

# Designing Color Reproduction Systems: A Perspective View

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## Abstract

We can now enjoy excellent color reproduction from color photography, color printing, and color television in our every day life with reasonable prices. This was however not achieved within one day but has a long history of improvements.

J C Maxwell, for instance, first realized color photography, in as early as 1861. Though colors were indeed reproduced in his color photography, the color reproduction quality must have been very low.

However once a break-through was established, the succeeding improvements have been rather rapid. For instance in color photography, photographic emulsions have been continuously improved in order to achieve high speed with finer grains thus giving less granular color images under usual photographing conditions.

As for color sensitivities, the introduction of spectral sensitizers was epoch-making. With regard to color dyes, an application of color development was a key technology towards the modern color photography of high image quality. And again, once these break-throughs were established, their improvements have been carried out vigorously and continuously.

It should be noted however that these improvements have not been achieved through systematic developments, but rather through a series of serendipities (discoveries by accidents). Now that the theoretical basis of color reproduction systems has been well established, the color reproduction system may be constructed through a more logical way.

At the same time, the rapid growth of modern computer technology has now been favorably employed for improving color image quality. It realizes what would have been impossible in an analog system like conventional color photography through a full exploitation of digital image processing techniques.

In the present talk, I will review the process of color reproduction, by taking color photography as an example, in the light of modern colorimetry and will elucidate implicit interrelations between various factors affecting the color reproduction quality.

I will also demonstrate some noteworthy improvements when digital color imaging techniques are applied to the color reproduction system. Though I am taking color photography as an example, the present talk is also applicable to a variety of color imaging systems including color hard copy, color printing, or color television.