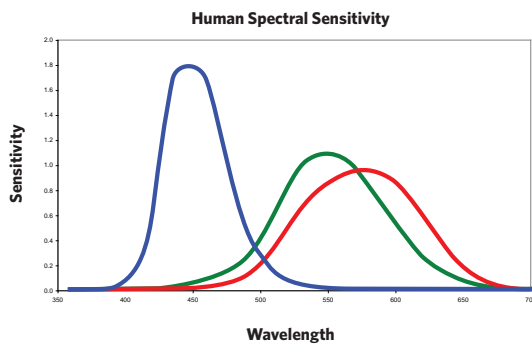


On Color in digital and analog cinema A Talk with Tom Maier



Dr Thomas O. Maier is Kodak's most senior and experienced color scientist. He was instrumental in writing the industry standards for digital cinema color.



On film color and digital color

Film is subtractive color and digital is additive color. Those are fundamentally different ways of creating color. 'Subtractive' means you start with white light and subtract out red, green or blue to get cyan, magenta, or yellow and all other colors are combinations of these three basic colors. Additive means we start with blackness and add red, green, or blue and all other colors are combinations of these three basic colors.

On dealing with different systems

If we start with film, and we scan that film, we need to know what to do with the additive digital system to produce that exact same subtractive film colors. Because the filmmakers want any movie to look the same whether it is shown as a film movie or a digital movie. And that can be a challenge because there are some colors that the one system can make and the other one can't. Those are called 'out of gamut' colors.

On solving the color gamut situation

So people sat down and said, this is a very pleasing and generally acceptable result if we take those colors and make them these colors - if we 'map' them intelligently from one system to another. From that, the idea of 'color spaces' was born. Today, there is 'film color', and there are several 'color spaces' associated with different digital media and devices. Creatives can accept the color gamuts as they are or they can tweak them to show colors that they want.

On DCI's color specifications

If we imagine all colors on a three-dimensional graph, we can have a simple equation which tells us, given this set of X, Y, and Z numbers, this is the unique color it defines, how to make that color out of any set of red, green, and blue additive colors. So everybody in the world, knowing those values, and using high-quality measuring instruments, will know how to produce that color.

This simplicity allows us to make television or digital projection images that visually match the film images and the original scene colors.

On room to innovate in color

What we've really defined - and I was a prime mover in this -we've defined something that not only includes every color that a human eye can see, it also includes colors that can't be seen, because it's all mathematical. So there's plenty of room to make a bigger gamut with a digital projector, and there are a number of ideas on how to do that. And I think those will come along in the future.

On the color 'headroom' in digital cinema

There are colors that the digital projector can produce that film can't produce - colors that are rarely if ever produced because filmmakers aren't used to working with this medium. But as artists get more comfortable and confident with digital projection, they will paint from a different palette.

On the real measure of color

The colors that artists had 500 to 700 years ago were substantially limited relative to what we have today. And yet they painted masterpieces that are beautiful, because they knew how to work with what they had. And I think it's the same thing today.

So when you get down to it, it's not about exactly how many colors we can display; it's how effectively the person can creatively tell a story or convey a message or feeling, which is the real reason why anyone uses color in motion images.

