



Tuning Light Intensity By Dr. Glenn Rand

Tuning light provides the photographer with maximum control of the light's intensity. While there are more controls for tuning the light within the studio, many of the aspects of intensity control are also available in the ambient/controlled situation.

Tuning light happens within a light envelope—the totality of the light sources, light modifiers and ambient light effects that create illumination for our subject. Tuning can add or subtract light within the envelope.

Using the light's on/off switch is the easiest part of adding or subtracting intensity. Though you may own five lights, you do not necessarily have to use all of them every time. There are situations in which additional lights will be called for, but be careful not to over-light.

When controlled, additional lights increase intensity, either generally or specifically, even in natural light. John Sexton talks about the making of his image “White Boulder, Dead Horse Point, Utah” that was exposed in the subtle available light after sunset. There is a white boulder in the foreground of the image that he envisioned as being a lighter tone to separate it from the background. “I photograph with available light, and I had a flash unit available, so this specific time I used it,” says John about his unusual



method. Adding light by multiple flashes creates more intensity in the foreground, even within the natural environment.

Intensity can be added and adjusted in multiple ways. First, a light source that illuminates all or part of the subject can be added to the envelope. The importance

Opposite: The image was painted with two flashlights. The first light was used with a red gel for a portion of the exposure. The second light was very small and directed to add light just to the flowers.

Left: The purple flower image was made with a long exposure of a reflection from water with motor oil floating on the surface. Only a flashlight was used to paint the flowers with light. Control of the light environment created only a small pool of light that could be changed both in intensity and direction to tune the light, which allowed reflections from the oil slick and created the light fall-off on the granite background.

of the amount of control for any additional light depends on the subject. Incorrectly added additional lights can adversely affect the light quality, particularly with highly reflective surfaces and transparent materials.

Many pieces of lighting equipment have variable intensity controls built into their operations. However, Yosef Karsh, the great portrait photographer, used a simple method based on light intensity to accomplish his photographs. If he wanted a 4:1 light ratio, for example, he would use eight bulbs as the main light and two bulbs on the fill side. All the bulbs were the same wattage, mounted in arrays next to each other and equidistant from the subject.

The more accessible concept to photographers is the idea of tuning light by moving the source. By applying the Inverse Square Law (ISL), light intensity can be



varied by simply moving the lights in and out. If the light is being reflected into the envelope, moving the mirror or fill card closer or farther from the subject also changes the intensity on the subject.

Since the ISL is based on a mathematical square function similar to photographic stops (shutter speeds, f-stops and ISOs), they work well together. We often use equivalent exposure, holding the light's intensity as a constant and can also hold the exposure constant while tuning the light. Using the ISL, you have a great deal of control to meet an exposure value.

In addition, f-stops, shutter stops, ISOs and the ISL all use or can use the number 2 as their base. Moving the lights closer or farther from the subject has a numerical relationship to full f-stops. The important thing about the full stops on a lens (f/1.4, f/2, f/2.8, f/4, f/5.6, f/8, f/11, etc.) is that they are all related to the power function of the number 2.

The control constant in photography is this 2:1 ratio that is expressed in stops and the ISL. If we deal with light distance as a power of 2, we find that moving the light 1.4 times farther away from the subject will halve the intensity of the light. We are working backwards with the ISL and 1.4 is approximately the square root of the number 2. That means that the light intensity has reduced one stop. If we move the light twice as far from the subject, we have adjusted the light two stops; and if we move the light 2.8 times farther away, we have reduced the light by three stops. This relationship holds for all full stops as multipliers of distance change for the light.

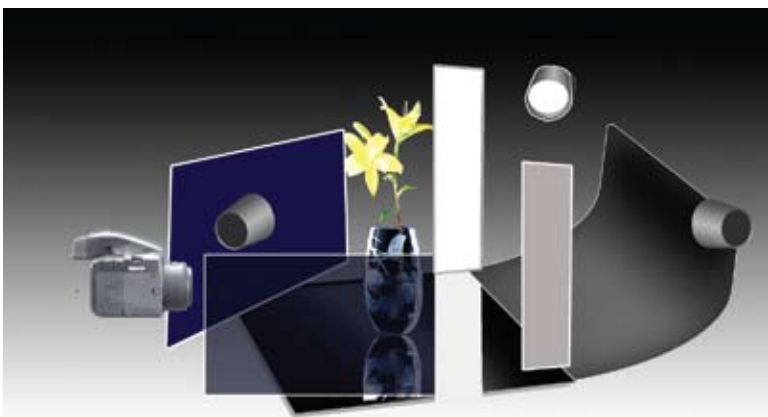
While there will be a diminution of a lighting unit's power if it is put through a diffuser screen, once the light is defined as to its type (specular/diffuse), the major factor affecting the light's power will be its distance from the subject.

However, additional lights do not necessarily mean extra lights. In still life or architectural photography, lights can be turned on or off as needed. With electronic flash, as John Sexton uses, multiple "pops" can be used if the subject is static. This technique is common enough that several meter manufacturers build products that calculate this technique. Knowing the true effect of your flash, and the relationship between the guide number and the number of pops allows for exact tuning of this additional light.

During a long exposure, the flash unit can be aimed



Left: This image and diagram shows the mixed white/black-line treatment of a glass vase. The intensity for each reflector card on the right was tuned by moving the light illuminating it closer and farther until the proper light intensity was reflecting from the left edge of the flower. The small fill card on the right received ambient light only. The mirror in front was placed to create subtle specular highlights on the glass details. After establishing the lighting of the glass, a spotlight was added to illuminate just the flower. A gobo was used to assure that no light from this spotlight would show on the glass. An incident meter was used, held at the flower and pointed at the flower's spotlight while it was moved closer and farther away until the light was tuned to the proper exposure.



at the foreground subject and fired multiple times from different positions. Also with long exposures, you can make tuning effects by painting with light. This technique uses a continuous light such as a hooded flashlight or a light made from a Hosemaster to shine additional light onto specific areas of the scene. It is important that the additional light be aimed away from the camera and that you or other objects do not cast a shadow or block the lit subject during the additional exposure.

Effects can range from delicate to extreme depending on the number of pops, the length of painting or the distance the additional source is from the subject. The direction of additional lighting will also affect the look of the image. If the pops or painting lights originate from the same direction, the additional intensity will have the characteristic of the additional light source. If the direction of the flash unit or painting tool is changed continually, the light becomes more diffused.

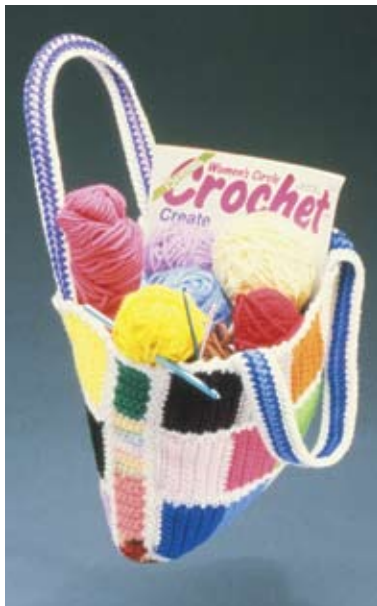
Using digital imaging to layer different lighting effects allows for precise control of specialized light intensities. However, just because you can use layering to build up light effects does not mean that they will look correct if they are not based on correct lighting technique. While lighting effects can be layered together to create a desired look for the image, the lighting needs to be correct for each part.

One of the most common ways that additional light is placed into the envelope is by use of reflection, which is usually done to reduce the contrast of a subject by opening up the shadows. By using a mirror as a reflector, the light coming from the surface of the mirror will be of the same type as the source that it is reflecting. If you are reflecting a spotlight, the mirror takes on the form of a spotlight of the size of the mirror. If you are reflecting a diffuser panel, the light coming from the mirror will appear as a diffuse source of the size of the mirror.

This makes mirrors exceptionally helpful. For example, if additional light is needed on a label of a bottle, a mirror can be positioned to reflect a small amount of light only on the label. If the shape of the mirror does not match the desired beam of additional light, the mirror can be partially covered with any material—tape, paper, paint, etc.

Tuning by reducing light is often just as important as increasing light when establishing the correct light envelope for a photograph. There may be a need to reduce the intensity at a location within the light envelope, over the entire scene or to keep light from affecting the scene.

Left: This image and diagram show the classic white-line of a flower in the glass vase. The intensity for each reflector card forming the white lines was tuned by moving the light, illuminating it closer and farther until the proper light intensity was reflecting from each side of the vase. After establishing the lighting of the glass, a spotlight was added to illuminate just the flower. One of the flags for the glass was used as a gobo in order to avoid additional light reaching the glass. The flower's lighting needed to equal the exposure set for the white-lines. An incident meter was used, held at the flower and pointed at the flower's spotlight while it was moved closer and farther away until the light was tuned to the proper exposure. Glass used for this photograph made by Mary Marshall of Crystal Glass Studio in Carbondale, CO.



Left: This measured photograph was made for a cover of Women's Circle Crochet Magazine. The lighting of this subject was controlled to produce only three stops of difference between the reflected spot-meter readings from the white yarn and the black detail. The lighting was tuned for both the highlights and shadows. Meter readings were taken until the light was tuned to create the dynamic range required for the magazine's offset printing press. While the image looked flat as captured (because it met the needs of printing press), the printed cover looked full tone.

The light blocked by a barndoor attached to the light source generates a shadow and a feathered edge. The structure of the light pattern produces a fully lit area, the feather where the light is losing its intensity and the shadow cast by the barndoor. Usually the light's position can be adjusted to allow control of where the light, feather and shadow will fall. Feathered lights can be added

to cover a larger area without a noticeable change in intensity. Overlapping the feathered portions of each light source creates the larger pattern of directional light.

Gels can be used for an even decrease in light intensity without control on the source. Lighting gels can resist the heat of the light source. Even with electronic flash, the modeling light is a heat source and requires the use of heat resistant gels. Neutral density

gels only decrease the intensity of the light, while color gels also decrease intensity as they change the color.

Sometimes the light within the envelope has reflections that are not helpful to the image. Flags—black, heavy textured material that cuts down reflection—can be used to control unwanted light in the envelope. Flags are particularly helpful in lighting shiny and transparent subjects and to increase the contrast of the image. Tuning the light with a flag means increasing or decreasing the flag's angular effect. This effect can be seen by moving it closer or farther from the subject. When the flag is close to a shadow area, the lighting ratio will be higher for that area in the envelope.

With some subjects the lighting may require more light sources, each with its own control, which can build up unwanted intensity. Too much light can be problematic, particularly with digital capture and transparency film. While there may be a need to use more or different light interactions to achieve the lighting for the subject, intensity control is critical.



Dr. Glenn Rand has worked as an artist and professionally in photography for more than 35 years. His work is in major museum collections in the United States, Europe and Japan. He has published and lectured extensively about photography and digital imaging. Presently Dr. Rand teaches in the graduate program at Brooks Institute of Photography in Santa Barbara, CA.