school outreach programme (NSF-DMR-1150630) that uses visual design to engage students in science, technology, engineering and mathematics disciplines ('Drawing at the Nanoscale'; <http://go.nature.com/2sFkGX>).

At the Design Help Desk we set up with Kieran O' Mahoney, an expert in human learning at the University of Washington, science and engineering graduate students consult with a design graduate student to receive visual advice and guidance for their figures. Providing even basic visual design foundations can make a dramatic improvement to a scientific figure. Design recommendations have focused on simplifying content by eliminating any unnecessary elements that do not contribute to the main message. In addition, design consultants have emphasized the need for a simple grid structure to logically organize different elements in a left-to-right and up-and-down sequence.

One of the key benefits from these one-on-one consultations has been the

creation of an environment where the scientist or engineer explains their research work to a non-expert (the design consultant). This interaction forces students to identify and clarify the most important information they want to communicate — a key stage in explaining any research output, whether through writing or figures. Similarly, design students benefit from needing to make their knowledge understandable to non-experts. Both scientists and designers have reported enjoying this cross-disciplinary engagement.

In a study we conducted with materials science and engineering postdoc Yeechi Chen and Kevin Larson from the Microsoft Corporation, we sought to determine the impact that good design might have on readers of scientific papers. In this study, scientists and engineers were shown a series of figures that were redesigned following basic visual design principles³. An example of a redesigned figure is shown⁴. As at the Design Help Desk, the redesign focused on simplifying images, reorganizing portions of the composition and making more effective use of visual contrast. With these relatively simple changes, the redesigned figures significantly improve readers' perception of the associated papers.

We hope that our results and our experience will inspire similar efforts in science and engineering graduate programmes. With research papers being published at an astonishing pace, compelling figures ensure that years of work in the laboratory do not go unnoticed.

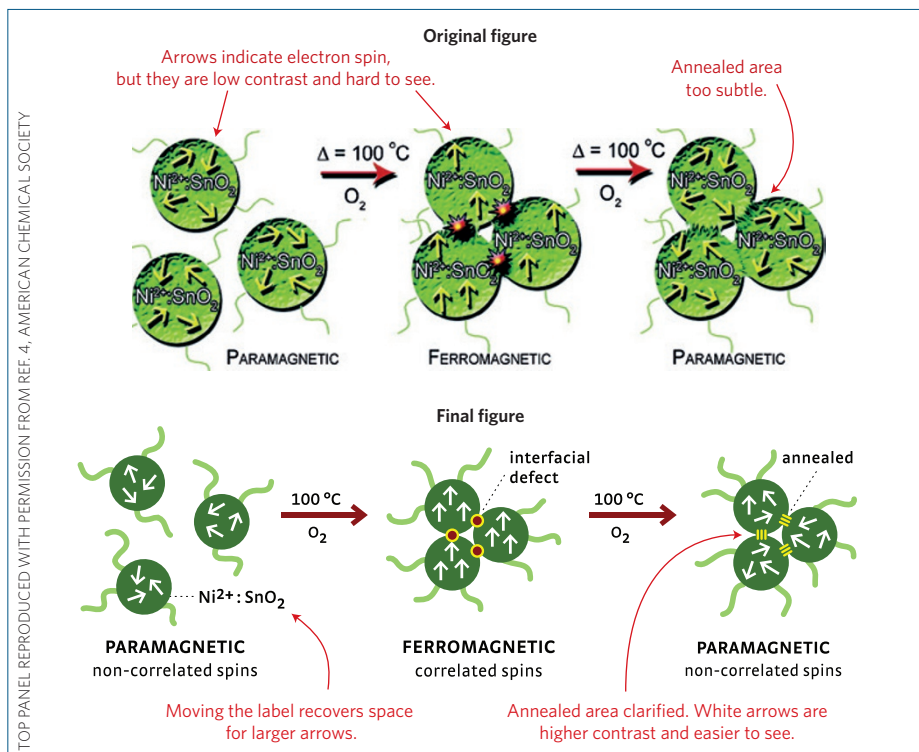
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Correction

In the version of the In the Classroom article 'Graphic design for scientists' originally published (*Nature Nanotech.* **10**, 1084; 2015), the name of the School in Karen Cheng's affiliation should have read 'School of Art, Art History and Design'. Corrected in the online versions after print 9 December 2015.