



THIRD EDITION

DESIGNING WITH LIGHT

AN INTRODUCTION TO STAGE LIGHTING

J. MICHAEL GILLETTE

Designing with Light

An Introduction to Stage Lighting

THIRD EDITION



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To Joyce Ann who knows why

Preface

The purpose of this book is to introduce students to stage lighting design, which is an amalgam of technology and art. Without an understanding of the technology used in the craft, it is difficult to design with light. And without an understanding of the theory and processes of design, it is almost impossible to design with light. To be successful, a designer needs to know both.

As with any art form, the basic elements for a successful creation are an understanding of the chosen artistic medium and the inspiration to create. I hope that this text will provide that basic understanding of the design potential of light and give an insight into the sources that inspire a lighting designer to create.

ORGANIZATION

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Because the study of theatrical lighting design covers two basic areas—technology and design—this text has been divided into two sections. Chapters 1 through 10 present practical information that is essential to developing an understanding of the technological aspects of designing with light. Chapters 11 through 17 provide information on how to design with light as well as how to draft the light plot and execute the other paperwork used by a lighting designer.

NEW TO THE THIRD EDITION

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Since the publication of the second edition, I've received several suggestions that there might be a better way to organize the material of the book. I agree, but I also have come to the conclusion that the teaching of lighting design is

an idiosyncratic endeavor. What works well in one circumstance doesn't work quite so well in another. If truth be known, *I* have never taught the material in this book in linear fashion from first chapter to last. But, since I can't seem to discover an organizational structure that would work well in *all* circumstances, the book remains divided into roughly two major sections: tools and design. Chapters 1 and 2 are necessary background for both sections. Chapters 3–10 primarily cover the tools of lighting design. Chapters 11–17 discuss the processes of designing with light and bringing a lighting concept to life on the stage.

The location of Chapter 9, “Color,” has been, and remains, a conundrum. It logically belongs in both sections as it is both a tool and a design element. Its current placement is dictated only by the fact that the information on dichroic filters (new to this edition) has been placed alongside the discussion of other types of filters in Chapter 9. I felt it was important for students to be introduced to dichroics before delving into the technology of moving light fixtures, which is found in Chapter 10 and which make such effective use of these filters.

New photos have been added to update the illustrations of manufacturers' current equipment and products. New material has been added to many chapters to introduce new developments and adaptations of existing products and processes.

As indicated above, Chapter 10, “Advanced Technology Equipment,” is new to this edition. It is primarily devoted to a discussion of moving light fixtures and associated equipment. This new class of instrumentation has become virtually indispensable to the rock show/concert/entertainment segment of the industry and is an important addition to the tools of the lighting designer.

ACKNOWLEDGMENTS

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CHAPTER 1

An Introduction to Designing with Light

Any dramatic production, unless it is performed outdoors during the day, needs some kind of artificial light. If illumination were the only function of stage lighting, however, you could hang a bank of fluorescent lights over the stage and forget all about the **dimmers, control boards, cables, and instruments**. Obviously, there is more to stage lighting than simple illumination. Effective stage lighting not only lets the spectators see the action on the stage but also ties together all the visual elements of the production and helps create an appropriate mood and atmosphere that heighten the audience's understanding and enjoyment of the play.

Dimmer: An electrical device that controls the intensity of a light source connected to it.

Control board: A console containing controls for a number of dimmers. Also called a control console.

Cable: An electrical extension cord used to connect instruments to dimmers or instruments to permanent stage circuits.

Instruments: Lighting fixtures designed for use in the theatre.

LIGHT AND PERCEPTION

.....

What is lighting design and why do we bother to “design” light in the first place? To understand these questions, we first need to understand what light is, what it does, and how light influences our perceptions and understanding.

We can describe light in terms of its characteristics and physical nature. Visible light can be defined as: (1) something that makes vision possible; (2) that portion of the electromagnetic spectrum that stimulates the visual receptors in the eye; (3) that relatively narrow band of the electromagnetic spectrum between infrared light and ultraviolet radiation. Further, light travels at approximately 186,281 miles per second.¹

¹*Webster's Ninth New Collegiate Dictionary*, 1986, p. 690.

Although the above describes the physical nature of light, it doesn't tell us what light "does." What does light do? A simplistic, and accurate, answer is that it allows us to see things. It makes objects visible. However, it is probably more important for a student of lighting design to realize that *the manner in which the light illuminates an object shapes our impressions and understanding of what we're seeing*. That concept is the crux of the discussion of light and perception as well as the underlying reason that we bother to design with light.

The angle of the light, its intensity, color, and sharpness or diffusion all affect our impression of the object we're seeing. To illustrate, almost everyone has heard of the phrase "the ever-changing face of the mountains." But, if you stop to think about it, unless there is some cataclysmic disaster, the features of any particular mountain or mountain range change very little, if at all, over hundreds or even thousands of years. However, if you were to critically look at a mountain range for even a few days or weeks, you would begin to understand the concept behind the phrase. The appearance of any mountain changes considerably in the course of the day. The patterns of highlight and shadow created by sunlight falling on the ridges and valleys shift continuously as the sun moves across the sky. A steep cliff that is bathed in brilliant morning sunshine slides into deep shadows in the late afternoon. A hillside that hides in morning gloom emerges into brilliant sunshine by midday. Clouds or fog soften or obscure part of the range. In the late afternoon we may be treated to the mountain being bathed in a soft purple or peach twilight at sunset. Thus the manner in which the sun illuminates the mountain controls not only what we see but also, to a great extent, how we feel about what we're seeing.

Intellectually everyone understands that the physical structure of the mountains isn't changing. But our individual perception, our personal understanding, of what those mountains mean to us is based on a complex process involving not only sight and intellectual recognition, but our emotional reaction to what we're seeing. That emotional reaction is controlled, to a great extent, by two primary elements: instinct and learned behavior. Another example may help explain this process. Imagine that it's a pleasant, sunny summer day. You're walking down the sidewalk next to a park. There is a low stone wall, about waist high, between you and the park. The park is inviting, with a thick carpet of grass beneath a canopy of large shade trees. A few benches are randomly scattered on the lawn. A young couple sit on one of the benches quietly talking. Across the street there are several stores—a bookshop, a clothing store, a bank, and a drugstore on the corner.

Now, imagine that you're on this same street at 2:00 A.M. on a moonless night. It's really dark. The only light comes from the window of the all-night drugstore on the far corner at the other end of the park. As you walk beside the stone wall, you peer into the blackness of the park. A little starlight filters through the leaves. You hear a low noise coming from the park. Then you think you see something move. You quicken your stride as you cross the street and almost break into a run as you rush into the drugstore.

As mentioned earlier, our emotional reaction to what we see is controlled by two primary elements: instinct and learned response.

Instinctively, most people are afraid of the dark. This response was genetically programmed into our ancestors tens of thousands of years ago when our progenitors roamed the plains and woodlands looking for food. Our primary defense against being eaten by something larger, stronger, and faster than we were was to be able to see it. If we saw it, we would at least have a chance of defending ourselves. If we couldn't see it, it could jump out of the dark and "get" us. Humans don't see well in the dark, so our ancestors who avoided dark places were more likely to live to pass on their gene pool than those who ventured into the dark and didn't return. With each succeeding generation this healthy act of self-preservation became more and more reinforced in our genetic code.

The second contributor to our reaction to what we see is learned response. From the time that we're infants we are busy learning. A great deal of what we learn is stored in the brain as memories. Almost all of our early learning is experiential—learning by experience. What we learn experientially is a major contributor to how we will react in any given circumstance. Occasionally I have looked outside on a cloudy summer day and absently thought, "It looks like it could snow." Logically, I know that it isn't going to snow, but there is something about the shape and color of the clouds, the direction and speed of the wind, and the color of the light that reminds me of the way it looks before a snowstorm. Our subconscious minds are constantly comparing incoming information—what we're currently seeing—with memories of what we've experienced before in our ongoing struggle to help our conscious minds make sense of our surroundings. An interesting example of this learned response occurred during the University of Arizona production of *Terra Nova*, which primarily is set in Antarctica and chronicles Scott's ill-fated trip to the South Pole. (See Color Plates 12 and 13.) The director wanted the lighting for the Antarctica scenes to be "white and painfully bright." At first I left the lights uncolored, but the white light seemed warm rather than cool. Before the next rehearsal I put a light blue **color media** into all the lights. At rehearsal that night almost all the people in the audience complained of being chilly or cold. The thermostat in the theatre hadn't been changed from the previous day. The only difference was the light blue color in the lights. My assumption is that our subconscious minds saw the blue light, compared it with memories of "the color of cold," and convinced our conscious minds into thinking that the theatre actually was cold. Subsequently we had several comments from the paying audience that the theatre was rather cold. We raised the thermostat a few degrees even though the production occurred in late September in Tucson when the average temperature was in the high 90s. Such is the power of the mind.

The reason that we design the lighting for an event or a place is to influence the audience's perception and understanding of what they're seeing. That

Color media: The plastic or glass material used to color the light emitted by lighting instruments.

Lighting designer:

Person responsible for the appearance of the lighting during the production.

Production concept:

The creative interpretation of the script that will unify the artistic vision of the production design team.

is the reason lighting is thoughtfully designed for theatre, films, and television as well as for rock concerts, theme parks, and retail stores. Lighting influences our perceptions and understanding. Machiavellian, isn't it? Read on and learn how Machiavellian lighting design really is.

DESIGN CHARACTERISTICS OF LIGHT

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As you begin to study how to design with light, it is important that you understand what lighting design is, as well as what it is not. Theatrical lighting design is a process and a craft for creating an artistic result. While the lighting design first of all allows the audience to see the stage, it is more than an exercise in illumination. The **lighting designer** uses light to achieve four primary goals: (1) To influence the audience's perception and understanding of what they're seeing; (2) to selectively illuminate the stage; (3) to sculpt, mold, and model actors, settings, and costumes; and (4) to create an environmental atmosphere that is supportive of the play's **production concept**. To achieve these goals the lighting designer uses the tools of lighting design—the instruments, dimmers, color media, and so forth—to create a design that works to support the production concept.

Any creative art, whether in theatre, painting, or sculpture, comprises—in equal parts—inspiration and craft. Inspiration in this case refers to the creative element, the process used to create a conceptual image that the artist “sees” in his or her mind. Craft refers to a mastery of the tools and techniques used to re-create the conceptual image in physical form. Michelangelo is reputed to have said that he released figures that were trapped in the blocks of stone that he sculpted. He first studied the stone, saw the figure entombed within it, and then used chisels and mallet to sculpt away the stone to reveal the form trapped within. Michelangelo's statues are the result of the two qual-



Development of the Production Concept

The production concept is the coordinated artistic vision that the members of the production design team—the producer; director; and the scenic, costume, lighting, and sound designers—develop. This kind of development is possible only if all members of the team freely share their ideas and vision for the produc-

tion. A regularly scheduled production meeting (discussed more fully in Chapter 2, “Lighting Production Team: Organization and Responsibilities”) is probably the most effective method of ensuring that every member's ideas, thoughts, and opinions are heard and understood by every other member of the team.