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Part One

# Understanding Light





# The Functions of Illumination

- The new developments in lighting over the last decade have created opportunities for approaches to ways of creating illumination that have only been dreamed of in the past. Lighting technology has greatly evolved from the time of table lamps and track lights, yet many homeowners have not updated their thinking much beyond that stage. According to *Builder Magazine*, “within 10 years of the launch of Energy Star®, U.S. consumers had purchased more than a billion products qualified under the program”. More than one-half of the largest U.S. homebuilders currently participate in Energy Star in some way, such as specifying products with Energy Star ratings. Nearly two-thirds of U.S. consumers recognize the Energy Star logo.”

The use of energy-efficient products, especially lighting, is not just a fad, it is a necessity. It is time to step up to the plate and make green design an integral part of your work ethic. We can now achieve lighting effects that are as flexible as our lifestyles, energy-efficient with a lower carbon imprint, and less intrusive in remodel situations. Plus, we can often do it within a reasonable budget and without dramatically changing the way we live. At the same time, we can increase the comfort and convenience levels of our living spaces, both inside and out.

Lighting can be a tremendous force in architectural, interior, and landscape design. It is the one factor that helps blend all the elements together. Yet, it has for too long been the second-class citizen of the design world. The results have left many homes drab, uncomfortable, and dark. Often the blame goes elsewhere when improper lighting is the real culprit causing the discomfort. Helping people become aware of what lighting can do is the first step.

Most of us simply accept what light there is within a given space instead of realizing that we can change and improve the situation. The main objective of this book is to create a *language of light* that is easily understood by design professionals, homeowners, and contractors. Once we all speak the same language, then communication is better and fewer mistakes are made.

Light has four specific duties: to provide **decorative, accent, task**, and/or **ambient** illumination. No single light source can perform all the functions of lighting required for a given space. Understanding these differences will help you create cohesive designs that better integrate illumination into your overall plan.

The following sections explain the four functions.

### DECORATIVE LIGHT

**Luminaires** (this is the lighting industry's term for light fixture) such as **chandeliers**, candlestick-type wall **sconces**, and table lamps work best when they are used to create the sparkle for a room. They alone cannot adequately provide usable illumination for other functions without overpowering the other design aspects of the space. Think of them as the "supermodels" of illumination. Their one and only job is to look fantastic. Another way to visualize them is as architectural jewelry.

For example, a dining room illuminated only by the chandelier over the table can create a **glare-bomb** situation. As you turn up the **dimmer** to provide enough illumination to see, the intensity of the light from the decorative fixture causes every other object to fall into secondary importance (see Figure 1.1). The wall color, the art, the carpeting, and especially the people are eclipsed by this supernova of uncomfortably bright light. No one will be able to adequately see any of the other elements in the room, no matter how beautiful or expertly designed.

By its very nature, any bright light source in a room or space immediately draws people's attention. In the best designs, the decorative light sources only create the illusion of providing a room's illumination. In reality, it is the other three functions of light (task, accent, and ambient) that are actually doing the real work of lighting up the space.

Another common example of poorly done lighting is the overuse of table lamps and wall sconces with **translucent** shades. Filling a room with translucent shades makes the room look like a lamp shade showroom. It is partly because translucent shades, such as those made of linen or parchment, can draw too much attention to them (see Figure 1.2). When incorporating this type of decorative fixture into a lighting design, consider using an **opaque** shade with a perforated metal diffuser fitted on top. This will help direct the illumination downward over the base, the tabletop, and across your lap when you're reading.

Filling a room with only table lamps to provide the main source of illumination is bad lighting design, as it uses only one available light source. The other three functions of illumination must come into play. This is called **light layering**, where a number of light sources are blended together to create a comfortable, inviting, and flexible environment.

### ACCENT LIGHT

Accent light is directed illumination that highlights objects within an environment. Luminaires such as **track lighting** and **recessed adjustable fixtures** are used to bring attention to art,

Light performs these basic functions: decorative, accent, task, and ambient—the well-integrated layering of the four within each space will create a unified design. “The mark of professionalism in lighting is the absence of glare.”—General Electric



**FIGURE 1.1**

No matter how striking a decorative fixture is, such as this oval shaped pendant, if there is no other lighting in the room it tends to visually dominate. This is where effective light layering comes into play.

## Residential Lighting

**FIGURE 1.2**

Here we see the same style of wall sconce, manufactured by Boyd Lighting, with three types of shades. The fixture in the center has an opaque black shade, the fixture on the right has an opaque metal shade, and the fixture on the left has a translucent linen shade. Of the three, your eye is automatically drawn to the translucent shade.



sculptures, tabletops, and plants. Just like any of the other three functions, accent light should not be the only source of illumination in a room.

The museum effect: when art becomes visually more important than people within the space. Even museums now add additional illumination beyond accent light to help reduce eye fatigue by cutting the contrast in the overall environment.

If you use only accent light, you get the **museum effect**, where the art visually takes over the room while guests fall into darkness. Subconsciously, people will feel that the art is more important than they are. Of course, some of your clients may indeed feel that the art is more important than their guests. Their desires must be taken into account, even if they seem to be incorrect. You may be able compromise on a more layered design that provides some ambient light. If not, their guests will just have to try to be witty or profound enough to compete with the art. (See Figure 1.3.)

How many times have you had to sit down or search for an espresso after going through three rooms in a museum? People can get really exhausted when looking at illuminated art next to non-illuminated walls. Even museums are now adding additional illumination beyond accent light to help reduce eye fatigue, thus cutting the contrast in the overall environment. They too are learning the advantages of light layering to counteract the life-force-draining museum effect.

Effective accent lighting thrives on subtlety. A focused beam of light—directed at an orchid or highlighting an abstract painting above an ornate chest of drawers—can create a wondrous effect. If done well, people won't notice the light itself. They will see only the object being illuminated. The most successful lighting effect achieves its magic through its very invisibility. If you see the light source, then there is no magic.

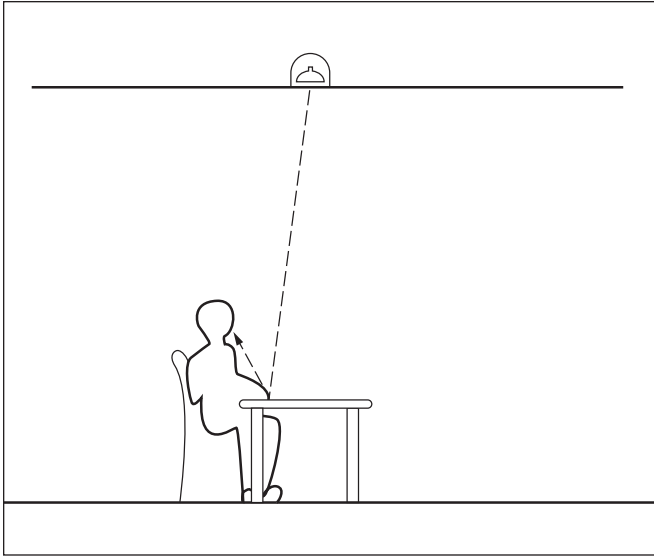
In the movies, if we can tell how a special effect has been achieved, we feel cheated. We don't want to know how it's done, because we want to think it's supernatural. In lighting design, it



**FIGURE 1.3**

This African mask is being illuminated subtly with a single recessed accent light. By itself it would dominate the room. It must be layered with other types of lighting to be part of a well-integrated lighting design.

Veiling reflection refers to the glare and eye fatigue resulting from overhead light hitting directly on white paper with black print, as if you were trying to read through a veil.



**FIGURE 1.4**

Veiling reflection (glare) occurs when task lighting is placed directly overhead.

Ambient light is the soft, general illumination that fills the volume of a room with a glow of light and softens the shadows on people's faces. It is the most important of the four functions of light, but it is often the one element that is left out of the design of a room or space.

should be no less the case. We want to see the effects of light, but the method needs to remain unseen. This subtlety is what will create a cohesive wholeness, allowing the design, the architecture, the furnishings, and the landscaping to become the focus of a space, not the luminaires or the lamps glaring out from within them.

## TASK LIGHT

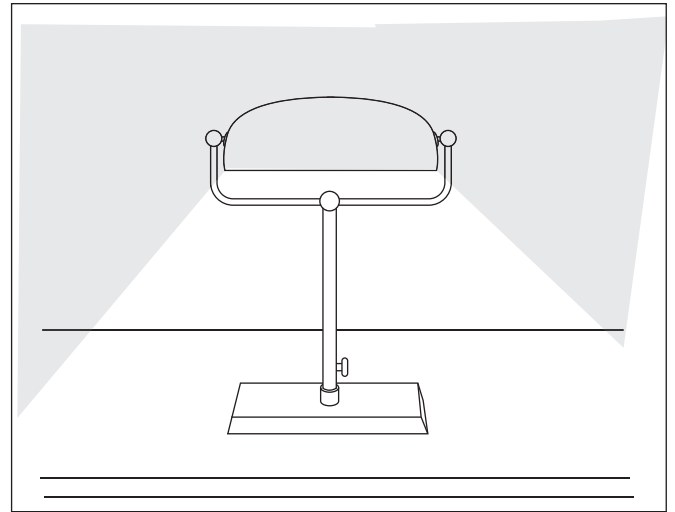
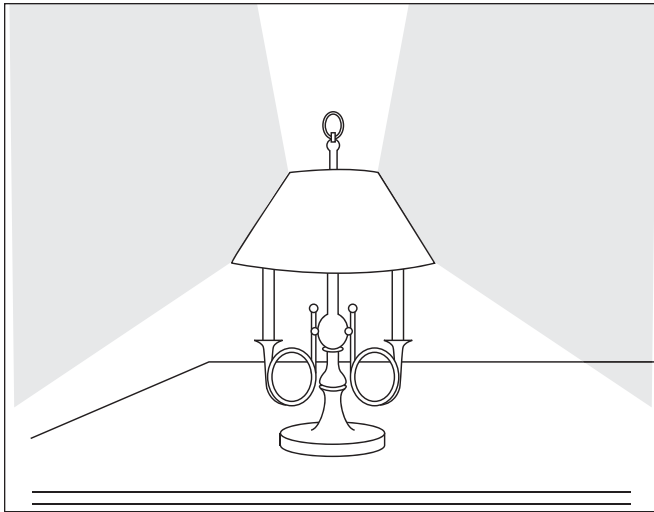
Task light is illumination for performing work-related activities, such as reading, cutting vegetables, and sorting laundry. The optimal task light is located between your head and the work surface. Lighting from above isn't a good source of task light, because your head casts a shadow onto your book, computer keyboard, or ransom note.

Overhead lighting or incorrectly placed **task lighting** often contributes to what is called **veiling reflection**. It occurs when your eyes try to accommodate the contrast between black print on white paper. This happens when light comes down from the ceiling, hitting the paper at such an angle that the glare is reflected directly into your eyes, causing eye fatigue. Think of it as the mirror-like reflection of a light source on a shiny surface. It may be a glossy magazine page or any matte surface that has markings of shiny ink, pencil lead, or other glossy substance. Veiling reflection is a way of describing the resulting brightness that washes out the contrast of the print or picture. The term comes from an uncomfortable situation where you are trying to read something while wearing a veil (see Figure 1.4).

Another related term is **photo-pigment bleaching**. When you try to read a book or a magazine outside, sometimes the brightness of the sunlight on the page makes it difficult to read. You end up moving to a shaded spot or tilting the magazine until the sun isn't hitting it directly.

A reflective surface is always a reflective surface, which means you can't eliminate glare if you are focusing light onto a mirror-like finish. What you can do is redirect the glare away from the normal viewing angle. That's why light coming in from one side or both sides, instead of directly overhead, is more effective: It directs the glare away from your eyes.

**Portable tabletop luminaires** (this is what everybody but lighting designers call table lamps) with opaque shades often do the best job for casual reading, because they direct the light better and don't visually overpower the room when turned up to the correct intensity for the job at hand. You may be thinking, "That's fine and dandy for some Euro-chic interior, but what about my Louis XVI library?" Well, a **Bouillotte lamp** (see Figure 1.5) does a great job of task lighting, as does a **banker's lamp** (see Figure 1.6). **Fluorescent** or **light-emitting diode (LED)** linear lights are also a good source of task illumination when mounted over a work surface with a shelf above or in the kitchen with the fixture mounted under the overhead cabinets. Incandescent versions are not energy-efficient and can get very hot. You will learn about the differences in the types of lamps that are available in Chapter 3. As we go from room to room in Section Two, you will get more examples of properly placed task lighting.



## AMBIENT LIGHT

Ambient light is the soft, general illumination that fills the volume of a room with a glow of light and softens the shadows on people's faces. It is the most important of the four functions of light, but it is often the one element that is left out of the design of a room or space.

The best ambient light comes from sources that bounce illumination off the ceiling and walls. Such luminaires as opaque indirect wall sconces (see Figure 1.7), **torchères** (floor lamps), indirect **pendants** (see Figure 1.8), and **cove lighting** can provide a subtle general illumination without drawing attention to the source. You could call it the **open-hearth effect**, where the room seems to be filled with the light of a roaring fire.

Keep in mind that filling a room with table lamps does not provide adequate ambient illumination. These are decorative fixtures that can double as task lights when needed, but they cannot provide ambient light, although they can provide **ambience**. This is what helps people form an impression of a space. Using them alone in a space creates blobs of uncomfortable illumination that overpower the environment. Let these portable luminaires be a true decorative source, creating welcoming little islands of light instead. As mentioned earlier, using opaque shades and perforated metal lids can turn these luminaires into more effective reading lights. Utilizing other sources to provide the necessary ambient light lets the decorative luminaires create the illusion of illuminating the room without dominating the design.

The inclusion of an ambient light source works well only if the ceiling is light in color. For example, a richly hued eggplant-colored ceiling in a Victorian dining room or a dark wooden ceiling in a cabin retreat would make indirect light sources ineffective, because the dark surfaces absorb most of the light instead of reflecting it back into the space.

One viable solution to this situation is to lighten the color of the ceiling. Sometimes the best answer to a lighting problem is to alter the environment rather than change the luminaire. Instead of the whole ceiling being painted in a dark color, how about a wide border in that color

**FIGURE 1.5 (left)**

A Bouillotte lamp is a traditional tabletop fixture that provides excellent task lighting in a traditional setting.

**FIGURE 1.6 (right)**

A banker's lamp is another traditional-style fixture that provides good task light while blending into a more traditional setting.



**FIGURE 1.7 (left)**

This is an example of an opaque wall sconce, by Sirmos Lighting, that offers ambient light from a shape that appears to be an architectural detail.



**FIGURE 1.8 (right)**

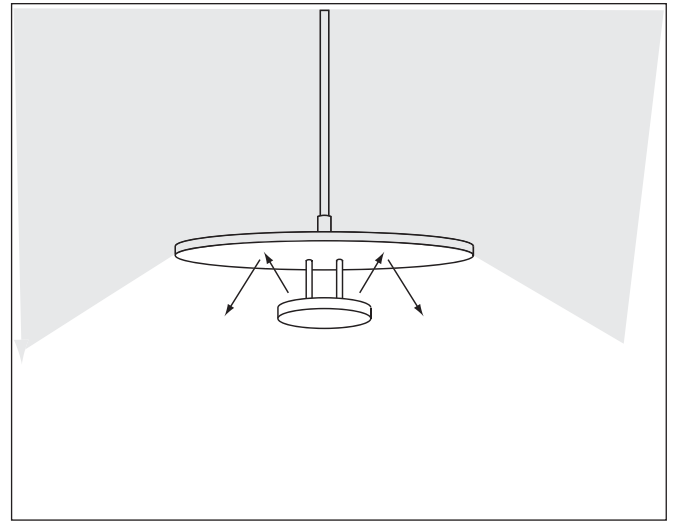
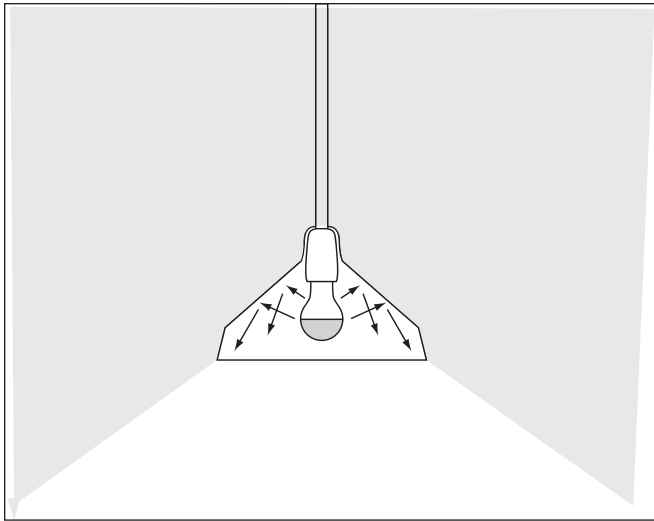
This modern pendant, the Zsu-Zsu made by Artemide, offers good ambient illumination along with a decorative element. It comes in three sizes and is available in both incandescent and fluorescent versions. You will learn more about the advantages of fluorescent lamps in Chapter 3.

with the rest of the ceiling done in a cream color or similarly light hue? A wooden ceiling could be washed with a light-colored opaque stain, giving it a more weathered look without taking away from the wood feel itself, as simple painting would.

If you or your clients are dead set against changing the color, luminaires such as the ones shown in Figures 1.9 and 1.10 will provide their own reflective surfaces. If you were faced with a situation like this where a lighter-colored surface is not an option, a possibility would be to use a luminaire that essentially provides its own ceiling.

Using a traditional chandelier or pendant with a hidden **halogen** or fluorescent source could complement the design while adding a subtle layer of ambient light. Sometimes luminaires can be multifunctional, providing either task and decorative light or task and ambient light from the same fixture.

One such luminaire has been out on the market for many years. It is a metal-shaded pendant generally known as a **RLM** fixture (Figure 1.9). It has a white-painted interior fitted with a **silver bowl reflector lamp**. A silver bowl reflector lamp is a bulb that is coated on the top of the glass envelope to project light toward the base of the bulb. The illumination from the reflector lamp is then bounced off the inside of the shade itself, instead of the ceiling, to provide an adequate



level of ambient light. This a good type of fixture to use when you want to create the illusion of a secondary ceiling level in a vaulted space to create a more human scale to a room. There are more modern versions of the RLM, such as the one shown in (Figure 1.10). The halogen source fitted within an integral reflector bounces light off the dish-shaped reflector and down into the room below.

There are many ways of getting ambient light into a room. Ambient light, just like the other three functions, should not be used by itself, because you end up with what is known as the **cloudy-day effect**, where everything in a given space appears to have the same value, without any depth or dimension. Here again, ambient illumination is only one component of well-designed lighting. Light layering is always the way to go.

## LIGHT LAYERING

As mentioned earlier, lighting design is successful when all four functions of light are blended together within a room to create a fully usable, adaptive space. Good lighting draws attention not to itself but to the other design aspects of the environment.

Once you have a good understanding of these functions of light, you can decide which are needed for a specific area. An entryway, for example, desperately needs ambient and accent light but may not need any task light because no work is going to be done in the entry. However, there may be a coat closet that would need some task-oriented illumination.

What we often see is a house lighted for entertaining only. Many of the high-end design magazines show this type of lighting design. It has a very dramatic, glitzy look. Every vase, painting, sculpture, and art deco ashtray glistens in its own pool of illumination. Yet the seating areas largely remain in darkness. What are these people going to do for light when they want to go through the mail, do their taxes, or put a puzzle together with their family or friends? High

**FIGURE 1.9 (left)**

An RLM fixture coupled with a ceramic bowl reflector lamp provides a wide splay of ambient light without relying on the reflective qualities of the ceiling itself.

**FIGURE 1.10 (right)**

A more modern version of an RLM fixture, such as the “Spectro” by Boyd Lighting, uses frosted glass or a white metal to bounce the indirect light down into the room.

drama is fine for special occasions but not so great for day-to-day living. You wouldn't want to wear a tux or an evening gown every day, would you?

Also, you should know that the photographers for design magazines often use supplemental lighting specifically for photographing the rooms. Those lights won't be there when someone is living in the house, and the effect won't be nearly as wonderful as it seems on the printed page. What it does do, however, is give people a false sense of what type of illumination recessed **downlights** alone can provide. When it is the only type of lighting that exists, rooms appear smaller and people look older than they really are. On the other hand, if you layer the light properly, it can have all the benefits of Botox without the pesky injections.

This doesn't mean that you should eliminate accent lighting. Just don't make it the only option. Simply putting ambient light on one dimmer and accent lighting on another provides a whole range of illumination-level settings. The additional layers of decorative lighting and task lighting complete the design.

As you become more sophisticated about what lighting can do, you then have the knowledge to give yourself and your clients what they want and what they need. If, once the project is finished, someone walks in and says, "Oh, you put in **recessed lighting**," If they walk in and say, "You look great!" or, "Is that a new painting?" then you know the lighting has been successfully integrated into the overall room design.

- **THE BOTTOM LINE**

Light layering is the key to effective lighting design. It is the true art of lighting.