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Color Management Day Part 3: The Ten Most Common Color Management Mistakes

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Bruce Fraser: Welcome to Top 10 Color Management Mistakes. My name is Bruce Fraser. Some of you may know me as having labored long in the color management wars. I'm joined here by two equally battle-scarred veterans: Fred Bunting works for Light Source. He is the author of what I consider to be the best user manual I have ever seen: the manual for the Colortron. Whatever you think about the instrument, you have to admit the manual is a wonderful grounding in the whole complex, slippery field of color. Our other panelist, Andrew Rodney, labors directly in the trenches, running a digital imaging business in lovely Santa Fe, New Mexico. He is also a tireless performer on-line. No questions is too stupid, no questioner is too stupid, for Andrew to answer. I admire his patience enormously.

I'm going to keep my remarks brief and get to the meat of the session. This is a short session, we only have half an hour, and I definitely want to leave time for questions and answers. So without further ado, I will turn you over to the capable hands of Fred Bunting.

Fred Bunting: My name is Fred Bunting. I'm with the company formerly known as Light Source. Now we're known as XRite, the California Technology Center. We're up here in Marin; we're the California branch of XRite. XRite is the maker of color measurement instrumentation: spectrophotometers, colorimeters, densitometers. I'd love to answer questions or talk to you about any of those --- color management, color theory, and all that.

Bruce has asked me to talk about what I consider to be the 10 biggest color management mistakes. When I first thought about it, I was wondering whether these should be user mistakes or expert mistakes or mistakes that companies make. So I thought I would address a little of all three.

I'll start with number one, which I put under the category "Bakers and Candlestick Makers." Mistake number one is confusing calibration and

profiling. Somewhat of a beginner's mistake, but a lot of intermediate users also are getting these two notions confused. If you learn nothing else about color management, it's important that you learn that there is a distinction between calibration and profiling.

Specifically, calibration alters the behavior of a device. It is an active thing; it actually changes something. A profile is a description. It's very passive. All it does is describe a device. For example, with monitor calibration, I could calibrate my monitor without profiling it, which is what we used to do in the old days; or I could profile a monitor without calibrating it, which is something you still have to do on Windows. Each of those has benefits. Of course, the best of all possible worlds is when you profile a calibrated monitor, they're in sync and everything is working great.

But they are two separate processes, so don't ever get confused that profiling is actually calibrating something, that it's altering a device or even altering an image. A profile is a separate task from calibration. A profile has a life of its own, and can leave your system and travel with images.

Mistake number two, under the category "It Takes Two to Tango," is confusing the notions of applying and embedding profiles. Applying profiles is actually changing image data. Embedding profiles is not altering the image at all. Another thing that's important is that profiles are always applied in pairs. One represents the source, one represents the destination. Whereas with embedding, you're only embedding one profile, and that represents the source. Another way of thinking of it is that embedding is a delayed correction, because it only has half of the correction in it. The other half has to be supplied at a later time, when you specify a destination.

Mistake number three is "The Old Switcheroo:" altering device behavior after profiling. This seems like an obvious one, but you'd be surprised at the number of ways this can bite you. For example, you might have some well-meaning robot, like a scanner driver that is automatically setting your highlight and shadow settings as you scan. This throws off a lot of scanner profiles completely, because they were profiling under certain highlight and shadow conditions. Sometimes this is done manually. A prime example is with monitor calibration. This is why everybody's always telling you you only want to have one piece of software that can affect the LUTs --- the lookup tables that affect the calibration of your monitor.

That brings me to monitors and sound in ColorSync 2.5, which you may not realize can also affect the lookup tables. When you click on a monitor, that's changing the behavior of a monitor, which brings me to my next big mistake, "200-Pound Gorillas Can Be Wrong."

Mistake number four is adding lookup tables to profiles. A lookup table is a calibration. Adding calibration information inside a profile I consider a fundamental mistake. Lookup tables were added by Apple to ColorSync 2.5 monitor profiles, which means they have this unique behavior in the single context of monitors and sound. I believe this confuses the notion of what a profile is. A profile is a passive description; you shouldn't be able to click on a profile and see an instant change to that device. That's my pet peeve of the day.

But sometimes 200-pound gorillas can be right. Mistake number five is

fighting Photoshop 5.0. I believe it's a great waste of energy to be fighting against something that I consider to be a very good melding of two fundamentally incompatible things: the Photoshop way of doing things, where you have a single editing space; and the ColorSync way of doing things, where you have multiple images coexisting side by side from many different sources, headed to many different directions. If it were up to me, I would change one word in the documentation: Instead of referring to working spaces, I would call them editing spaces, to emphasize what I think this Photoshop 5.0 concept is really about.

"The Cop at the Door" is the name I give to all these mechanisms in the Setup dialog boxes that Photoshop has set up so that as images are coming in, they're all mapped to one particular working or editing space. You can get around it, and I believe it's really bad advice.

Mistake number six: Using a colorimeter to test profiles. This is something I've seen done by experts and even reviewers. I want you to appreciate the irony that somebody from XRIte is telling you that there's actually something you cannot do with a colorimeter. Let me start by saying that colorimeters are invaluable instruments. They have many very important uses. In color management, they're absolutely essential for making and tuning profiles, and occasionally for using profiles when you're separating spot colors. But when you're evaluating image rendering by a color management system --- what I see a lot of people doing is, they've got their color management system nicely set up; they run an IT8 target through; they take out their colorimeter and they start measuring values to see how accurately they came through. That's just not a way of testing imaging, because there's a fundamental difference between colorimetry --- which is measuring isolated colors --- and perception, which is what we do with our eye/brain combination that measures colors within fields. There are all sorts of important and inescapable things that the eye does that a colorimeter cannot do, such as looking at neighboring colors; taking into account the light source. A number of things that the eye does automatically cannot be done by a colorimeter.

So colorimetry is not perception. That other way is the source of all this rendering intent stuff, the difference between colorimetric and perceptual rendering intents. That's where all that comes from.

Mistake number seven: I call this "Play It Again, Sam," where the "it" is an IT8. Mistake number seven is using IT8s to test profiles. This is along the lines of what I was just talking about. One of the things that happens if you're testing a color management system using an IT8 is that it screams out, "Take out your colorimeter and start measuring values." This is a bad direction to go, as I just talked about. But there's other stuff as well. For example, IT8s don't show the hard stuff that a profile had to do. (I don't mean to pick on IT8s; any target where you're just looking at isolated colors that are spot-checking the color spectrum that the profile is going to manage falls into this category.) But all of those, if they're just showing isolated colors --- not showing the colors between the colors: the ramps, the gradations, how smooth the gradations from one tone to the next --- that's the hard stuff that profiles in color management systems have to do, and they're not really shown by IT8s. This is especially true with scanner profiles, where the IT8 is used to make the scanner profile. So to feed the same image you used to make the profile back into the system as a test is really not much of a test at all.

"Come into the lab and let's see what's on the slab." That's an obscure cite. I wonder if anybody knows where that came from.

Audience: Rocky Horror.

Mr. Bunting: Rocky Horror, that's right. I don't know if I got it right; it's been a long time since I've seen it. But mistake number eight is archiving an LAB. It's more than just an 8-bit versus a 16-bit issue, which is important, but there's more to it. LAB is not the last word in device-independent color spaces. Color scientists are well aware that there are problems with LAB, and they're working on alternative appearance models as we speak. So if you have an image and you're trying to think of how to store it away for a rainy day five years from now, just storing it away in LAB for that purpose may be incurring an unnecessary conversion. All conversions are potentially losses. I would not convert to LAB merely for the purpose of archiving, because you may change your mind in the future.

Mistake number nine is about SRGB. I'm making a little joke there, because SRGB has gotten a lot of bad press lately, and we've beating on that a little bit today. So I won't go into it too much, other than to say that I think that SRGB is fundamentally a good idea in many contexts. In fact, it's perhaps the root of this Photoshop concept of working spaces --- the idea of a standard RGB space that everybody can agree upon. That's a really good idea. But, as we've talked about in earlier sessions, this is not a good idea for images that are ever going to see paper, or any large-gamut device like a film recorder. But I won't beat that horse any more than it already has been beaten.

Last mistake: "No lamensa sine impensa." I asked somebody for a very pithy Latin quote; loosely translated, it means "there's no such thing as a free lunch." Mistake number ten is expecting instant miracles. I originally wrote this saying that the mistake was expecting miracles. But I've seen miracles, and color management really does work. But it takes a little bit of effort up front, a little bit of investment of time in order to get these things to work. If you think about it, the way we do things now, we're altering images and we're tuning images on an image-by-image and a job-by-job basis. What we're trying to do is build robots that take care of a lot of that for us. A lot of that effort comes out, but we still have to put some effort in up front in getting these things to work --- tinkering around, removing components. Eventually, the robots start to work, so all this effort that you're expending in getting to know color management is well worth it, because this is the world we're entering into.

That's my list. The last thing worth saying about robots is that as we're setting up these robots, remember that we're asking them to handle something very subjective and very human, so there's only so much we can ask of them. Thank you.

[Applause]

Mr. Fraser: Thank you, Fred. I do have one question for you. On the matter of calibration versus characterization, would you agree that profiling an uncalibrated device --- particularly an uncalibrated output device, like a printing press --- is an exercise in futility?

Mr. Bunting: Profiling an uncalibrated device?

Mr. Fraser: Where you have no idea how much the device is going to

drift.

Mr. Bunting: It depends upon how stable the device is. For example, it's almost a necessity with monitor calibration on Windows, where getting the control over the lookup tables on Windows, from a software point of view, is really hard. So by necessity, you have to profile an uncalibrated system and hope that it remains stable. But that's better than no profiling at all. Profiling within the context of a color management system has great benefit, even if you're profiling uncalibrated devices. You just have to do it more often.

Mr. Fraser: Thank you, Fred. Here is Andrew Rodney, who really works in the front line with this stuff.

Andrew Rodney: Thank you. Fred covered a wide gamut --- no pun intended --- of many of the mistakes, certainly some of the ten big mistakes. I would say that number ten --- "don't expect a free lunch" --- is definitely an appropriate consideration. I talk to a lot of people who ask me, "Does color management work?" I wouldn't be here if I didn't believe that it did. But color is such a complex area, and there is so much up to interpretation. I don't think we'll ever see something totally robotic. I don't know if we do want robotic color. There are a lot of people out there that have names for those of us who are on the front lines, trying to make color management work. I believe that it does work, but it's not a miracle, and it does take a lot of time investment and human intervention. So I would say that Fred's number ten would certainly be my number one.

The other mistake that he mentioned that I would certainly have on my list is fighting Photoshop 5.0. It's futile. It took me --- I think Bruce would probably agree --- we started doing beta on it in January. I've been messing with color management for quite some time, going back to non-ICC color management, some of the proprietary stuff Kodak was doing. I thought I had this figured out, and there was a period of weeks and weeks where I was just scratching my head. There was a gentleman at Adobe whose name I will not speak today, because he is here in the audience. He would write back to me by e-mail and say, "No, bad dog. You've got it wrong. You haven't gotten it yet." Finally the light bulb went off. It really is a very elegant, beautiful system. It's not worth fighting, because once the light bulb goes off, it's like resolution, for those of you who've tried to comprehend this whole thing with resolution, and then the light bulb goes off, and it's a very simple, elegant concept. Same thing with Photoshop 5.0: it really does work.

I don't know if I have a list of mistakes. Some of the things that people ask me about or try to fight me about in color management I'll raise, because it seems that these are issues that people will try to use to attack the whole idea of color management.

One of the things that you'll hear quite often is, "It's impossible to calibrate a monitor so it looks like a print. It'll never be 100%." My argument is, "If it's 95%, is that a worthwhile goal?" I think it is.

[Tape Turn]

... but it's a very important goal to try to achieve, getting that monitor into a known and consistent state, and especially with Photoshop 5, making sure you have a good ICC profile that reflects the state of that monitor. So, color management, I don't know. Fred, you may have an

opinion. Will it ever be 100%? I don't know. We're in our infancy right now. Who knows what will happen in five years, but it is so much better and more powerful than what we had years ago, that I think it's a worthwhile goal.

There is one mistake I think a lot of people make and I think it's very important. I don't know if it was touched upon; we were talking about this at lunch. This is having a good viewing condition for evaluating your final output.

There's nothing more frustrating than having someone come in and look at some output on your 5000 K lightbox, and then call you an hour later from their cell phone, saying they're in the elevator and it does not look right. It's hideous. They want to come back and have it remade. And color is a difficult concept to grasp, so one of the mistakes I would say a lot of people make is they'll go out and they'll buy the spectrophotometers, they'll buy the software, they'll get the calibrated display, and then they'll evaluate the output under God knows what kind of lighting. So please spend a little bit more money and get a good viewing box and use that if for anything so that if somebody does come in and complain about the color, you have a known, controlled viewing condition and you can put it up there and say, see, this is what you signed off on. If it doesn't look this way in the elevator, we'll talk to maintenance about putting 5000 K bulbs in the elevator. So, I think that's important.

The other thing is that it seems that there are two camps --- those who believe in color management and those who absolutely think that it's the devil's child, and they come up with the argument, well, the only way to do this is to work by the numbers, as if people who are dealing with color management are advocating that Adobe remove the info palette from Photoshop. No. That's absolutely not correct. I think that having a calibrated system is just another tool in your arsenal and I do not suggest that you do not work by the numbers. I think that that's a big mistake. I think they work hand in hand, and you need to know what the limitations are of working by the numbers because many times you can't specify an exact CNYK number, yes, maybe for Pantone color, but if you're working with continuous tone images, it's really ridiculous to assume that you can do everything exactly by the numbers.

You can use the numbers and a calibrated display. They are both tools that are quite helpful. I'm trying to think --- one of the mistakes I see a lot of people make --- I wouldn't --- more the desktop users, is when they go about creating profiles for their output device not really understanding the destination color space of their device. People who are using some of the inkjet printers, like the Epson inkjet printers, are a perfect example. They make the false assumption that what they need to do is convert their files to CNYK to print out to an Epson printer because it's a four- or six -color printer, and I get people all the time who say the color management doesn't work on these Epson printers, and I converted the file to CNYK and then I sent it to the Epson printer, and it just didn't look right. This is a very common mistake that I see in a lot of the people that I deal with: not really understanding where they're going before they even start the process. Those of you who were in the seminar previous to this where we were actually building ICC profiles, right off the bat, you need to tell the software you're going up to a CNYK device or to an RGB device. Think about that before you actually commit, because in many cases, you don't really need to create a CNYK profile.

Other than that, I think, most of the mistakes that Fred touched on are probably the most common mistakes. Again, I'll just say, expecting too much is really a big mistake. The people expect that you just press these two buttons and you get perfect color. I don't know that we'll ever see that, and I don't think it's a realistic expectation. The whole idea is to make the process easier, to get from point A to point B, and I think the color management has proven at least in my shop to have done that. There are a lot more people out there that would propose that it doesn't work, but a lot of people really haven't tried it and I would suggest that you investigate the hardware and software possibilities and give it a try, because it does really work.

Mr. Fraser: Before we open up for questions, I'd like to add my number one color management mistake, which is misdefining color management systems, considering them as this new satanic thing or this new magical thing. They're just another way of getting from one color space to another. We've been doing this for 40, 50 years with all scanners scanning in RGB. And all printing is done in CMYK. Color management doesn't do anything new. It's simply another tool for converting from one color space to another. It's a more flexible tool than what we're used to. It's not a closed proprietary system. Now, that we have the ICC profile format we have the potential to work cross-platform, to use different systems, which is a very, very mixed blessing, admittedly. But, there's nothing new in color management, and the people who say this stuff can't possibly work, and even if it did work we wouldn't want it, are simply misunderstanding what color management is. It's just another set of lookup tables and a way to connect them. We have five minutes left, so I'll take some questions. Yes, ma'am.

Audience: Just a [inaudible] you were talking about stage three and four of the [OUT's] and the [inaudible] you're offering many, many times, than you've ever explained it.

Mr. Fraser: Okay. The question was could we explain what we mean about the lots and the monitors and the sound control panel. Fred?

Mr. Bunting: Monitors and sound ---

Mr. Fraser: While Fred's vamping, I'll tell you that basically in monitors and sound you can choose a monitor profile and when you choose that monitor profile in monitors and sound it will actually change the behavior of your monitor because there is a lookup table built into that profile which gets downloaded to the video card. If you choose the same monitor profile in the ColorSync control panel, nothing happens to the monitor, so at very least it's confusing and inconsistent.

Mr. Bunting: Is this all profiles, I thought this was only some?

Mr. Fraser: Well, this is only some monitor profiles too, which makes it worth, but any of the monitor profiles that are created by the ColorSync calibrator, and now I guess for better or for worse, some vendors are starting to rev their monitor profiles to also include lookup tables.

Mr. Bunting: This is not in the ColorSync 2.5 monitors and sound control panels, but in the ColorSync 2.5 version, there's an area where you can click on profiles. When you do that, you're doing two things. You're selecting a profile and making it the new system profile, but you're also downloading a lookup table that is embedded in --- I don't

want to use that word embedded. It is included inside that profile. And that's a nice thing that Apple obviously intended, so your profile's going to sync up with your lookup table. But the problem is, it also changes the behavior of the device, so in my opinion, it's not really a profile that you're clicking on. It's a setting file, and so in my opinion, they've munched the two concepts together. Does that explain it? I wish I could show it, but this is not the right version.

Audience: [Inaudible] what do we do about it?

Mr. Bunting: Just don't go into the monitor control sound panel and click on an ICC monitor profile. That's the awkward thing about this advice. I'd like to tell people not to go to monitors and sounds, but there's a lot of really good useful stuff you can do there. However, there's a certain area where if you go there and you have a monitor calibrator, the two will conflict with each other.

Mr. Fraser: Yes it's just something that you need to be aware of. If you're using the ColorSync calibrator, for all your monitor calibration it's not a problem. If you're using a third-party calibrator, and you click on that profile and you click on an Apple-generated profile in monitors and sound, it will wreck your third-party calibration and when you switch back to the third-party profile, it may not restore the lot, so you will then have a monitor that's out of sync with your profile. That's the danger, so you just have to be aware of it. Yes, sir?

Audience: [inaudible]

Mr. Fraser: The question was, how can you assign a profile to the monitor without going through monitors and sound? You can assign a profile using the ColorSync. With ColorSync 2.12, it's the ColorSync system profile control panel. With 2.5 it's simply the ColorSync control panel. And, what that's doing is telling the color management system that this profile represents your monitor. It's up to you to then do something to make sure that that profile actually does represent your monitor. That is the difference between characterization and calibration.

Speaker: And, in fact, I would word the question differently. You're not really applying a profile or associating a profile with that monitor, it's sort of a system, and it's telling the system something about your monitor, it's not doing anything else.

Speaker: That raises one other problem that I've mention that I've run into. It seems that more and more printers and scanner manufacturers are installing ColorSync when they install other components, and apparently, I'm not sure if this has changed recently or not, Apple is not giving permission to these particular people to install ColorSync 2.5. So, if you have ColorSync 2.5 already installed and let's say you get a brand-new Epson printer, and you go to install the Epson software, the Epson software is going to install 2.5 over version 2.0, and that can cause all kind of problems, and unfortunately, in the case of the Epson, you cannot do a custom install and not install ColorSync 2. So, if you're running ColorSync 2.5, be very careful when you install software to make sure that you're not overriding your newer version with an older version. What can happen then is you lose all of your preferences. You may have had a custom monitor profile that you may have loaded into ColorSync 2.5 --- well, after ColorSync 2.0 is written over it, it's not there any more and you may think that it's there. So, keep an eye on that.

Mr. Fraser: Okay, one last question, very quickly.

Audience: [inaudible].

Mr. Fraser: The question was, if you accidentally load one of these profiles in monitors and sounds, how do you get rid of it? How do you get back to your original monitor calibration. The specific details would depend on what third-party system you were using for monitor calibration, but generally loading that calibration utility --- like the Adobe gamut control panel or the Colortron monitor calibration control panel --- usually just loading that control panel and turning monitor calibration off and then on again will reload the correct lookup table to the video card.

[Speaker]: That in fact is one of the problems that sometimes you can't.

[Speaker]: I would think zapping the P-RAM, in the worst case, would probably flush it.

[Speaker]: Actually, I don't think it does.

[Speaker]: No?

[Speaker]: That's the problem. It gets stuck sometimes.

Mr. Fraser: Okay. Well, that's all we have time for. So, thank you all for coming. We'll see you later this afternoon.

[Applause]

Mr. Bunting: By the way, I will be down at the XRite booth, booth 601, for the next couple days if anybody wants to stop by and chat. Thanks.

[End of Session]

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