Chapter 1

About Colorimetry

For any book on "color," the question "What *is* color?" appears appropriate.[†] I skip this question, though. Why? Because I think it doesn't carry you much farther.

In order to get a feel for why this might be so, consider a few possible answers:

Physicist: "Color is nothing but the wavelength of electromagnetic radiation in the 470–700 nm[1] band, as Newton has already shown. This topic is old hat. Who cares?"

Physiologist: "Color is the (electrochemical) activation of the neural system as modulated by the three retinal cone types.[2] Nowadays the photopigment genetics has been fully cleared up, and color is well understood."

Psychologist: "Color is a basic sensation of the visual modality that is most easily measured by way of the Munsell atlas.[3] There are still some minor problems to be cleared up."

Philosopher: "Color is a *quale*.[4] Either you see color by wavelength or color is mere mental paint, we haven't decided yet."

[†]Various notes appear throughout the text, but this is the only footnote. Notes are collected at the end of each chapter. There is no need to consult them at first reading, or at any time at all. You might find the notes occasionally useful as a guide to additional reading and so forth. Best to simply ignore them right now.

Colorimetrist: "Colors are the equivalence classes of mutually indiscriminable physical beams. Colorimetry is a closed subject, though very useful in many applications. Simply follow CIE[5] recommendations and you can't go wrong."

Engineer: "Color is simply a transformation from radiant spectral densities to Lab[6] coordinates. Just refer to the manuals."

Artist: "Colors are what make the picture surface *vibrate*.[7] You can easily spend a lifetime and still not understand color."

Salesman: "Colors are what make the product sell, as simple as that."

Computer scientist: "Colors are 3-item, ordered data structures, typically represented as 24 bit (3-byte) structs.[8] What else did you want to know about it?"

Man in the street: "Color is what makes the red fire truck stand out from the green bushes. Any fool understands as much."

And so forth.

Each answer is representative of many answers that I have actually heard. Most are phrased in some kind of technical lingo that would make the target in-crowd nod in recognition. Did you *learn* anything in reading these answers? Did you notice that some answers are just plain *wrong*, while others involve a *confusion of levels*, show an overly *limited understanding* of the question, or are simply sophisticated ways to *dodge it*? You are probably confused, and rightly so. For "color" means many different things to many different people for many different purposes.

The question, "What is color?" should not be posed at the beginning, but rather at the end of a book on color. Or, even better still, the reader should be liberated of the urge to ask the very question by the time the book has been read, and not simply because the question was answered between the covers. It is possible to know much about color without really knowing what it is (or rather, can be). Instead of considering so-called deep questions ("Is the RED[9] I see the same as the RED you see?" is perhaps the most commonly heard one), it is more useful to discuss pertinent *facts*.[10] This is what I will do in this book.