

Positive Image, Negative Light

The Art and Physics of Photography



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Preface

Early drafts of parts of this book were written for a course first taught in the Fall of 2013 at the University of Wisconsin–Fox Valley, in Menasha, Wisconsin. *The Art and Science of Photography* is an interdisciplinary course that uses the art of photography to learn some physics (and a little astronomy). But an equally-important goal of the course is to use physics as a point of departure for learning a bit about art.

You will find throughout the book, as examples, illustrations from my own photography. This is in part because I have you as a captive audience. But it is also convenient, since I know my own pictures and the stories behind them, and I don't need permission to use them.

But of course I also want you to look at other photography. And so a companion book to this one is *The Photography Book*,¹ which presents hundreds of photographs, spanning the entire history of photography. Each has a short analysis, with cross references to other photographs that are related. This book is different in that there is only one photograph by each photographer, and they are arranged in alphabetical order by photographer's name. Thus, the ordering of the pictures is thematically random, which often results in unusual juxtapositions on facing pages. I will often refer to pictures in *The Photography Book*, and so you should have it handy while reading *Positive Image, Negative Light*.

The larger concerns of *Positive Image, Negative Light* are to give the reader some background that is helpful for asking important questions about the nature of art and science. But the practice of photography is the point of departure for these bigger issues, and as such *Positive Image, Negative Light* does contain a lot of simply practical information as well.

And so *Positive Image, Negative Light* has five basic goals:

- (1) To ask basic questions about how photography fits in as an *art*, and about the nature of art itself.
- (2) To ask basic questions about the nature of physics *as part of the study of the natural world*, and about the nature of science itself.
- (3) To gain some practical knowledge that will allow the reader to more easily learn technical aspects of photography, as they are needed.
- (4) To gain some practical knowledge that will help the reader more easily learn to be a better photographer.
- (5) To expose the reader to a set of interesting photographic processes and tools that are not usually covered in a beginning photography course.

In what follows I assume no specific prior knowledge apart from the basic skills required to graduate from high school. If you have little experience with photography, it is my goal that *Positive Image, Negative Light* will help form a useful foundation from which to learn about photography in whatever way that works best for you. If you are a seasoned pro, but looking to set off in a new direction, then I still hope that you

¹Phaidon Publishers

will find much in *Positive Image, Negative Light* that is fresh and inspiring, and it is my goal that the book will help to open new possibilities.

Positive Image, Negative Light covers some material that is typical of textbooks that link physics and photography. But it is also personal; it is very much my own take on the two subjects. I would not say that my personal views regarding science and art are controversial, but they are perhaps somewhat unconventional. There are few details here that other artists and scientists are likely to strongly disagree with. It is, rather, what I have chosen to emphasize and what I have left out all together that most shows my own personal likes and dislikes.

I make no real apology for this, but I do want to be honest about it. Since my formal training is in physics and astronomy, while I am essentially self-trained in art (with informal help from many others), the science part of this book is perhaps more conventional and straightforward than is my portrayal of art. And so my choice of physics-related topics should give one a fairly balanced and conventional taste of that subject. Regarding photography as an *art*, however, I am surely on shakier ground.

Certainly, I do not pretend to present a comprehensive and unbiased view of art; I am unqualified to attempt such a thing. But I do try to make a case that the particular thin slice of art that I present here has some merit and is worth spending a little time to consider, even if it turns out to be not your particular cup of tea. This book is a bad place to get a sense of what are the hot topics in *ArtForum*, but I believe that it does at least point to important and interesting questions about art in general. And since it is my goal to get you thinking, it doesn't matter much whether you agree with me or not. Thus it is fitting that my discussion of art is personal, since my own art is the bit for which I really do know about what I am talking.

And so this book can be thought of in part as a very long Artist's Statement, justifying the value and relevance of my own art. But I try to do this in a way that emphasizes the broader questions I am asking, rather than the particular answers I try to give (tentatively) with my own art. And I hope this book does help a little to make you a better photographer, and as such I do spend time on some of the very basic technical aspects of photography that I find important. But in doing so, I try to use these technical issues as points of departure to consider the status of photography as an art, finally exploring some issues relating to this status in the digital age.

Although I try not be preachy about it, this book may also be read as a manifesto of sorts for the aspects of science that have always moved me the most. I am interested in science not for the technological gizmos it has produced, or for some notion of inevitable human "progress." Rather, science is, for me, part of *the study of nature*. My interest in Einstein's General Relativity, for example, is essentially the same as my interest in bird watching. Because I have spent some time to learn a bit about birds, I can now walk through the woods free of binoculars, looking only at the ground at my feet, and a world is open to me just by the sounds I hear. And when I stumble on my way up the stairs, as a physicist I can take comfort in the idea that my shin in contact with the stairs prevented me from following my normal straight-line path through 4-dimensional spacetime.

My formal credentials are in physics and astronomy,² and not in art or photography. But I do have a fair amount of experience with art photography as well. Apart from teaching photography for the University of Wisconsin Colleges, I have long been involved in art-science collaborations, many with my colleague, the painter Judith Waller. We used to teach a class together *The Art of Science; The Science of Art*, and we have collaborated on several exhibitions and planetarium shows. I have exhibited photographs in many

²I am Professor of Physics and Astronomy at the University of Wisconsin – Fox Valley, and my PhD in astronomy is from Ohio State University

juried competitions in Wisconsin, Ohio, New York, Missouri and Colorado, even occasionally winning an award or two (well, two actually). I have had several solo exhibitions, as well as joint exhibitions with the artists Judith Waller, Diana Ludwig, Dawn Patel and the photographer Teresa (Saska) Patrick. Some of my photography can be seen on my online portfolio here:

JohnEBphotography.com

My particular area of expertise is alternative-process photography, especially regarding the combination of antiquarian photographic processes with modern digital scanning and printing. Probably the most significant example of this is my own sort-of invention of what I call *cyanonegative photography*. I have taught the process to many students over the years, and even a few other photographers, some of whom have won prizes with their own efforts. I am also a fan (and small-time collector) of old cameras. How many old cameras do I have? Well, it depends on how one counts (working, non-working, barely-working, duplicates, etc). But I need *yet another* camera like I need a hole in the head.

One of the themes of this book is the meaning of digital technology and what it has to say regarding photography as an art form. This may seem like I am speaking out of turn here, since I have neither formal training in art, nor have I ever been a professional photographer using professional digital equipment. Nevertheless, there is a sense in which I am well-positioned to say something of interest about these issues, even if it is not obvious from my *Curriculum Vita*.

As will become increasingly clear in this book, my photography is almost entirely devoid of the use of a digital camera. I often use equipment and old physical processes that are about as far removed from modern digital photography as one could imagine. But I use these in new ways that depend absolutely on the digital; many of my photographs could not exist without modern digital processing and scanning and printing. This kind of interplay between the old and new is one of the themes of this book.

And despite my collection of old cameras, I am not a knee-jerk hater of digital imaging technology. In fact, I am one of its early users, having used digital cameras and elaborate digital image processing long before most photographers. My formal training is in astronomy, and I was there (in graduate school) for the digital revolution as it transformed astronomy in the 1980's. The CCD digital detectors (see Chapter 6) used in modern digital cameras were new then, and still far too expensive (and with insufficient resolution) to be of practical use for photographers. I am the last person one would want to ask about the latest multi-thousand-dollar model of DSLR camera. But I do have a deep and decades-long understanding of the underlying technical principles of digital photography.