

# Addressing Ethical Standards

Almost a year ago we wrote a short note for the newsletter (November/December 2003 issue) to introduce our ASPB Policies and Procedures for Handling Allegations of Author Misconduct. We wish that we could report back to you that this had remained an academic exercise but, sadly, we have had a number of instances in which issues of author misconduct have arisen. ASPB is not unique in encountering such issues; this is an area affecting many, probably all, professional societies and publishers.

One of the duties of our Society is to raise the awareness of such issues among our membership to help us all avoid violating acceptable ethical standards. Accordingly, we have decided to run a series of articles in the newsletter in which we systematically address

ethical standards. With this issue we inaugurate this series.

We thought that we would start with a no-brainer, (the inappropriateness of) using image manipulation software to “improve” one’s data. Of course, despite our tongue-in-cheek prose, and as obvious as it may seem that this is a no-no, it happens. If the data look too good to be true, perhaps they just might be! Now “image manipulation” encompasses a multitude of sins, from out-and-out invention of data through the reassembly of data bits into novel “experimental” results, to much more subtle alterations of contrast and brightness to “enhance” one’s data. Where should one draw the line?

Happily, two of our colleagues at *The Journal of Cell Biology* have done a marvelous

job of addressing these issues. Accordingly, we here reprint (WITH PERMISSION) the introduction to their article, and we encourage all of you to read their article in full at <http://www.jcb.org/cgi/content/full/166/1/11> and to make it available to your labs and colleagues.

In the next issue of the *ASPB News*, we will explain why our reprinting of this article does not constitute plagiarism, the subject of our next discussion. 

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## What’s in a picture?

### The temptation of image manipulation

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It’s all so easy with Photoshop<sup>1</sup>. In the days before imaging software became so widely available, making adjustments to image data in the darkroom required considerable effort and/or expertise. It is now very simple, and thus tempting, to adjust or modify digital image files. Many such manipulations, however, constitute inappropriate changes to your original data, and making such changes can be classified as scientific misconduct. Skilled editorial staff can spot such manipulations using features in the imaging software, so manipulation is also a risky proposition.

Good science requires reliable data. Consequently, to protect the integrity of research, the scientific community takes strong action against perceived scientific misconduct. In the current definition provided by the U.S. government, “Research miscon-

duct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results.” For example, showing a figure in which part of the image was either selectively altered or reconstructed to show something that did not exist originally (for example, adding or modifying a band in a polyacrylamide gel image) can represent falsification or fabrication.

Being accused of misconduct initiates a painful process that can disrupt one’s research and career. To avoid such a situation, it is important to understand where the ethical lines are drawn between acceptable and unacceptable image adjustment.

Here we present some general guidelines for the proper handling of digital image data and provide some specific examples to illustrate pitfalls and inappropriate practices.

There are different degrees of severity of a manipulation, depending on whether the alteration deliberately changes the interpretation of the data. That is, creating a result is worse than making weak data look better. Nevertheless, any manipulation that violates these guidelines is a misrepresentation of the original data and is a form of misconduct. All of the examples we will show here have been created by us using Photoshop; although they may appear bizarre, it is remarkable that they are actually based on real cases of digital manipulation discovered by a careful examination of digital images in a sample of papers submitted (or even accepted) for publication in a journal.

#### Why is it wrong to “touch up” images?

If you misrepresent your data, you are deceiving your colleagues, who expect and assume basic scientific honesty—that is, that

each image you present is an accurate representation of what you actually observed. In addition, an image usually carries information beyond the specific point being made. The quality of an image has implications about the care with which it was obtained, and a frequent assumption (though not necessarily true) is that in order to obtain a

presentation-quality image, you had to carefully repeat an experiment multiple times.

Manipulating images to make figures more simple and more convincing may also deprive you and your colleagues of seeing other information that is often hidden in a picture or other primary data. Well known examples include evidence of low quanti-

ties of other molecules, variations in the pattern of localization, and interactions or cooperativity.

*Read this article in its entirety by visiting <http://www.jcb.org/cgi/content/full/166/1/11>.*

