American Journal of Physics

BOOK REVIEWS | JUNE 01 2024

The Visual Elements—— Photography: A Handbook for Communicating Science and Engineering by Felice C. Frankel FREE

The Visual Elements—— Photography: A Handbook for Communicating Science and Engineering. Felice C. Frankel. 208 pp. University of Chicago Press, Chicago, IL. Price $20 ISBN: 978-0226827025. (Ram Seshadri, Reviewer)

Ram Seshadri

Am. J. Phys. 92, 479–480 (2024)
https://doi.org/10.1119/5.0216761

AAPT PHYSICS EDUCATION®

BOOK REVIEWS

Sathya Guruswamy, *Editor*
Department of Physics, University of California, Santa Barbara, CA 93106; email: sgurus@ucsb.edu

The Visual Elements—— Photography: A Handbook for Communicating Science and Engineering. Felice C. Frankel. 208 pp. University of Chicago Press, Chicago, IL. Price $20 ISBN: 978-0226827025. (Ram Seshadri, Reviewer)

Felice C. Frankel, a research scientist at MIT, is several things, captured well in her Wikipedia entry (downloaded April 7, 2024), which states: "*… a research scientist and photographer of scientific images … multiple awards, both for the aesthetic quality of her science photographs and for her ability to effectively communicate complicated scientific information in images*." She is also a prolific author of books on design, illustration, and photography in the service of science and engineering. As someone who is familiar with her prior work and owns several of her books, I approached the task of reviewing this book with some trepidation, believing that I may not have much new to learn. I am happy to have been wrong. This compact and relatively inexpensive paperback is a gem that conveys the author's decades of expertise in capturing science and the scientific method. It provides a step-by-step manual for using several commonly available tools. It is also a source of inspiration, with several examples of the author's creativity and originality. More than anything else, the book is immensely pleasurable to peruse.

Let me get my two peeves out of the way. I believe this is an exceptionally good book for newcomers to Frankel's world. In this regard, the title is something of a barrier, suggesting that there may be other books in The Visual Elements series that one should potentially await, and indeed, this appears to be the case on perusing the author's website. Buying into a series is a significantly greater commitment than buying a single book. I can understand that after over a half-dozen books, the choice of titles is limited, but the subtitle of the book, slightly modified, would have made a better title: A Handbook for Communicating Science and Engineering through Photography. A second peeve is that very few of the images have a scale bar, including most of the micrographs. I understand that scale bars can impact aesthetics, but we firmly and emphatically teach our students that without a scale bar, images are worthless. There are a few examples where objects, such as dollar bills or paper clips, are introduced for scale. These could be useful for the layperson, but in scientific illustration (journal articles, for example), dollar bills or coins are usually prohibited.

The first four chapters of the book are detailed and beautifully illustrated descriptions of how a (flatbed) Scanner (Chap. 1), (cell) Phone (Chap. 2), Camera (Chap. 3), and the (optical or scanning electron). Microscopes (Chap. 4) can be employed to create images. Chapter 5 addresses the assembly of images, and Chapter 6 is about the very important issue of image integrity. One of the several very useful things about the book is that the Table of Contents (pages ix–xiii) reads like a checklist. For example, under "Chapter 1: scanner" is a list of the precise pages where one can find out when the scanner is useful and how to work with objects that are not flat.

Chapter 1 would perhaps surprise most readers since I believe that few of us have considered the ubiquitous scanner to be a powerful scientific visualization tool. The author points out that one can use them both in reflective and transmissive modes. Who would think that entire Petri dishes of sliced tomatoes (the latter clearly meant to illustrate the point rather than for scientific publication) can be scanned with stunning clarity.

I appreciated the fact that the author does not ignore the abilities of the perhaps not-so-humble cell phone (Chap. 2). Having trained as a professional photographer with a long history of working with film and with the best lenses, one could easily see the author turning her nose up at a tool that is in most pockets. Happily for those among us who believe the best camera is the one we carry, the author provides useful tips for using cell phones, including how to post-process images taken in a hurry.

Chapter 3: Camera is an old friend. I enjoyed revisiting familiar images such as the iconic photograph of light-emitting semiconducting quantum dots from the lab of Moungi Bawendi at MIT (a 2023 Chemistry Nobelist). I learned for the first time that two different exciting wavelengths of ultraviolet light were employed in creating this image, which one assumes was originally caught on film. Another familiar image is of a statue in one of the courtyards of the Isabella Stewart Gardner Museum in Boston that is employed to illustrate the connection between the aperture setting on the camera lens and the depth-of-field, which is how much of the image stays in focus. One also learns from this single pairing of images of the role played by the shutter speed. If Felice Frankel were Claude Monet, then these images would be her Rouen Cathedral.

Chapter 4: Microscope lays out important messages on how to best use transmitted and reflective light in optical microscopy. The descriptions regarding scanning electron microscopy are more limited, but any reader who has paid close attention to the book will emerge as more skilled at all kinds of imaging, including those not described in it.

Chapter 5 addresses how images can be assembled from components in the most effective way. This chapter perhaps is the least detailed and, in my opinion, rightly so, because of the plethora of different tools that are used and the different goals that readers may have when they carry out their image assembly. However, this is yet another chapter that is full of

inspiring examples that can help neophytes and veterans think about how best they can convey the results of their research.

Finally, Chapter 6 addresses the all-important topic of image (read "research") integrity. What is particularly useful here is the extensive experience of the author in dealing with journals and her explanation of what would and would not fly with the journals that take these matters seriously.

It is rare that a book inspires creativity and is at the same time so useful and instructive. I have shared this book with some science and engineering graduate students in my institution, and their enthusiasm for it has prompted me to place an order for several copies.

Ram Seshadri is the Fred and Linda R. Wudl Professor of Materials Science and a Distinguished Professor in the Materials Department, and Department of Chemistry & Biochemistry at the University of California, Santa Barbara. His research at the interface of physics, chemistry, and materials science addresses functional inorganic and hybrid materials.

AJP Index to Advertisers

AAPT Summer 2024 Meeting . . . . . .Cover 2
AAPT Membership. . . . . .Page 401
AAPT Compadre . . . . . .Page 403
APSIT . . . . . .Page 404
AAPT Career Center. . . . . TOC