

by Donald M. Tsusaki

INTRODUCTION

The Cooke 229mm f/4.5 PS945 Portrait is one of the most unique lenses available to a large format photographer. Although many think of the PS945 as just a soft-focus lens, implying that it therefore is of limited use, the PS945 is in fact highly versatile. Beyond its soft-focus as well as excellent sharp-focus capabilities; beyond its moderately long focal length, suitable for product or portrait photography; beyond its flare-free coatings and super build quality, the PS945 can also act as, if you will, a visioning tool.

The large format camera serves two basic roles, that of previewing, then capturing the image. Capturing the image encompasses all of the techniques and technologies, whether digital or analog, that ultimately resulting in converting the image to some sort of presentation format. In its previewing role, the large format camera, essentially the lens and ground glass, is an aid to photographic seeing.

One of the first exercises in Betty Edwards' book, "Drawing on the Right Side of the Brain," is to draw an upside-down picture of Igor Stravinsky. The idea is to shut down the left-brain that wants to name objects, and to allow the right brain to take over. The ground glass serves exactly this purpose in the preview role. Edwards also asserts that drawing requires five basic skills, the perception of edges, spaces, relationships, lights and shadows, and the whole (gestalt). The lens has the task of projecting the image onto the ground glass, an image that contains edges/lines, spaces, relationships, etc.

The PS945, just like any other large format lens, fulfills its role of projecting an image. The way it forms the image is what gives it added value in making a picture. One has to make a choice whether to render an edge or line in the image as soft or sharp, which means one has to pay attention to the line. One has to decide whether to

throw the background out of focus or keep it sharp, which at a minimum means paying attention to negative space, or photographically symbolizing depth. One can also consider how an out of focus background is rendered, not just as an uncontrollable photographic symbol of "out of focus," but where the diffused, blurred blobs of light or color become image elements in themselves.

By making the choices about how image elements are rendered more explicit, the PS945 can help to heighten the photographer's awareness as he or she sees photographically. This is what could make the PS945 a visioning tool for some photographers.

Overall the body of knowledge about the PS945 is relatively sparse. There are a few good resources from which one can learn about the PS945. With the lens, Cooke includes a CD that has an article from Jay Allen and a few pictures by Clive Russ. Jay's article gives some good hints about how to get the most out of this lens. Though the lens has been on the market for about 2 years, and certainly many photographers in that time have been exposed to the lens at workshops, so far few users have shared out their experiences. Searching the Internet yields some nuggets of knowledge about the PS945, but of course in no organized fashion. Most of the search returns, however, lead to questions about the lens and in many cases speculations about how the lens performs.

To augment the body of knowledge, this article shares my first learnings about the characteristics and behaviors of the PS945. My experimentations so far have centered around getting a handle on the basic characteristics of the lens: soft-focus, its uncommon optical behaviors, and some mechanical notes. I conclude with a proposal about building a community of PS945 users that could be aimed at extending the body of knowledge.

“You may not, and probably will not find out their full possibilities for some time. I had one lens in my possession for over two years before I discovered that it was the best one I owned.”

Alvin Landon Coburn, 1920, describing Pinkham and Smith lenses

FIRST IMPRESSIONS

Coburn may have had to discover the value of his lens over two years, but these days one needs to get a return on investment much quicker. At least, a photographer would want to achieve the greatest amount of satisfaction from his or her PS945 as quickly as possible. Coburn surely did not have any means as effective as the Internet to acquire knowledge. Today it is possible to speed up the learning process by accessing the experiences of others. Structuring a body of knowledge makes the learning process even quicker. However, reading and research ultimately satisfies mainly the instant gratification needs of the left brain; in the spirit of Coburn's quote, one should expect to spend some time using the PS945 in artistic endeavors to really discover its full possibilities.

If the PS945 anywhere near approximates the imaging characteristics of its ancestral predecessor, the Pinkham and Smith Visual Quality IV must certainly have been a wonderful tool to use. Though Coburn may not have been talking specifically about the Visual Quality IV, it is reflective of the way Pinkham and Smith brought lenses to the market – designing lenses based on the specific requirements of certain photographers and producing them in relatively small quantities. According to Barbara Lowry's history article, also included on the PS945 CD, J. Wallace Gillies requested Pinkham and Smith to create the lens that was dubbed the Visual Quality IV. Following their customary business model, P&S produced few of these lenses. Perhaps by shunning marketing P&S was able to keep demand within scope of their production capacity.

In spite of its rarity, the Quality IV became known for its imaging qualities.

Does the PS945 exactly duplicate the imaging characteristics of the Quality IV? Having never used a Quality IV I have no point of reference. Based on dialogs I have had with representatives from Cooke, I am convinced that they are being genuine with their claims. My belief is that the passion of the Cooke lens team to capture that *je ne sais quoi* of the Quality IV in their design dominated the creation process.

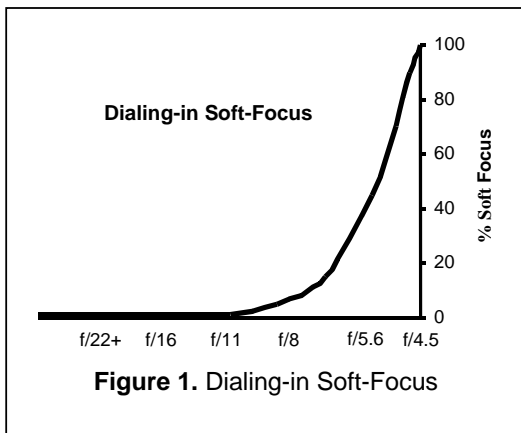
Beyond historical verisimilitude, the PS945 is successful in its own right. Its modern design surely improves upon the original. The manufacturing process most certainly produces more consistent results today. The Copal 3 shutter makes exposure predictable, and of course it is completely compatible with electronic flash. The lens coatings are superb. Even in strong backlight there is no ghosting or flaring. One could argue that the lens coating makes it impossible to exactly replicate the behaviors of the uncoated Quality IV for which flare may have been a key quality. Part of what makes the PS945 so versatile is that the design fuses the best of modern optics and manufacturing with the imaging characteristics of its famous forebear – and it is readily available today.

What makes the PS945 “versatile”? The most obvious characteristic that distinguishes it from other modern lenses is its ability to produce a range of image qualities from soft to sharp. In the middle of the soft-sharp spectrum it can produce images with a nice buttery feel. And on sharp end, it is equally competent as other lenses for f/64-type, all-over sharp images. In parallel, the PS945 gives slightly lower contrast for some subjects on the soft end and crisp high contrast on the sharp end. It performs well for distant subjects as well as in the macro range. The 229mm focal length is a very good compromise between the normal lens range and the typical portrait focal lengths. It has a slightly wider maximum aperture compared to most lenses available today,

and can reach a smaller aperture (f/90) than many lenses provide. Specialty lens is hardly an apt description.

SOFT-FOCUS

The soft-focus behavior of the lens is non-linear. If you use a reasonably strong loupe, perhaps 6x or more, it is educational to observe how soft-focus dials in as you vary the aperture. This is easiest to notice by looking at a specular highlight or a very distinct line created between a light and a dark object. Going from f/11 to f/8 there seems to be little soft-focus introduced, and one has to look hard for any differences. Between f/8 and f/5.6 the soft-focus starts to become easily noticeable. From f/5.6 to f/4.5 the soft-focus effects dials in at an exponential rate. So in the space of a 1/2 stop it is possible to make fairly large changes of soft-focus without having to go through too many contortions regarding exposure, e.g., +/- 1/4 stop. Figure 1 crudely represents this in a graph.



Some of those who have used the lens favor smaller apertures to create a subtle elegance to their images. The sweet spot seems to vary for different photographers, anywhere from f/5.6 to f/7.2.

The following pictures are attempts to isolate characteristics of the PS945 with little attention paid to producing artistic images. (A later update to this paper will

contain links to larger versions of these pictures on the PhotoVerge website.)

The first couple of pictures show how soft-focus varies with f/stop. Illustrations 1 and 2 were taken deliberately against a cluttered background, in part to get a feel about the “bokeh” of the lens.



Illustration 1. f/16



Illustration 2. f/4.5

At f/16 the tiny ice crystals fringing the plant remnant are tack sharp. Behind the plant were barren bushes with twigs randomly sprayed in all directions. In the picture, the background looks like brushstrokes, with out of focus highlights that were rendered as roundish blobs. At

f/4.5 the partially backlit ice crystals distinctly show the haloing that creates the soft-focus effect. As others have described this effect, it is as if an out of focus image is overlaid on a sharper inner image. Illustration 3 shows this in more detail.

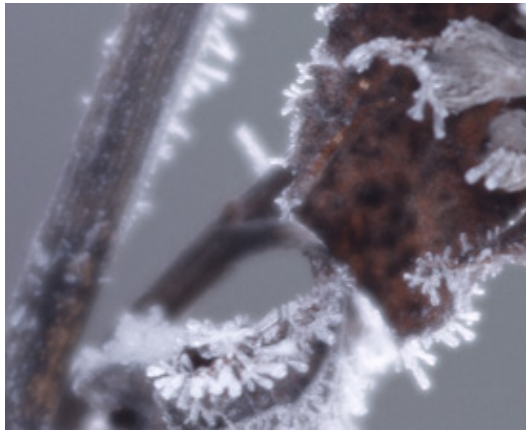


Illustration 3. f/4.5 detail

Compare also the background rendering between Illustrations 1 and 2. Map the three large white blobs on the right side of Illustration 2 to the corresponding highlights of Illustrations 1. The way the lens spreads out of focus parts of the image suggests some new ways to think about pictures. Perhaps in some ways, the background can become subject. Or rather than simply using a wide opening to make an image “pop,” in essence visually attempting to eliminate the background, with the PS945 one could try arranging the abstract rendering of the background as a contributing image element to the overall image. Paying attention to backgrounds in this way may trigger new modes of perception. This is one way the PS945 could become a visioning tool for you.

There are also differences in the way the PS945 renders images in comparison to modern sharp lenses. Illustrations 4 and 5 compare the PS945 with a 210mm Super-Symmar. This test is not a good scientific comparison, but does give some hints about the differences. In a proper test either the image sizes should be made to match, or the focal lengths of the lenses should be the same. Lacking the means,

and the patience, to be completely accurate, here the f/stop was simply kept constant at f/5.6.



Illustration 4. PS945 at f/5.6



Illustration 5. 210mm Super-Symmar at f/5.6

The point of focus is the rear part of the forward candleholder. Compare the soft way the PS945 renders the out of focus objects, such as the rear candleholder. Also the two lenses render the dimples in the background paper differently, where the PS945 is clearly softer. To get a closer look at how these two lenses produce their images, compare the two enlargements in Illustrations 6 and 7. These differences are most obvious in the specular highlights,

but one can also see how the PS945 spreads highlights into darker areas.



Illustration 6. PS945 at f/5.6, detail



Illustration 7. 210mm Super-Symmar at f/5.6, detail

These details point out another aspect about the soft-focus imaging of the PS945. The soft-focus halting is most noticeable when it spreads onto an adjacent darker area. In other words, one can expect to achieve more of a soft-focus feel where there are distinct contrasts, light against dark. Harder lighting, for instance from spots, produces more of a soft-focus effect than the soft, even lighting of a softbox. Backlighting, which in most cases means there are some extreme contrasts between blown-out highlights and shaded parts of the subject, is useful to emphasize

soft-focus. And of course you can choose any quality of light from hard to soft as one of the levers for controlling the soft-focus aspects of your images. Once again by bringing an imaging element, such as lighting or rendition of line, into the forefront of your consciousness, the PS945, the visioning tool, acts as a creative catalyst.

If you are digitally processing your images, you should experiment with how the sharpening or unsharp mask filters affect the soft-focus image. In some cases these filters actually degrade the soft-focus effect. Try turning off sharpening in both your scanning software as well as software such as Adobe's PhotoShop. Furthermore, resizing images and creating JPEGs can have a deleterious impact on the subtleness of the soft-focus effect.

The way the PS945 treats backgrounds is especially useful in macro-photography. The 1:1 magnification picture of mangostin fruits (Illustration 8) taken at f/11 has very tactile detail in the forward object. The focus very gently tapers off toward the background.



Illustration 8. PS945 at f/11, 1:1

To a certain degree the non-linear effect of soft-focus could be applied against the dimension of distance. Soft-focus is more apparent in close-ups than for distant objects while staying at the same f/stop. However, this effect is less relevant; the differences in typical subjects taken at

close vs. distant points make it hard to draw really good conclusions.

Illustration 9 was taken at f/4.5, with a little back tilt to retain some focus across the picture. The sun was just beyond the top edge of the picture, yet there was no significant flaring and no internal reflections. The barbed wire in illustration 10, which again was taken at f/4.5 with some back tilt, is relatively sharp.



Illustration 9. PS945 at f/4.5, back tilt



Illustration 10. PS945 at f/4.5, back tilt

In order to use wide apertures in bright conditions, just use an 8x neutral density filter. Under "sunny 16" with EI 100 film,

you can use f/5.6. It might be handy to have 2x and 4x neutral density filters as well for extremely bright scenes or to comfortably use f/4.5.

Beyond f/stop or distance, there are other factors that influence the perception of soft-focus in the image. Jay Allen in his article included on the PS945 CD suggests a number of other possible variables, such as:

- film choices, e.g., low vs. high saturation color film
- development choices, e.g., low vs. high acutance developers
- lighting, soft vs. hard
- racking out the lens a little beyond sharp focus to increase the apparent soft-focus

There are some other possible comparisons worth making in order to better understand how the PS945 performs. For instance, one could do more precise or representative comparisons with sharp lenses such as the 210mm Super-Symmar. It would also be instructive to look at other ways of creating soft-focus such as the image-degrading techniques of smearing Vaseline on a filter, stretching netting over a lens, using one of a variety of "soft-focus" filters, or applying soft-focus effects using image-processing software. Or one could compare the PS945 with other optical solutions for soft-focus such as the use of waterstop-type disks with edge perforations. From a historical perspective, one of the most interesting comparisons could be to compare images taken with the PS945 and the Visual Quality IV. As an aside, there are a few pictures by J. Wallace Gillies on the web, though there is no indication that these pictures were taken with a Visual Quality IV.

After spending some time with the PS945, I began to realize that soft-focus is not everything that this lens is about. It is in fact capable of producing a variety of image types, all of which can be controlled by the photographer. And what was surprising is how using this lens can

actually cause some paradigm shifts in the way one creates images.

UNCOMMON OPTICAL BEHAVIORS

When I first started using the lens, the soft-focus haloing made it difficult to judge when the focus plane was exactly where I wanted it. To neutralize the haloing, I tried focusing at $f/8$ or $f/11$. I expected that merely opening up the aperture would just introduce soft-focus effects. However, after puzzling over some results where the plane of focus was not where I expected it to be, I realized that there is a slight focus shift difference. Photographing something at, say, 2m by focusing at $f/8$, one has to rack the lens in about 1.5mm when the aperture is opened up to $f/4.5$ to maintain exactly the same point of focus on the subject.

Is this a problem? Not really. Refer to the article by Jay Allen that comes on the CD with the lens. In it he suggests that to add more soft-focus after reaching $f/4.5$ one could move the lens a little bit further beyond the focus point, that is to say, throw in a little bit of out-of-focus on top of the soft-focus. It takes some experimentation, perhaps focus bracketing, to guarantee repeatable results. The other option is to focus at a smaller aperture, then open up, letting the focus shift of the lens introduce a predictable amount of de-focusing.

There are two other approaches that could be used, depending on your needs. One is to simply focus at the shooting aperture, whatever that might be. This method leaves nothing to chance. The other is to focus wide-, or nearly wide-open, and then stop down. In this case depth-of-field may overcome the noticeable effects of focus shift. However, one should recognize that the focus shift works in the other direction. Stopping down after focusing wide-open on the eyes in a frontal portrait means the plane of sharpest focus will move slightly toward the ears.

At any rate, the focus shift is relatively minimal, but does become something to take into consideration, especially when close-up work.

The PS945 has some curvature of field. According to one of the lens designers at Cooke, this characteristic was also duplicated from the original Pinkham and Smith Quality IV. Indeed, the curvature of field is one of the behaviors that contribute to the PS945 "look". With 3D subjects wide-open, this is not problematic. With subjects where there is clearly a single point of interest upon which one places the focus, the curvature of field helps to throw other parts of the image out of focus quicker, and as mentioned above, adds to the overall soft-focus result. Although stopping down the lens does not change the curvature of field (see Stroebel, where he contrasts how stopping down a lens eliminates spherical aberration), the effect of curvature of field diminishes because the circle of confusion gets smaller. Pragmatically, that means if one is stopping down to achieve more depth of field anyway, curvature of field becomes a negligible factor. Probably where this becomes a constraint is when one wants to photograph a flat surface while using a wide aperture. Curvature of field may also be noticed when using front or back tilts for near-far focusing as is common with landscapes. The middle of the photo could show some de-focusing if one is shooting wide-open or nearly so. Illustrations 9 and 10 show a trace of this effect. Normally one would be stopping down anyway for landscape shots where both the background and foreground should be in focus.

As with any lens, diffraction starts to set in as the lens is stopped down to small apertures. With the PS945, diffraction is not very detectable even at $f/32$. Stopping down to $f/90$ diffraction is present, but with the PS945 it is not objectionable.

Relative to our expectations of modern lenses, all of these characteristics in the PS945 could be labeled aberrations. Technically speaking, they are. But the

sum-total of these characteristics is what make the PS945 a powerful visioning tool. Knowing how the lens behaves allows one to refine an image in subtle ways. To use a musical analogy, it is like how a French Horn player produces different tone colors out of one instrument, from the growl of the wolf in "Peter and the Wolf" to the lyrical, mellifluous sounds of "A Midsummer Night's Dream". Is a technical analysis of this lens meaningful? I think not. More relevant is to just go out and make great images. Knowing how the lens behaves qualitatively, though, gives you more opportunity to control the final result.

MECHANICAL NOTES

This lens looks distinctive. The gold ring and the shaping of the lens barrels give it a "Cooke" look, a trait that Cooke is maintaining with its new Convertible XVa. The finish is what one would expect from a premium product.

Given its wide maximum aperture and Copal 3 shutter, the PS945 is hefty. It is similar in size to a 300mm APO Symmar, though as with the Symmar, most of the bulk is determined by the shutter.

Whether its weight poses a problem depends on your requirements. Someone concerned about saving grams in a backpack may want to leave the lens home. The versatility of the PS945, though, may spark a change in a photographer's equipment complement. The PS945 certainly can replace one or more lenses of the 150mm 180mm, 210mm or 300mm class in terms of normal functionality, perhaps achieving a net savings in weight. Add to that the ability to choose soft vs. sharp rendition, it is conceivable that the PS945 can more than justify a spot in the backpack.

A sturdy front standard is necessary, as would be the case with any large objective. Anyone who already uses long-focus or telephoto lenses should have no problem with this lens.

With the lens racked out for close-ups or macro photography, it is mandatory to use a sturdy tripod. Extending the mass of the lens makes inertial moment a consideration. On a flimsy tripod it would take forever for the twisting and swaying of a camera in motion to damp down.

The rear element of the PS945 is small enough to make this lens suitable for even smaller lens boards such as the Technika. It is also small enough to use comfortably on a Technika front standard that requires that the rear element be no wider than 87mm.

RETURN ON INVESTMENT

Much of the discussion and speculation on the web about the PS945 has been of the nature of, "well, I'm not going to plunk down a bunch of bucks for a soft-focus lens when I can just smear Vaseline on a filter," or variations on that theme. If the aim is simply to make an occasional "dreamy-looking" picture, then the cheapest means for degrading a high-quality sharp lens makes the most economic sense.

The shame of it is that the discussion often goes no further. For that matter, seeking soft-focus for the sake of soft-focus is to apply a photographic trick, such as using a star filter.

Presuming one has concrete reasons for making an investment, which really ought to be the case whether the object is a lens, camera body, software, scanner, or whatever, then the question is what are some of the ways to achieve a return. In other words, how does the investment create value? Financially speaking, the clearest value creation results from making significant new sales based on your investment. I have heard an anecdote that one photographer wished the price of the PS945 was \$10,000 so as to make sure no one else can get their hands on this lens; he apparently feels that the unique characteristics of this lens give him a market edge.

Business cases could also take into consideration soft (if you will) or strategic values. The PS945's versatility may tip the scale for you. Or if you perceive the PS945 as a visioning tool, something that could facilitate your creativity, you may be able to close the gap in your business case, particularly if there is an opportunity to make more images that could sell, win prizes, or get into galleries.

Ultimately the investor has to make a suitable business case. The PS945 is, like every other piece of photographic equipment, a tool. It is useful to recognize, however, that this particular tool is capable of producing more than just soft-focus effects.

COMMENTS ABOUT COOKE

One of the differentiating qualities of Cooke Optics, Ltd., is its customer-orientation. No other optics company that I am aware of participates consistently in online discussion forums. And no other optics company seeks out input for new product designs directly from any and all photographers who wish to express a desire. Customer service and responsiveness is also top-notch.

With the PS945 and with the soon to be released evolution of the famous Cooke Triple Convertible XV (the new one is really a quintuple convertible), Cooke is differentiating itself in the market by making large format still lenses that have a tie to rich histories. This gives the Cooke lenses a verve that makes usual optics feel somewhat bland.

Whether Cooke will be successful with their new large format lenses remains to be seen. They have, however, clearly an angle on how to dominate selected niches.

EXTENDING KNOWLEDGE

Some discussions are underway about creating a special community of practice for users of Cooke lenses, a Cooke Lens

Community. The starting community could be for those who use the PS945. A core purpose would be for users to share their experiences and knowledge gained from using the PS945; other users could take advantage of the learnings of others in order to achieve results faster; and prospective users could gather more meaningful information and research in one concentrated place, information that would be more useful in their decision process than what can be garnered from marketing releases or random comments in discussion forums.

If you have interest in helping to build such a community, send an email to one of the contacts listed below.



Illustration 11. Reflection. PS945 at f/4.5, scan of Polaroid print

CONCLUSION

"It is the lens that draws the image for you," wrote Tom Ang. In this sense, all camera lenses are visioning tools. What sets the PS945 apart is the degree of choice available to a photographer for rendering picture elements – for instance, of line, texture, or negative space. Directly

confronting these choices may augment the photographer's seeing process.

Juxtaposing a thought from Cézanne against the quote above from Coburn: "Knowledge of the means to express our emotion is essential – and is acquired only after very long experience." One way to either shorten the path or broaden the scope of acquiring experience is for those in a community of practice to share their knowledge with others. Perhaps the thoughts shared in this paper may be helpful to some; or if they are meaningless, at least they can point out the creative cul-de-sacs.



Illustration 12. PS945 at f/4.5, back swing



Illustration 13. PS945 at f/4.5, back tilt/swing

REFERENCES

Allen, Jay, [How to Use a Soft-focus Lens, Featuring the Cooke Portrait PS945](#), Cooke Optics Limited, provided on the PS945 CD, 2002.

Ang, Tom, [Tao of Photography](#), Amphoto Books, New York, 2000.

Edwards, Betty, [The New Drawing on the Right Side of the Brain](#), Jeremy P. Tarcher/Putnam, New York, 1999.

Lowry, Barbara, [Cooke Optics Presents New Cooke Portrait PS945 Prototype Lens to Paul Wilson](#), Cooke Optics Limited, 2002, available at http://www.f32.net/Services/Equipment/Lenses/cooke_presentation.php

Lowry, Barbara, [English-made Cooke Lenses: Still in the Picture](#), excerpt from View Camera Magazine, May/June 2002, available at <http://www.f32.net/Services/Equipment/Lenses/cooke.html>

Lowry, Barbara, [Pinkham & Smith Company](#), Cooke Optics Limited, provided on the PS945 CD, 2002.

Stroebel, Leslie, [View Camera Technique](#), Focal Press, Woburn, Mass., 1999.

CONTACTS

Donald Tsusaki
info@photoverge.com

Barbara Lowry, Cooke Optics, Ltd.
barb@cookeoptics.com