The Steeper the Curve, The More the Contrast

Topics: Using curves to assign more contrast to the most important areas.

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Author's comment: Drum scanner operators had been using this technique for decades without understanding its theory. This column was the first to explain how and why it worked. It has become an important part of every edition of *Professional Photoshop,* with more examples each time.

This archive, to be released over several years, collects the columns that Dan Margulis wrote under the *Makeready* title between 1993 and 2006. In some cases the columns appear as written; in others the archive contains revised versions that appeared in later books.

Makeready in principle could cover anything related to graphic arts production, but it is best known for its contributions to Photoshop technique, particularly in the field of color correction. In its final years, the column was appearing in six different magazines worldwide (two in the United States).

Dan Margulis teaches small-group master classes in color correction. Information is available at http://www.ledet.com/margulis, which also has a selection of other articles and chapters from Dan's books, and more than a hundred edited threads from Dan's Applied Color Theory e-mail list.

3

The Steeper the Curve, The More the Contrast

Color correction is a give-and-take operation. Once an image uses the entire available space, there can be no gain in one area without sacrifices in another. Every improvement thus has a price. Fortunately, there are real bargains out there.
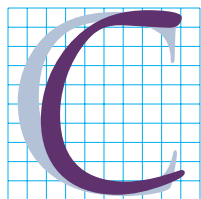
Color correction is like life. We are forever having to make decisions involving allocation of scarce resources. I have eight hours free during which I would like to improve my skills; should I spend it making sure I understand every feature of a program I already know pretty well, or should I learn a new one? I have a couple thousand dollars available to spend on hardware: should I buy a disk drive, more RAM, a portable viewing booth, or a new CPU?

Tough calls like this are what put the fun in color correction.

As we saw in the last chapter, there *are* some free lunches available. There, we avoided being shortchanged by making sure we used the full available tonal space, every time. And we adjusted curves so that colors that were supposed to be neutral got that way.

Those moves were unconditionally positive. They improved things at no cost to any aspect of the image. Best of all, very little judgment was called for.

Once there is a full range in an image, however, we pay a price for any further moves. Sometimes the price is too high, but it is sometimes astonishingly cheap. To be an adequate color technician one need only grasp numbers. To be good at it, one must be a bargain hunter.

Figure 3.1 *Below, each row shows the result of a single curve applied to each of the three originals, above. Can you guess the shapes of the three curves that created the three rows?*

To illustrate, we will use the same rules as last time. In correcting, local selection is not permitted. Neither is the use of any retouching tool. All moves must affect the image as a whole. The colorspace will be exclusively CMYK, and all corrections will be accomplished by means of curves.

As Long As It Catches Mice

In Spanish, there is a saying that goes, in the nighttime every cat is a gray one. Entirely too many computer artists amend this to say that all cats are gray as long as the highlight and shadow are correct. If that was your impression, consider Figure 3.1.

The top row is the original version of each of three felines. I have preadjusted each to have a good highlight and shadow, which for black and white work on this kind of paper is 3^K and 90^K, respectively. (If you are wondering why this shadow sounds a bit higher than its color equivalent of $80^C70^M70^Y70^K$, it's because with four inks in play it's harder to see detail in such areas, and in CMYK there is often an arbitrary limit of 300 or less on the sum of the values of all four.)

Each of the other three rows shows what happens when a certain curve is applied to each of the three images. As you can see, the original was not the best possible reproduction of any of the three cats, because in each of the lower three rows, there is one cat that's better—and two that are worse. You'll see the three curves that made these rows in a minute. Meanwhile, can you figure out what they must look like?

The images in which we set highlight and shadow in Chapter 2 were all fairly busy, by which I mean they contained several important objects or colors. Some

images are like this, but many more are not. Product shots, fashion shots, images of animals, food shots—all generally have only one or two color ranges that are important. The rest is just background.

So it is with Figure 3.1. Each image is about a *cat,* not a background. If the price for improving the cat is making the background lose some detail, so be it. Just as I have only a certain amount of money to spend on computer hardware, I have only a certain amount of contrast to spend on this image. And, in these pictures, I propose to spend it on cats, not backgrounds.

I'm starting the discussion with black and white images because they are simpler: there's no need to worry about how the plates interrelate. Now, let's talk about why setting highlight and shadow works, and how we can extend the principle to bring out more detail in the important areas.

Consider a black and white image in which the highlight value is correct, but the darkest value is only 60^K.

Correcting this invariably creates a staggering improvement. A simple curve that leaves the zero point alone and moves 60^K up to 90^K will not just darken the picture: it will profoundly hike contrast throughout. Every detail will become more pronounced because there are now around a third more tones available. Any two locations in the picture will have more variation between them than before the correction. This variation is what gives an image snap.

This by-the-numbers method is a great start, but it is somewhat wooden. As we saw, it can even be mastered by a color-blind individual. Without such a handicap, the intelligent artist can do better.

Curvewriting boils down to this: the steeper the curve, the more the contrast.

The default curve is a straight line at an angle of 45°. If we change the default in any way, certain areas will become steeper than 45°, and certain others will become flatter. Any objects that fall in the steeper areas will improve. Unfortunately, anything that falls in the flatter areas of the curve will get worse.

In our hypothetical example the curve was steeper between 0^K and 60^K—and much flatter between 60^K and 100^K. We don't think about that part, because nothing in the image falls in that range. The correction therefore has nothing to lose. The curve damages an area of the picture that does not exist.

If you accept that, it is only logical to damage areas that *do* exist, but are not important. It is thus possible to trade quality in unimportant parts of the picture for extra mustard in the parts we care about.
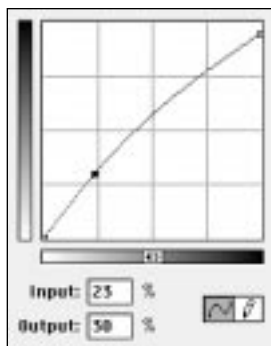
Figure 3.2 *The three curves that created the alternate rows of Figure 3.1. Left, second row; Bottom left; third row; Bottom right, bottom row.*
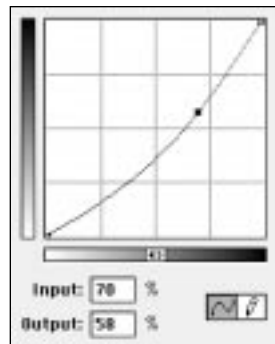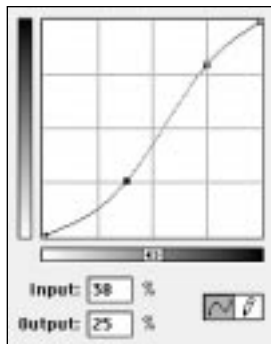
A white cat lives in the light end of a curve. A black cat, in the dark end. A gray cat, somewhere in the middle. That's enough information for present purposes, but normally one would like to narrow it down a little and find the exact range. This can be done by running the cursor over the lightest and darkest area of each cat and recording the resulting Info palette numbers. Alternatively, with the curve of a single channel open, we can move across the image while holding down the mouse button. This will generate a circle on the curve that will indicate the value of whatever is currently beneath the cursor.

Granted that the highlight and shadow start out correct, it still is possible to write curves, as Figure 3.2 shows, that are steep where a specific cat is found. Provided, that is, that we agree with what any of these cats would say, which is, anyplace a cat is not is a place unworthy of our attention.

Now, one last question before we look at the curves. Each of these three curves is intended to make a single cat purr, at the expense of the other two. The first part of the question is, which row hosts the two *worst* cats? I assume you agree that it's the second row from the bottom. The gray cat there is great, but the other two are much the worse for wear.

Why are the black and white cats so poor in the row that favors the gray one, even compared to what happened to the white and gray one in the row that favored the black one? (Hint: if you know, you are a long ways toward also knowing why the best retouchers write curves in CMYK rather than RGB—but we won't get into that for another few chapters.)

There is a big difference between a single image of three cats, and three images of one

cat. If all three cats were in the same picture, we'd be stuck with the original, if its highlight and shadow were correct.

But if even one cat is missing, this opens up space to maneuver. This kind of retouching is much like shopping: it's one thing to know what you'd like to buy, and another to find the money to pay for it. Or, to use a better analogy, it's like horsetrading. To get what you want, you need to find something you're willing to part with.

The curves of Figure 3.2 each get steeper in the region occupied by one particular cat. To pay for it, they get flatter in the tonal ranges of the other two cats, squashing contrast. It would also be possible to write a curve that helped *two* cats at once, paying for it by damaging the third.

And why are the black and white cats hurt so disproportionately badly by the curve that is aimed at improving the gray cat? It's all a matter of range. The gray cat originally had the most variation in its color of any of the three (the white one, by a narrow margin, has the least). Therefore, the area it occupies on the curve is longer, more expensive to correct, requiring more of a sacrifice elsewhere.

High Key and Low Key Images

Discussing black and white at such length in a book about color is not a waste of time. To be successful in CMYK, we have to realize that we are working not with a single color image but with four black and whites. Each one can be treated individually, and yet the four together constitute a family whose relationships must be respected.

Consider an image where the highlight is correct, but the shadow is $70^C70^M70^Y70^K$. This value indicates a red cast, because there isn't enough cyan ink. We need 80^C, not 70^C. So, we have to fix it.

The obvious way to do so is to grab the 70^C point of the curve and drag it up 10 points. A second way would be to grab the top right point of the curve and move it to the left, preserving the straight line, but making it steeper. And there are many other ways of making 70^C become 80^C, as illustrated in Figure 3.3. Which one should we use?

In real life, it would be unusual to have all of these choices, because we still have to meet the four basic requirements set out in Chapter 2. Namely, we need not only a good highlight and good shadow, but neutral colors where appropriate, and valid fleshtones.

Figure 3.3 *If the objective is to make values that were 70 percent increase to 80 percent, any of these curves will do the job—but they will have very different effects on the overall image.*
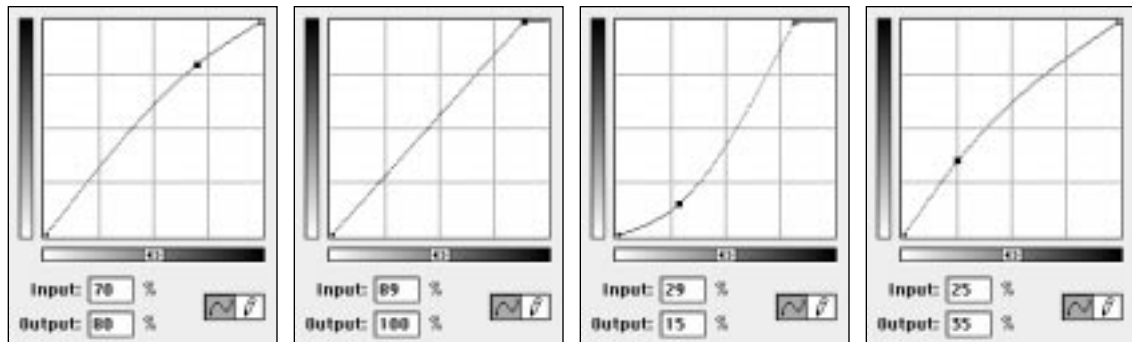
If the image has no neutral colors or flesh-tones in it, we may be able to use any one of these four curves. But most images are not like that, so the chances are we can forget about two or three of these shapes.

Which may still leave us with a choice.

When a choice exists, we resolve it in favor of the option that makes the important areas of the image fall in steeper areas of the curve. A professional might use the term *keyness* here. The picture of the white cat is a *high key* image, meaning that the important areas are light. The black cat is a *low key* image. As far as I know, there isn't a specific term for the image of the gray cat.

Figure 3.4 is a rare specimen, an image that's simultaneously high key and low key. Everything of importance here is either light or dark—there is nothing in the middle. The correction is obvious: steepen the ends of the curves, flatten the middle in all three CMY colors. In the black, there is no need to bother about steepening the light end. As the color circles indicate, the ice is so light that there's no black in it at all.

Most color images are simultaneously high and low key, but in a far different way. Consider a picture of a lawn. The lawn is green. CMYK greens are mixes of yellow and cyan. And in the greens of nature, yellow always predominates. In a lawn we would see heavy yellow, semi-heavy cyan, and light magenta.

In other words, the yellow, if it were a black and white, would be a low key image, whereas the magenta would be high key.

Or, to put it another way, the yellow is a black cat, the magenta is a white cat, and the cyan is a gray cat. The three curves we would use to correct such an image are in principle those of Figure 3.2.

Three different curves for three different cats. That is why we use the individual channels rather than the master curve, because we have already seen what happens when we try to correct all three cats with the same curve.

And while we are discussing why we do things one way and not another, let me bring up why we use curves rather than the Image: Adjust>Levels command.

Levels is nothing more than a curve with only three points: the two endpoints and a point in the exact center. Like curves, it can be applied to each channel individually. Effective moves are possible with it. High key and low key images can be handled with Levels by moving the midpoint up or down. This isn't quite as accurate as raising or lowering the exact point at which the main object of interest ends. In other words, light objects don't just end at 50 percent for our convenience; they are just as likely to pick 42, 37, or the square root of 1,500.

But this is a technical argument. I suspect that if I had corrected the white or black cat using Levels nobody would have known the difference. The gray cat is another story.

When the interest object falls in the center of the tonal range, rather than the ends, one really needs four points on the curve. One needs to make what some people refer to as an S curve, of which the second version of Figure 3.2 is a mild representative.

This can't be done in Levels, An S curve suppresses detail in highlights and shadows in the interest of developing it in the midtones. That's usually OK, but blowing the highlights and shadows out altogether, as Levels would do, is not.

Two of these three cats, then, could be corrected effectively with Levels. That's not bad. The only thing is, we work mostly with

color, not black and white images, and a color image is made up of three or four channels, and almost invariably one or more of them resemble the gray cat.

On to Bigger Game

As color can be seen as a bigger, more complex, and more dangerous relative of black and white, so does Figure 3.5 relate to the kitties of Figure 3.1.

Correcting this image doesn't stop with setting a highlight and a shadow. Here, unlike the images of Chapter 3, we have one obvious object of interest, one object that defines the whole picture. We would like to bring out detail and definition in the tiger, and if that should happen to harm detail elsewhere that is just too bad.

This is done just the way we handled the cats, except that here we have to do it four different ways, one for each channel. The black channel resembles the white cat. The cyan and magenta channels resemble the gray cat, and the yellow resembles the black cat. Knowing this, if we were sloppy we could actually take the appropriate curves directly out of Figure 3.2, apply them to this image, and see a substantial improvement.

It's much better, however, to measure the exact range of the tiger and be surgical with the curve. The more accurately the curve targets the tiger, the more precise the cor-

Figure 3.4 *The term* high key *means an image where most important detail is in light areas;* low key *means important darks. This unusual image can be said to be high key and low key simultaneously. The corrected version, below, closes up some of the unused space in the middle in favor of more detail in both highlights and shadows.*
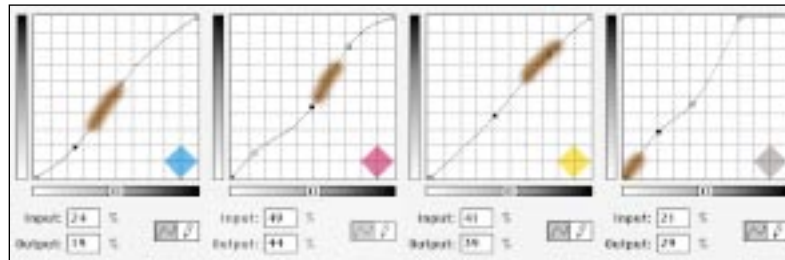
rection, and the less the undesired impact on the background.

Too many people select the tiger and correct it without touching the back-

Figure 3.5 By making the tiger (brown patches on curves) fall in steep areas of at least the CMK curves, detail is enhanced. It also emulates the phenomenon of simultaneous contrast, breaking the animal away from the background.

ground. This invariably looks unnatural, regardless of how careful the selection. The curves method is the method of the eye.

This particular exercise is useful in understanding not only color correction, but also human evolution. We discussed earlier how we perceive colors differently depending on what is next to them. Figure 3.5 shows why. Tigers like to prowl in areas just like this, where their color blends into the background. It was obviously rather useful for our prehistoric ancestors to know whether a certain stream had a tiger in it before going in for a swim.

After all, we don't run as fast as most other animals. We can't smell tigers as well as other animals can. And we certainly don't match up well *mano a mano* with a tiger. Aside from our impeccably designed hands, our biggest physical advantage is, we see color better than other animals do. And, per Darwin, evolution will enhance the advantages that animals already have. Hence, our unique sense of simultaneous contrast, which enables us to detect such slight variations as a tiger in a yellow stream when there is a yellow bank in the background.

Notice how, in addition to enhancing the tiger, the correction changed the color of the water, making it greener. This effect makes the true calibrationist howl as if several tigers were after him: sacrilege! This is not in the original art!! The water didn't change color just because a tiger happened to be in it!!!

But yes. Yes. Read *Origin of Species.* The way the human visual system works, water *does* change color when a tiger wades in. This is a preface to a tirade against color scientists that will commence at the start of Chapter 10. It is also why the bottom half of Figure 3.5 looks so convincing.

Do We Suppress the Snow?

Figure 3.6, yet another feline, is a further variation on the theme of give and take in color correction. In Figure 3.5, most people would agree that the tiger is of such paramount importance that we would be willing to let all lighter and darker objects lose contrast. This time, it's not so clear.

The bobcat's range can be enhanced in the same way the tiger's was. This time, the animal being more neutral than the tiger, all three CMY channels resemble the gray cat of Figure 3.1. If we apply that shape of curve to the three channels, the bobcat will gain detail—but the snow will lose out. And the delicate detailing of the snow is one of the more interesting features of the image.

So there you have it. The more you are willing to suppress the detailing of the snow, the better the bobcat you can have in return. The more you want to concentrate on the bobcat, the lower you make the lower point of the bobcat's range on the curve in each color. The more you do this, the flatter the snow will become. Your priorities on how far to go may be different than mine. Almost everyone would think that the middle version of Figure 3.6 is better than the top one. The vote might well split on whether the bottom one is better than the middle. The curves that produced both corrected versions are shown in Figure 3.7.

The successful retoucher is always on the lookout for something to suppress, some means of financing the improvement in the important areas. This means a continual hunt for ranges that are not in use.

As images get more complex, seat-of-the-pants responses have to give way to

Figure 3.6 *The bobcat in the original, top, is obviously the focus of the image. But is the snow important as well? If it is, the middle version preserves it, while extending the range of the cat into the shadows. The bottom version sacrifices the snow in favor of an even more detailed animal.*

more careful analysis. Often, horrors, we actually have to take out a piece of paper and start writing down some readings, but the extra time is worth it, because usually we can find unused color ranges. When we do, we will mercilessly compress them.

Figure 3.8 is the most difficult correction so far. Because it's a busy picture it resembles more the images of Chapter 2 than the cats we have been working with so far.

If this were a black and white image, the strategy would be fairly clear. The lightest significant areas are the lights themselves, and they don't carry a lot of detail. The second lightest significant area seems to be either the rugs or the column in front of the desk. Whichever, it is much darker than the lights, and therefore, the range we can compress is everything between. Probably, we would treat the lights as specular highlights and blow them out to zero. We could then find the value of the lightest portion of the column, and lower that to about 5^K. That would certainly steepen the curve.

Unfortunately, this is *not* a black and white image, so this approach won't work. Do you see why?
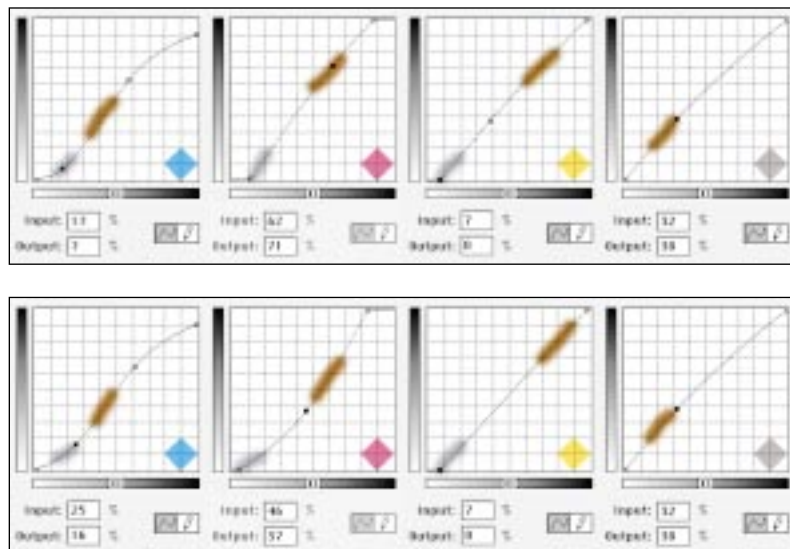
Figure 3.9 shows the magenta and cyan channels of the color image. In the magenta, the plan works just as outlined above. The lights are still the lightest object, and the columns are the second lightest. So we compress the range between them, not caring even if we take a sledgehammer to detail in the lightest areas.

But in the cyan plate, the second lightest object is not the column but the red floor. And there, detail is critical because it establishes the grain of the wood. We definitely can't afford to crush the highlight the way we did in the magenta. And the black channel will have a similar problem.

Some quick measurements: the lightest spot in the original image is in the chandelier to the rear. It starts out at $7^C4^M4^Y$, a little high. The darkest point, $66^C77^M73^Y66^K$, is in the shadow beneath the farthest chair. A typical value for the red floor is $17^C94^M100^Y4^K$, and for the column is $30^C33^M53^Y1^K$.

We can't bet the image that the lights themselves should be white. Therefore, there is no particular need to have a balanced highlight. And, as the lights carry no detail to speak of, there should, contrary to usual practice, be no

objection to having a zero value in any or all channels.

The shadow value suggests a red cast, but further investigation is necessary. It *looks* like it should be neutral, but it's in the middle of a red floor, and that could contaminate the readings. It's a good idea to check the chair itself, which should definitely be black, although it's slightly lighter than the shadow itself. And the chair measures $68^C78^M66^Y61^K$—still red. (Reminder: a neutrally balanced shadow has roughly equal magenta and yellow, and about 10 points more cyan, with the black being irrelevant.)

For all this picture's complexity, that shadow value is our only restriction, the only thing that *has* to be fixed. After all, the other areas that normally concern us don't exist here. There is no highlight, there are no neutral colors, and there is no fleshtone.

Therefore, there is considerable flexibility on how to write the curves. Naturally, we make them steeper in the areas that matter. Here's my approach:

Figure 3.7 *The curves that produced the bottom two versions of Figure 3.6. The bobcat's range is highlighted in brown and the snow in gray. Note, in the bottom curve, how much flatter the snow ranges of the magenta and, to a lesser extent, the cyan are. This accounts for a better bobcat—and poorer snow. Was it worth it?*

Figure 3.8 *The original, top, has little happening in the quartertone. The second version horns into this unused space. The third adds a Selective Color move to darken the windows.*

- **Cyan** needs to be strengthened in the shadow, but that doesn't mean just a wooden raise of the curve. Instead, let's emphasize the contrast in the floor, and between the walls and the darker areas of the image. So, since I don't care whether the lights have a dot or not, I make the curve start at the lightest point of the red floor, and raise the light part of the curve to make it steeper. Next comes a relatively flat area, reaching the range of the walls. This helps keep the second half of the cyan curve steep, adding definition in the shadows and breaking the windows away from the interior.

- **Magenta** is more straightforward. With no important detail in the highlights, I wipe them out. The shadow point needs to come down, but that is accomplished by finding the lightest point of the columns, and dragging *it* down until the shadow becomes reasonable. This, of course, makes the entire second half of the curve steeper.

- **Yellow** is such a weak ink that curve-steepening doesn't add much contrast to the image as a whole. Here, there is a modest gain by lightening the center part of the curve, representing the interior of the room, while holding the shadow point constant by

moving the top right endpoint of the curve to the left. This last move will cause large parts of the floor to print solid yellow. We can get away with this in the yellow plate, but it would be a bad idea with any other ink.

• **Black** is handled like the cyan, with a couple of differences. First, there is no need to reduce the highlight, since we don't start with any black in the lights. Second, we really want to have a very steep top half of the curve, because there's detail in the darkest part of the foreground chair that a good black can help bring out.

The second version definitely beats the first, but you might wish, on artistic grounds, to darken the sky to make the interior seem lighter by comparison. So, using Image: Adjust>Selective Color, I added cyan, magenta, and black to cyan. There is no pretense that this reflects what is in the original image. Omit it if you like.

Correcting a Machine Correction

In early 1997, I did a lengthy review of various scanner-control packages that try to color-correct without human intervention. They often get striking results. Novices think that this is magic, and in a way they are right. Set highlight and shadow properly, and the image magically looks a lot better. These programs try to identify the highlight and shadow point. If they are successful in doing so, bingo. Some are able to analyze color casts to some extent as well.

The big problem with such packages is that they don't think. They do just about as well as you or I would on images where the overall color balance is reasonable and where the highlight and shadow are easily identifiable. The horse image of Figure 2.11, on the other hand, was part of the test suite, and every program messed it up pretty badly. Most of them made the horses even pinker than they were in the original.

Figure 3.9 *Above, the cyan, left, and magenta, right, plates of the original of Figure 3.8. Below, the correction curves that produced the middle version.*
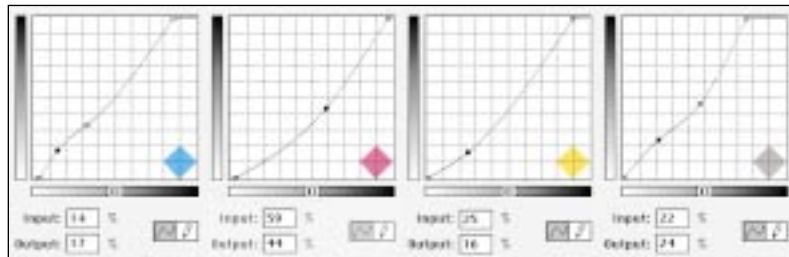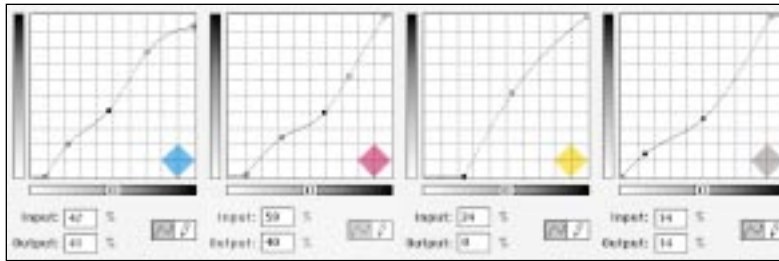
Figure 3.10 *The original, top right, has a reddish cast. Also, an automated correction chose the wrong highlight. The curves at left correct this but also add contrast to the walking area around the pool, the pool itself, and the trees.*

Similarly, images like Figure 3.9, where there's a range of choices of highlight and shadow and finding the right one is critical, are quite difficult for nonhumans. Results like those obtained by the color-blind person in Figure 2.2 are not uncommon.

The top half of Figure 3.10 has in fact already gone through such a correction, one that's become much more common than people realize. It's a capture from a digital camera with an automated range and color adjustment, very similar to, if not as sophisticated as, the programs I tested. As this is also a rather complicated image, it's a good real-world test.

About two-thirds of the way to the right of this image, some 15 feet from the far side of the pool, a guy wearing a white shirt is bending over his lounge. The camera felt that this shirt should be the highlight. For the shadow, it picked someplace in the trees.

Since we couldn't care less whether that shirt blows out, it shouldn't be the highlight. In fact, I'd forget the umbrellas as well and go for the far lounges. They start off at $12^C11^M24^Y$. There's not much to be done with the shadow. Other than the chaises there's nothing we can bet on being neutral. The people are much too small for us to measure fleshtone accurately.

There is, however, another known color that we can use for guidance. While we can't know exactly what hue a given tree is, it doesn't seem like too much of a stretch to say that it ought to be some species of green.

The trees in this original aren't. A typical value is $57^C64^M100^Y38^K$. This is a dark yellow, actually closer to orange than it is to green. We don't know how much, but the magenta surely has to go down and the cyan come up.

In writing the curves we also have to consider where we want to gain contrast. This picture is rather busy, but I think the areas to go for are the pool itself, the trees, and the mosaiced terrace around the pool.

In addition to lightening the highlight, therefore, I arranged for the curves to be steeper in these areas, to the extent this was possible while lightening the center of the magenta curve.

- **Cyan** is the unwanted color in the terrace, so it's important to have the lightest part of the curve be steep. The pool and the trees are both found in midtone to three-quartertone, so steepening that area helps both. The shadows and the quartertones pay the price.
- **Magenta** is difficult. The center has to come down if the trees are to become green. This, however, will make the shadows quite green as well. What I'd really like to do is move the top right endpoint sharply over to the left, to make the darker half of the curve extremely steep. Unfortunately, that isn't possible here. Some sunbathers

65
16 46
2

69
8 40
2

are wearing red shirts, with values of 90^M and higher. Moving the endpoint any further to the left than what's shown would posterize them. The steepening of the highlight area of the curve is, of course, for the terrace.

• **Yellow** is, as pointed out earlier, not a big contributor to contrast. Here, though, it's important to steepen it for the effect it will have in creating color variation in the pool. As both pool and terrace are relatively light in yellow, this curve is simpler than the three others. All that's needed is to raise the midtone.

• **Black** is also easy. The trees are dark, everything else is light. There's almost nothing in between. So I steepened both ends of the curve, flattening the middle.

Remember, by the standards of Chapter 2 the numbers in the original aren't so bad. But with these four dissimilar curves, a substantial improvement can be had.

Of Contrast and the Paycheck

This two-chapter series of color corrections demonstrates that there really is a place for the thinking artist. No automated system can hope to equal the work of someone who can make intelligent judgments about which areas of an image need emphasis and which can be sacrificed.

Yet the conventional wisdom still is that the changes we have just seen are impossible. Here is a quotation from a book on halftone reproduction that was published in 1993.

It cannot be emphasized too strongly that the quality of all photographs reproduced by the halftone process depends entirely on the quality of the original. No printing process, however refined, can compensate for a sloppy original. While a good process technician might well be able to enhance part of an image, it is usually at the expense of a tone elsewhere. For example, if lighter tones are heightened, the blacks could at the same time lose some of their density.

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Right.

Such sanctimonious piffle gets disproven every day. Anybody would prefer to start with the best image possible, but life isn't like that. As we have seen, a lot can be salvaged from second-rate originals.

No question, when we make an improvement, "it is usually at the expense of a tone elsewhere." But the author of these remarks did not grasp that this expense can be quite reasonable, in the hands of a thinking artist. It is quite true that every change suggested in this chapter had a cost. Fortunately, a lot of the time, the price was right.

When we go to the bank to cash our paychecks, the bank does not give us an extra percentage because we happen to be graphic artists. We are given a fixed amount of money, which we then have to allocate to best advantage.

Your spending decision can be entirely different from mine. It all depends on our priorities. If you wish to take a Caribbean vacation this winter, this may mean no meals in fancy restaurants for a while. If you are saving for a child's college education, you may have to skimp on the type of car you drive.

Few people seem to have trouble with this concept, and yet everybody says that color correction is difficult. Go figure.

Quick & Dirty

COLOR CORRECTION AS HORSETRADING

✓ If the full range of colors is in use, there will be a price for any further improvement of the overall image. We should therefore always be awake to the possibility of a favorable tradeoff, where detail in an unimportant area can be exchanged for contrast in a more vital one.

✓ Any change in the default curve will make some areas steeper than they were before, and others flatter. Objects that fall in the steeper areas of the curve gain contrast; objects that fall in the flatter areas lose contrast.

✓ Applying contrast-intensifying curves globally is easier and faster than selecting parts of the image and working on them locally. Most of the time, the result is also more believable.

✓ Two separate images of two objects would, in this method, be treated entirely differently from a single image in which both objects appeared. Furthermore, the separate images each would look better than the composite.

✓ When we look closely at a certain object, it gains detail, while everything else in our field of vision loses out. The camera, on the other hand, is egalitarian. We are fully justified, therefore, in emphasizing the details that we would like the viewer to focus on, at the expense of those we consider less important.

✓ Before beginning, take an inventory. List all the ranges in each color that fall in important areas. Use it as a guide not only to the areas that deserve extra contrast but to those that can be sacrificed.

✓ Writing curves to increase contrast does not excuse us from the obligation to keep neutral colors neutral and to keep appropriate highlight and shadow values. Before applying the curves, check the Info palette to make sure that none of these requirements is being violated.

✓ The conventional wisdom in color correction is that everything depends on the quality of the original. That can become a self-fulfilling prophecy. With proper attention, decidedly mediocre originals can yield professional results.

✓ Yellow ink adds color balance but is too weak to help detail. Therefore, curve-steepening maneuvers are much more effective in cyan, magenta, and black.