

Illumination: First and Foremost

With all the things that lighting can do, as well as all the training we have from watching music videos, it is not surprising that we sometimes forget the basics: *We have to be able to see the performers clearly and comfortably* or we are not going to care what they do. Watching a dark or unevenly lit show can cause eye fatigue. Your eye muscles are like any other muscles in your body—they get tired when you overwork them. Peering through the gloom at a dark stage wears them out, making you want to close them or go to sleep. The opposite is also true: Looking at a stage that is unremittingly bright can wear out your eyes as well. What the eye wants is even, comfortable illumination with some slight variations to keep it interested. If you give the audience a brief blackout, for instance, they might be able to watch the next scene with more energy. Conversely, bringing the lights up bright “stresses” your eyes a little, making it more relaxing to watch darker scenes afterward. Of course, all this should be looked at within the context of the script. Lighting must conform to what the script, the director, and the action require.

Many people believe poorly lit actors are also more difficult to hear. In other words, when our eyes are working harder, our ears suffer the consequences. This may be a psychosomatic reaction, or it may be that actors speak more softly when lit less brightly. Whatever the case, many people swear by this phenomenon so it is worth taking note of it. Lighting is the art of perception: People see whatever they think they see.

Good illumination, besides being the most important thing that lighting does, is also one of the most difficult things to achieve. Even the best lighting designers still struggle with it, and most of them spend years developing techniques.

Why is it so difficult? Why do directors find themselves looking at the same spot on the stage night after night, the spot where they *told* the designer they needed more light, and it never seems to get any better? Why do designers put their heads in their hands every time an actor hits a dark spot, the same dark spot that has been there for the last three rehearsals and refuses to go away?

Well, like most things, there is not one central reason. A lighting designer is fighting a battle against the senses: As I said, people see what they think they see. No matter how much light you are pumping into a scene, if people think it is dark, then it is dark. The lighting designer is a slave to the human eye.

Time for an exercise: Go out to your living room, your lobby, or your reception area—anywhere with natural light. Look around. Notice how the light flows evenly over all the surfaces. Notice how all the colors look pure and clean. Notice how the shadows are sharply defined, but also notice how you can see objects that are not directly lit. Look up at the ceiling. It proba-

bly is not getting any direct light at all, but chances are you can still see it clearly. Look at the features on people's faces—they will probably be easy to make out.

The sun is one heck of a lighting instrument. It is the lighting instrument that lighting companies have been trying to imitate for years. They make progress all the time, but they are still light-years (sorry) away from imitating Mother Nature.

Why is the sun so terrific?

Well, first of all, the sun is an *extremely* bright light source.

Brightness is measured in "foot-candles," a pretty straightforward unit of measurement. The amount of light produced by one candle, measured from one foot away, is one foot-candle (in theory anyway). A sixty-watt bulb in the ceiling of a light-colored room produces about twenty-five foot-candles. The sun, on a clear day in summer, produces about 250 foot-candles, ten times as much. If you have ever walked out of a bright, sunny day into a room with no windows, you know that your eyes need a moment to adjust to the new space, regardless of how brightly the room is lit. The sun is putting out a lot more light than our stage lights.

It does not help that the light coming out of a lighting instrument falls off very quickly as you move away from the instrument. This makes it hard to create an even amount of light everywhere on stage. Imagine that there are two actors, one standing ten feet from a light source, the other standing twenty feet away. Due to something called the "inverse square law," the person standing twice as far from the light source only gets one-quarter as much light. Since the sun is so much farther away, it really does not matter if one person is ten feet farther away (or ten miles, for that matter). The light on them will be the same. On stage, however, people can get different amounts of light depending on how close they are to the lighting instrument.

Unfortunately, there are difficulties with using the sun to light our shows. For one thing, it is outside, and we are in. For another thing, a lot of our shows have scenes that take place at different times of the day, and the sun doesn't respond very well to commands like, "Proceed to five o'clock, please," let alone, "Fade to black."

What to do then? How do we provide all the benefits of the sun—its brightness, its evenness, its accurate rendition of color—with the equipment we have available?

Back in the infancy of lighting, when most of the theaters we now refer to as "Broadway" were built, theater designers were only concerned with providing a place for lighting that had as direct a shot at the stage as possible. Therefore, they installed a pipe running across the front of the balcony and put all the lights there. Because of the shape of the theaters, the **balcony**

rail, as it is known to this day, was almost level with the stage, providing a horizontal angle of light. The performers were brightly lit, but they looked flat, like animals caught in the glare of oncoming headlights. With light only coming from one direction, their faces were not "modeled," that is, they had no three-dimensionality, and features were hard to distinguish. The actors had to wear very heavy makeup so that the audience could make out their expressions.

This situation persisted until the fifties when a new movement appeared in stage lighting. This movement was best encapsulated by a man named Stanley McCandless, who published a book called *A System of Stage Lighting*, which, quite simply, changed everything.

The 45 Degree Concept

McCandless pointed out, as artists and photographers have known for years, that the most attractive angle of light for the human face was about 45 degrees up, much higher than the balcony rail. Furthermore, the face was best illuminated by two lights, one to each side, both coming in at a 45-degree angle.

McCandless also took note of the fact that, when illuminated by any light source, faces take on two different colors, one on the side toward the light source and another in the shadows on the side away from the light source. He felt that the audience should see light on the stage looking like real sunlight, moonlight, or room light. Whatever side the "real" light was coming from was called the **motivational side**. The color hitting the actors from that side would be the color of the "real" light source: bright and warm for the sun, cool and blue for the moon, yellow for candlelight and so on. The color coming from the other, "nonmotivational" side would be the color of the light bouncing off the walls, the trees, the ground, the sky, and so on. Does this phenomenon really hold true in reality? Opinions about the McCandless theories vary widely. One good place to look is in paintings. Rembrandt knew a lot about the color of shadows. Remember, however, lighting is subjective. The audience sees what it thinks it sees.

Anyway, McCandless's book gave birth to the "warm/cool" idea in stage lighting. The two 45-degree lights that we talked about previously would be colored with filters: one warm, one cool, depending on which one was on the motivational side. The contrast between the two colors, along with the more attractive angles, would provide the modeling effect on people's faces that would help the audience distinguish features.

There have been a lot of changes over the years since McCandless's book first appeared in print, and these days his system is viewed as somewhat dated. Nevertheless, the 45-degree angle is still considered the most flattering

angle for front light, and we still try to choose a motivational side. Most designers stay away from a strict interpretation of the “warm/cool” system, since it tends to make actors change color as they turn and move on stage, but the general idea of using groups of lights placed at 45-degree angles is still in constant use, as is the use of color to create modeling.

Rim Light

Front light is only the beginning of illumination. If you think back to your field trip to the natural light laboratory, you will recall that in a well-lit room, there is light coming from many directions. The same is true of a well-lit stage.

When performers and the scenery behind them are only lit from the front, they will tend to fade together. When viewed from the front, the performers will melt into the scenery, particularly if the colors are similar. It is necessary to add some **rim light**, that is, light that comes from the side or the back to illuminate the “rim” of the actor—the shoulders, the top of the head, and the sides of the costume. This “halo” of light will help separate the performer from the background, and give the stage more depth. Back light and side light should be applied to the acting areas just like front light, so that each acting area has its own instruments.

Acting Areas

McCandless also suggested that the stage be broken up into **acting areas**. The designer divides the stage into small blocks of space and designs a set of lights to illuminate one area—two front lights, a back light, and two side lights, for example. Then, he will replicate that set of lights for every area on the stage. This way, the light on every part of the stage would be coming from the same angle, plus, the actors would always be about the same distance from a light. This idea is still very much in use.

How do you decide how many instruments to use for each acting area, and which angles to put them at? Now you know how lighting designers earn their fees. Most designers have their own favorite formulas, systems, and magic books for determining the best arrangements of lights, but you can fake your way through it.

The simplest system for an acting area would be two front lights, evenly placed 45 degrees off the center line and a single back light. This gets the job done in a basic way. By adding two more front lights, you have a second set of colors for the night scene. Adding side light gives you more rim light and better illumination. These are only some of the possibilities. What about a light coming straight down? Very dramatic. You might decide to emphasize light coming from one direction (perhaps the scene is in a dungeon, and the

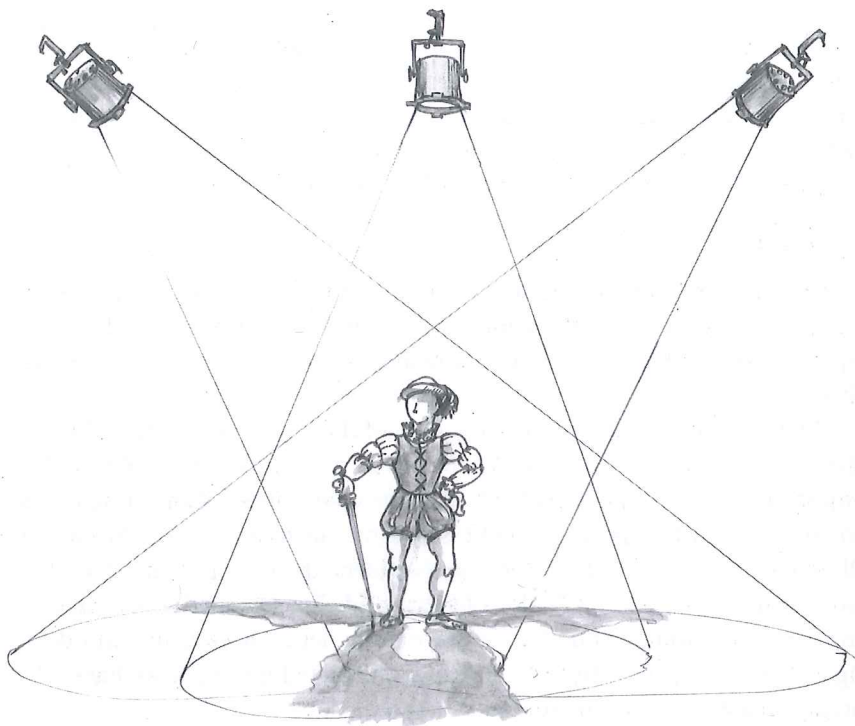


Fig. 16. Lighting an acting area

only light is from a high, barred window), or your theater may not have the right positions, or there might be scenery in the way, or you may simply discover a system that you like better.

How do you decide? And what do you do when you just want to survive? A few simple guidelines will help. Here are the three rules that I use:

- Each acting area should be lit from at least three different angles. By using three different angles, you can achieve the modeling effect, and give the audience something comfortable to look at. You can, of course, use more than three (something I would highly recommend), but three is the absolute minimum.
- At least one of those angles should be *downstage* of the performer. Whether or not you choose to use the flattering 45-degree position, you should light the performers from downstage so the audience can see them. If you are going for a “realistic”—not stylized—look, then you will probably want to use at least two different angles of front light. You may wish to only light performers from the back for an “effect” moment, but be aware that the audience will quickly tire of looking at

an actor with no front light, so do your moment and then show the performer's face to the audience.

- At least one of those angles should be *upstage* of the performer. As I said above, you need to get some "rim light" on the stage in order to make the performer stand out from the scenery. This can be straight from the back, from the side, or anywhere in between, but you will need it to keep things from looking flat.

So far you have divided the stage into acting areas and devised a system for lighting each area. Now what?

Wash Light

While the acting area system outlined above will cover most of the bases, it is not enough in most applications. For one thing, lighting instruments are not perfect. The beam of any instrument (especially those with a few miles on them) will be uneven, with hot spots and dark spots. Even brand new instruments will be brightest at the center and dimmer toward the edge of the beam. Furthermore, the designer may want the light from some instruments to be limited with **shutters**, movable metal blades inside the instrument that cut off part of the light. He may do this to keep the light off the scenery or the proscenium, or he may do this so that light from one area doesn't spill into another. Shutters cut off the light, but they often create hard shadows, which will show up as **shutter lines**, dark shadows crossing actors' faces as they move from area to area.

In order to address these ills, as well as a hundred others, it is a good idea to include some **wash light** in a lighting plot. A wash is a set of soft-edged instruments, all pointed in the same direction, that provide a smooth, broad wash of color over all the areas. Washes can be used to regulate the overall color of the scene as well as blending the acting areas into one another, covering the gaps.

The combination of well-designed acting areas and appropriate wash light will provide comfortable illumination.

Motivational Light: Time, Place, and Season

By now you know that motivational light is not the head speaker at a lamp convention. Actually, *motivation* is a term stolen from acting. Actors use it to refer to whatever is happening in their character's life that "motivates" them to take whatever action they are taking. For us, motivation refers to the light source that is apparently causing the room to look the way it does. **Motivational light** is the light that would be illuminating the scene if it were in a

real place: the moon for a forest scene, for example, or fluorescent lighting in an office scene. Whenever you are working with a lighting designer, one of the first questions she is going to ask is, "Where is the light coming from?" The set designer may provide part of the answer by incorporating lamps, overhead lights, a fireplace, or some other light source into the set. The playwright may help by choosing when and where the scene is taking place. Here are some of the things that the designer will want to know about the motivational light:

- *Where is the light in the room supposed to be coming from?* Sometimes the answer is easy. If the scene is outside, then you are primarily interested in the sun or the moon. There might also be streetlights, neon signs, Joan of Arc burning at the stake, or other types of additional light. If the scene is indoors, the sources may be lamps, candles, fluorescent lights, and so on. Sometimes the lighting will be a combination of indoor and outdoor sources, as sunlight or moonlight may be coming through the window.
- *What time of day is it?* This is a critical question, as lighting conditions change all day long. Sometimes they will need to change within a scene, as the sun goes down, for instance, or a character turns a light switch on.
- *What time of year is it?* Like time of day, time of year determines a great deal about lighting. The sun is cooler and lower in winter, brighter and higher in summer and sometimes playwrights use this for dramatic effect. Chekov's *The Cherry Orchard*, for instance, uses the approaching fall as a dramatic device to comment on the impending "winter" that is about to befall the Russian aristocracy. A good lighting designer can do a lot with this sort of detail.
- *Where is the play taking place?* Light is different by the seashore than in the mountains, different in the city than on a farm.

A good lighting designer spends a lot of time looking at the world, and so should you. What color is the light in the room where you are sitting right now? What is the "motivation" for the light in the room?

Mood and Atmosphere: Angles and Color

Angles in lighting are divided into five categories: front light, side light, back light, down light, and up light, and they all have their uses and meanings. I say "meanings" because each angle seems to come with a certain emotional baggage, which you can either exploit or ignore.

- **Front light:** The best light for illumination, the most “natural light,” best delivered from around 45 degrees up. When delivered from straight ahead, it is “deer-in-the-headlights” light, useful for sudden realizations or the arrival of the police.
- **Side light:** The best light for illuminating the body and for giving the figures on stage sharp outlines. Side light builds excitement and “show value.”
- **Back light:** Essential for separating the figures from the scenery. Used alone, it is great for sinister villains and dark shadows in the door. A subset of back light is the **silhouette**, where figures are seen against a brightly lit background without any light on themselves. This seems to have a connotation that is more “dramatic” than “sinister.”
- **Down light:** Makes for awkward rim light, as it not only lights the rim, but also the nose. Better to use it alone for a dramatic opera procession or an unusual dance. Good scene-change light. Will get you a laugh if used alone with a booming, divine voice.
- **Up light:** Light coming up through a grating gives the “industrial” look. Foot lights can give an olde-time theatrical look or a bizarre, Fellini-esque glare that is distinctly ominous.

Color in lighting is often more difficult to talk about than color in scenery or costumes. Color in lighting is rarely seen in isolation. Designers use a combination of colors to achieve a “balance” of color on stage—a general, overall range of colors that center around a particular part of the color palette.

Color is part of what makes each lighting moment distinctive. Light changes color continuously throughout the day, more pink in the morning, tending toward yellow in the afternoon, a warmer orange in the early evening, falling off toward blue as night falls. Light changes color when it reflects off objects as well. Light in a forest is a different color than at the beach.

Like everything else about lighting, color is subjective: An audience sometimes expects to see something that is not really there. Firelight is one of the better examples of this. Next time you are sitting around a campfire, look at the color of the light that hits people’s faces. If you are burning normal, dry wood, the light will be a yellowish white. Any good lighting designer, however, knows that audiences expect to see *red* light coming from a fire, and will filter it accordingly. People see what they think they see. As a theater artist, you have the choice of whether to play the game or not.

Color in lighting is also at the mercy of sets and costumes. There is a common belief, basically true, that it is easier to change the color of the lights than those of the set and the costumes. Sometimes, a lighting designer

will choose a color that (pardon the pun) shows a costume in an unflattering light. In *Hedda Gabler*, Hedda kneels over the stove and, page by page, burns the manuscript written by her rival. Because of the glowing fire, I lit her in deep amber. Unfortunately, the costume designer had dressed her in purple. Purple cloth plus yellow light equals brown dress. I lost that battle, as lighting designers invariably do. It's easier to change a lighting filter than to make a new dress.

The colors in the lights need not be stagnant throughout a show. In fact, in many cases, it is essential that they change over time, just as the color in real light does. Colors will change as the motivational light changes, as the sun goes down, for example, or as the room light changes. Sometimes color will become less saturated, as in the famous confrontation scene between Stanley Kowalski and Blanche DuBois in *A Streetcar Named Desire*. Blanche tries to hide her suffering behind a mask of gaiety and nonchalance, choosing a colorful Japanese lantern to light her dingy room. Stanley rips the colored paper off the light and holds the stark white bulb up to Blanche's make-up-smearred face:

Stanley: There isn't a damn thing but imagination, and lies, and conceit, and tricks. Take a look at yourself in that worn-out Mardi Gras outfit, rented for fifty cents from some rag person.

The absence of color in the light makes a powerful point about Blanche's refusal to confront reality.

One final note about color: Since the primary job of a lighting designer is to provide illumination, and what we are illuminating primarily is people, it is very useful to know which colors are best for which skin tones. Most of the time, for most actors, the oddly named "Bastard Amber" is a good bet. Bastard Amber gets its name because it is not really amber—more of an orangey pink. (There is also a color called "Surprise Pink," because, Surprise! It isn't pink.) Very light blues are all right as well, but they will make actors look a little pale. If you are lighting for video, however, stay away from saturated colors entirely. That romantic blue moonlight that looked so good on stage will look like little blue men from Alpha Centauri on television. Keep it white for TV.

Creating Focus: Specials and Follow Spots

Okay, so you are doing *When Ya Comin' Back Red Ryder*? It's a tense but quirky drama that follows a pile of offbeat characters playing out their lives in an Arizona diner. The waitress in the diner—a shy, portly girl named

Angel—never leaves the stage during the show and the director wishes to make the point that, after all is said and done, all these people have really been living in her world.

You decide to leave Angel in a pool of light for a brief moment after all the other characters have gone. A brief, lyrical moment. A blackout. Applause.

Enter the **special**, a single lighting instrument that lights one particular place on the set. Specials are generally a less saturated color than the rest of the lighting, allowing them to “punch through” the rest of the color. Often, they have no color at all. Specials are usually **ellipsoidals** because you want to have precise control over where the light goes.

When you really want to add emphasis and your subject is moving, there is nothing like a **follow spot**. A follow spot is any lighting instrument that is capable of being moved by an operator to follow an actor on stage. They come in all shapes and sizes. Follow spots may be hard-edged, super bright spotlights, or they may be more subtle and soft-edged, almost blending into the rest of the lighting. The subtle, soft-edged spot is very popular in opera, where the designers want to emphasize the lead singers without destroying the overall ambience.

Generally, choosing to use a follow spot means choosing to enter the visual style of musical theater. An audience is usually unwilling to accept that light is following an actor unless that actor is singing. I guess two departures from reality cancel each other out. The image of an actor standing in a follow spot is so strongly associated with musical theater that putting a follow spot on stage virtually declares, “We are doing a musical show.” An actor standing in a follow spot is one of our cultural icons, so make sure that icon fits your show before you do it. I welcome rule breaking, but be sure you know which rule you are breaking before you do it.

Lots of theaters have a built-in position for a follow spot toward the rear of the theater. Unfortunately, this creates a flattened-out look that can be unattractive. Follow spots are just like acting area lighting—the most attractive angle is around 45 degrees. Of course, if your spots are built in, then you must live with what you have.

Spots do not come only from the front. Back-light spots occasionally show up as well. Look for them in large musicals and rock-and-roll shows.

Where the Show Is (and Isn't): House Lights and Actors in the Audience

House lights serve a practical purpose—they help the audience to find their seats and read their programs. They also serve an aesthetic purpose—they tell the audience when the show is starting (by turning off) and ending (by turning on again). The line between house lights and stage lights also helps the

audience to know where the show is taking place. Sound like I am stating the obvious? Not necessarily. Sometimes, a director wants to have an actor go into the audience area. It can be problematic to light an actor walking through the audience because the lighting positions are in the wrong place. (Lighting positions are designed to light the *stage*, after all . . .) In this case, someone usually makes the suggestion that the house lights be used to light the actor. This is a difficult issue.

In the first place, there are very few theaters that have specifically focused house lights that can be turned on individually. Usually, when you hit the house-light switch, the entire house is lit. Right away you lose the primary *raison d'être* of lighting—to provide focus. Once you have brought the house lights up, the audience has a lot to look at—namely, itself.

When the house lights come up, the audience becomes part of the show. Fair enough, but the reverse is also true: The actor becomes part of the audience. That is, the actor ceases, in some ways, to be his character and he becomes a real person who is trying to portray a character. The audience's willingness to accept the actor as the character is strained. It is no longer clear what is the show and what is not.

Some productions want to do exactly that! Some directors want to play with these issues, and that is fruitful ground. As with follow spots, it is important to be aware of the conventions before you break them. Unless you are trying to make a point, however, use stage lights, with their capacity to be focused and directed, to light an actor in the audience. Of course, if you are in the musical theater style, you can always use a follow spot.

If you are using a space where you have to hang your own house lights, keep these suggestions in mind:

Use very unfocused lighting instruments, like big scoops, without lenses. If you are using fresnels, take the lenses out (be sure that you store them carefully). Add soft orange filters to give them warmth. Dim them down halfway. Hang them slightly behind the audience, pointing a little toward the stage. This keeps them from getting in the audience's eyes, yet allows easy reading of the program.

Moving the Show Forward: Cues, Timing, and Blackouts

Besides helping the show move around the stage by steering the audience's eyes, lighting also helps the show move through time by separating the scenes and defining the beginning and the end.

Every time the lighting changes, it is referred to as a *cue*. Cues are numbered, starting with cue number one, the lights that are on stage when the audience enters. Cue two is usually the light change that happens as the

show begins, often a blackout. Cue three is the light that begins the first scene, and so on.

Each cue is a list of which lights are on and how bright they are. Besides these levels, each cue has a time. This time tells how long (in seconds) it takes for the lights to fade to the levels written in the cue.

The timing of lighting cues is critical, and it is one of the most important things that a designer does, along with providing clear, steady illumination. The most important times are the ones at the ends of scenes, particularly if you are going to a blackout. A long, slow fade at the end of a scene can cause the emotions of the scene to become deeply internalized by the audience, as they slowly take in what has just happened on stage. Fast blackouts, or **snap-outs**, can be a stunning punctuation, leaving the audience with an after-image impressed on their retinas. Of course, in comedy, the blackout is a critical part of the show's timing. A second or two can be the difference between getting the laugh you so richly deserve and actors stumbling off the stage in uncomfortable silence.

Unfortunately, lighting equipment does not always go to black as quickly as we would like. Even with a snap-out, there is always a slight glow on stage for a few seconds after the lights go out. The problem is the filaments in the lights. When the lights are on, they are glowing white hot (that's what makes the light, after all). When the power to them is cut, it takes a moment for them to cool enough to stop putting out light completely. This takes longer for a stage light than it does for a household light because the stage light has a much bigger filament.

Actors should always hold their positions on stage for a few seconds after the lights go to black. Look at the filaments in the lighting instruments. If they are still glowing, the audience can probably see you. Count to three before you move. If you are not sure if you can be seen after blackouts, ask someone who is sitting close to the stage during a rehearsal if they saw you move.

In some cases, a scene will be followed by a scene change. The crew moving the scenery will need some light, so the designer will create a dim **scene-change light** (typically some blue lights or a dim back light) to allow them to see. This cue needs to be dim enough so that the audience recognizes it for what it is and does not believe that there is a scene going on. If you are doing a scene-change cue, make sure you "button up" the previous scene by going to black first. Once you are in blackout, the actors can exit, the audience knows the scene is over, and the scene-change cue can come on. Likewise, do not fade directly from a scene-change cue to the lights for the next scene. Go to black first. It buttons up the scene change and tells the audience that the "show" is starting again.

offered by several different companies. Ask your dealer for a catalog. Remember, though: If you are going to use templates, you must have an ellipsoidal spotlight. Fresnels cannot handle templates.

I mentioned earlier that an ellipsoidal is capable of being either hard- or soft-edged. This is possible because an ellipsoidal has all of its lenses mounted in a movable barrel that can be slid back and forth. If you want to make your ellipsoidal more “fuzzy,” that is, get rid of the sharp line, just “run the barrel” forward or backward until you like it. Likewise, if you are inserting a template and you want the image to sharpen up, run the barrel back the other way.

Ellipsoidals are referred to by two numbers: the diameter of the lens and the **focal length**. The focal length is the distance between two mystical points in the optical system, and the only thing you need to know is that the longer the focal length, the narrower the beam that comes out the front.

There is also a class of ellipsoidals called **zoom ellipsoidals**. These handy instruments have an adjustable focal length, so you can make fairly radical changes to the size of the beam without hanging a different instrument. Why not use them all the time and have more flexibility? There are two trade-offs: cost—predictably, zooms are more expensive—and amount of light—zooms tend to be less bright than the fixed focal-length units, because they waste some light inside the instrument.

Follow Spots

Follow spots come in many shapes and sizes, but there are some things that are common to all of them. Follow spots are designed to put out a bright, crisp circle of light, much like an ellipsoidal (in fact, you can bolt a handle onto the back of an ellipsoidal and have yourself a low-tech follow spot). The size of the circle of light is determined by the **iris**, which is operated by a sliding handle on the top or the side. A spotlight will also have **shutters** that shut off the light by sliding in plates from the top and bottom. Many spots can also dim the light out gradually with a **douser**, two plates that swing in from the sides to gradually block out the light. These controls—the iris, the shutter, and the douser—are often right next to one another. On most spots, they are on the top.

A follow spot will generally have a number of different **color frames** that may be pushed in one at a time or together to put a **color filter** in front of the light. These color frames are controlled by a series of levers on the side of the follow spot. Pushing one color frame in knocks the previous one out.

Finally, many spots have a lever, called a **trombone**, that you can push back and forth to adjust the focal length, just like a zoom ellipsoidal. Pull it back to shorten the focal length and produce a wider beam; forward to do

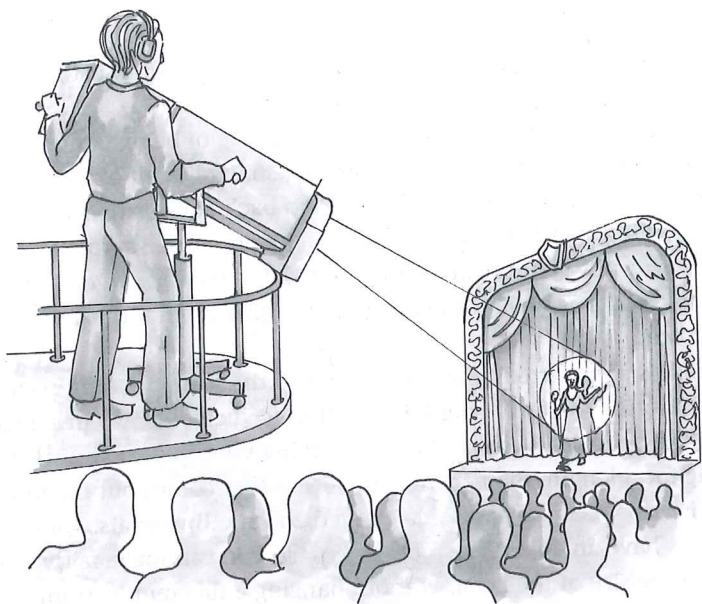


Fig. 28. A follow spot

the opposite. Unlike the iris, shutter, and douser, the trombone is a “set it and forget it” control that the operator will only need to mess with once.

Different size theaters need different size follow spots. In order to determine which spot you need, you need to know the **throw distance**. This is the distance from the follow spot to the stage. Thirty feet is quite short; a good distance for a converted ellipsoidal or a “club” spotlight. These spots use lamps similar to those in regular lighting instruments. Some of them even use “MR-16” lamps, the low-voltage slide projector lamp I mentioned before.

As spots get bigger, the light sources start to change. For throws approaching one hundred feet, use a metal-halide, or HMI lamp. This highly specialized lamp has no filament. It produces light by forcing electricity to jump a tiny gap, sort of like a miniature arc welder. It packs a real wallop though, and it is often used for rock-and-roll. If you go to a rock concert and see follow spots mounted on the truss directly above the stage, they are probably HMIs. They make excellent spots for clubs, fashion shows, and theater as well. An HMI spot comes with a twelve-pack-size piece of equipment that sits on the floor under the spot. This is called a **ballast**, and it is required to keep the lamp burning, so make sure you do not forget it when you rent the spot. One caution about metal-halide: Once you turn it on, do not turn it off

until the end of the show. HMIs will not restart if they are hot, so if you turn it off at the beginning of intermission, forget about getting it back on for the second act. You must let it cool for a couple of hours before you can use it again.

For extra long throws (200 feet and up) in large theaters or stadiums, technicians use another type of spot. This kind of spot uses an arc like the HMI, but the arcs are much bigger and the light is much brighter. There are two varieties: the **carbon-arc spot** and the **xenon-arc spot**. Both of these spots require permanent installations and external venting to accommodate their large size and noxious fumes. Carbon-arc is a much older technology and is gradually disappearing. It requires a fair amount of skill to operate because the light is produced by arcing the light between two carbon electrodes, called **trims**. These trims slowly burn away, increasing the gap between them. If the gap gets too big, the arc will stop and the light will go out. If it gets too small, the trims will fuse together and the light will go out. If the gap is only slightly too big or too small, then the light will smoke, flicker, and look terrible. It requires a skilled operator to maintain the proper amount of space between the two trims. Furthermore, the trims only last about forty-five minutes to an hour, so right in the middle of the show, they have to be replaced with fresh ones, which is called "retrimming." It used to be that rock-and-roll shows had a period of about a minute built right into the show when all the spots could be shut down to retrim.

There is a general trend in theatrical equipment toward making things easier to use, and the carbon-arc spot is a welcome casualty of this movement. Replacing it is the more sophisticated xenon-arc spot. The concept is the same: Force an arc to jump across a sizable gap and it will produce light. The xenon arc, however, is enclosed in an airless glass envelope and the electrodes do not get used up in the process. Xenon lamps do occasionally have to be replaced or adjusted, but the adjustment happens every few years, not every few minutes.

Intelligent Lighting Instruments

It was a warm spring evening in 1980, when a team of designers from Showco Productions sat the rock band Genesis down outside a barn in rural England. On that day, they showed the band the prototype for the first practical, road-worthy, and cost-effective intelligent spotlight. The band's manager, Tony Smith, coined the name "Vari*Lite" and rock history was made.

The first Vari*Lites were shrouded in mystery. Until recently, they could not be purchased—only rented—and they came with their own technicians. On tour, local stagehands were shooed away from the lights and they were

never opened in public. Because of their popularity, however, it wasn't long before other companies—among them Morpheus, High End Systems, Martin, and Clay Paky—released competing products. Together, they changed the visual image, not only of rock-and-roll, but of theater, industrials, fashion, award shows, and even permanent architectural installations. Today there are dozens of different moving lights, falling into two general categories: **moving yoke** (or moving body) and **moving mirror** (or moving beam).

Moving Head versus Moving Mirror

In a moving head (the more common term for moving yoke) fixture, the lamp, optics, color wheels, gobos, and all accessories are built into a moving case, which is panned (moved up and down) and tilted (moved side to side) by two motors. The combined motion of the pan and tilt motors can point the unit in almost any direction. Moving head fixtures tend to have a greater range of motion than moving mirror lights.

Unlike the moving head fixture, the moving mirror fixture stays in one place, while a mirror redirects the light beam. The mirror uses two motors—pan and tilt again—to throw the light where the designer wants it. What the unit gives up in range of motion, it gets back in speed. Because the mirror is so much smaller and lighter, it is easier to reorient, giving the designer almost

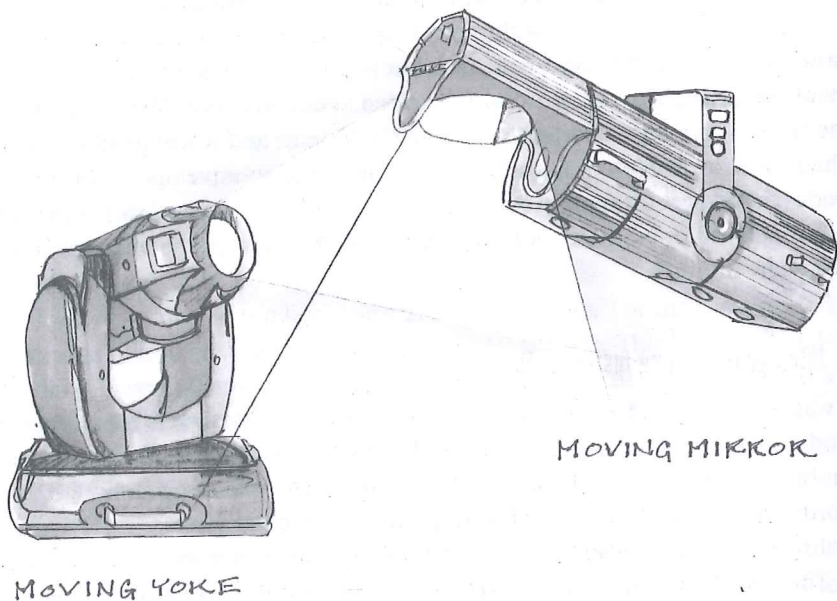


Fig. 29. Moving head versus moving mirror

instantaneous movement. The Clay Paky Golden Scan 3, for example, can go from one end of its pan to the other in less than half a second. That's fast.

Spot versus Flood

Intelligent spotlights are similar to ellipsoidal spotlights. They can be focused and shuttered with a hard-edged beam and they can project a shadow pattern from a gobo. Intelligent floodlights are kind of like fresnels, with a soft-edged beam that blends well into other lights but cannot be fitted with a gobo.

The Light Source

Almost all moving lights use a short-arc light source* that produces light by jumping electricity across a tiny gap between two electrodes, creating a tiny "point source" of light. A smaller source means smaller optics and a sharper beam.

Different intelligent lights have different features, depending on their function and their price range. Here are some of the features you will see, depending on how many samoleons you want to drop on a fixture.

Color Filters

Intelligent lights have the color filters built into the body of the fixture so they can be manipulated more quickly and easily. Unfortunately, that puts them next to the extremely hot light source where plastic or Mylar media would be instantly melted. Moving light color filters are made from **dichroic** glass that reflects away the unwanted frequencies instead of absorbing them, thereby staying cool and extending the life of the color media. There are two kinds of color systems: In the simplest, a dozen or so dichroic glass filters are mounted in slots on a moving wheel and the designer dials up the one she wants. The second color system, known as CMY mixing, consists of three wheels, generally cyan, magenta, and yellow. Each of these wheels is graduated from a fully saturated color at one end to clear at the other. By rotating the wheels in front of the beam of light, the unit can create virtually any color. Some fixtures may have diffusion filters or even "black light" filters.

Gobos

Intelligent spotlights are fitted with at least one gobo wheel, that is, a moving wheel with slots where the designer can insert preselected gobos. More expensive lights may have as many as four wheels, with at least one of them capable of spinning the gobo in its holder. Spinning gobos can produce

*As of this writing, Vari*Lite has come up with an ellipsoidal spotlight that uses the same type of tungsten lamp as a conventional, nonintelligent fixture.

flickering fire, water ripples, or other psycho-spacey effects. You can also order custom gobos with text, logos, or other artwork.

Focus, Zoom, and Iris

Some units allow control over the focus of the unit, from hard to soft focus, just like moving the barrel of an ellipsoidal back and forth. The zoom function moves the light source itself, making the beam of light larger and softer.

Shutters

Another way to control the light is with shutters, either hard-edged or soft-edged. A soft-edged shutter produces a frost-like effect, while a hard-edged shutter gives a sharp edge.

Other Effects

Depending on the fixture, the manufacturer may include a strobe effect (produced with lightning-fast shutters), prisms that multiply the image, or an iris to alter the size of the beam.

Dimming

Short-arc lamps cannot be dimmed like filament-based lamps, so they require mechanical dimming, generally a metal door that closes over the light beam before it hits the lens. Because the beam is out of focus at this point, the door reduces the overall light output instead of creating a hard edge, like a shutter does.

Control Systems

The original Vari*Lite system had its own proprietary control language and control boards. These days, however, intelligent lights all use the DMX lighting protocol. DMX is actually a poor choice for controlling intelligent lights, because it only allows one piece of information to be sent on each channel. For example, if you want to mix red, green, and blue color wheels to produce a color, you must use three DMX channels to send the information—one for red, one for green, and one for blue. A complex moving light may require dozens of channels of DMX control, one channel for each gobo wheel, color wheel, focus mechanism, shutter, and so on. The need for a common standard was strong, however, and DMX was already familiar to light professionals. In the absence of a better idea, it was adopted by default.

The Downside

Despite the best efforts of instrument designers, there remains a downside to using intelligent lights. The most obvious is cost. Intelligent lights cost

Costume Design: Character, Period, and Function

To me, there always seems to be a kind of divine madness about costume designers, and no wonder. They spend much of their time mucking about in character's brains, peering at their everyday life, thumbing through mythical closets and faraway dresser drawers. As costume designer Celestine Ranney puts it, "I make clothes for imaginary people."*

While scenic design focuses on Grand Statements and lighting builds Mood and Atmosphere, costume design takes a more personal, more individual road. Costumes depict Character. The costume designer is trying to give the actor a home for the character, a place in physical space, a garment that restricts and reveals the actor as it would the character. The costume should help the actor move as the character would move, giving the actor another tool with which to create the role. "Clothes make the man," the saying goes, but perhaps it is more accurate to say, "Clothes reveal the man." Costumes take the inner workings of the character and put them on the outside. They are like X-ray machines.

Costumes must also knit together well with the other design elements. If the set, lighting, and costumes are not of the same "world," the show will feel disjointed, although the audience might not know why. Furthermore, the color in these three elements must be complementary, so the actress in the beige dress doesn't end up in front of a beige wall and completely disappear.

Of course, all the design arts exist to tell the story, and costumes are no different. It is not enough to see an eighteenth-century nobleman wearing an

*Quoted by Tara Maginnis on *Costumes.org*.

embroidered waistcoat. We must see a desperate eighteenth-century nobleman who has lost his fortune and donned his last threadbare waistcoat as he comes courting, seeking a bride's dowry that will reverse his fortunes and make him a true man once again, a force to be reckoned with, a courtly presence unmatched in power and influence.

Or something like that.

The work doesn't stop there. Even more than scenery (and way more than lighting), costume design expresses a certain snapshot of historical time: a Period. When signing up to a new project, one of the very first questions from the costume designer will be, When is it set? The silhouette, shape, texture, and accessories of any garment are dependent on fashion, and fashion goes hand-in-hand with time. Costume designers, therefore, tend to be history buffs. They must know general trends in clothing—like bustles, top hats, and skirt lengths—plus tiny little details like the fact that purple dye used to be very costly and was, by law, forbidden to everyone but the emperor. They must know that the opening of King Tut's tomb sparked an explosion of Egyptian-themed clothing. Costume designers have to know about revolutions, scientific discoveries, cultural traditions, and all sorts of other phenomena that affect the design of clothing. Therefore, researching the period of the play is of tremendous importance.

Of course, every aspect of design has its practical side as well, and the costume designer's work is grounded in the reality of the human body. Every piece of art the costume designer makes must be displayed on a pre-existing shape. It must fit that shape, reveal or hide that shape as necessary, and not impede any of the actions that shape wants to take in the course of arguing, sword-fighting, wrestling, lovemaking, eating, or doing jumping jacks. Some characters dance, some sing, some strip, some climb stairs or ladders, some have to fit through doors and some have to change clothes in an awful hurry. Costume designers, therefore, must design clothes that serve whatever function is required of them by the play.

Let us take a look at how costumes reveal character. Then we'll talk history and, finally, we'll get practical.

Character

The playwright's words are the beginning of everything, so, like every other designer, the costumer starts with the script.

How to Read a Play Like a Costume Designer

Like the other designers, a good costume designer will read the play through once without worrying about the practical details, simply letting the emo-

tions of the play flow out of the text. Once she has a handle on the overall story, she will go back and begin to answer specific questions:

Where does the play take place? What country are we in? What city? Are we indoors or out? Which rooms are we in? People might dress differently in the bedroom than in the kitchen.

When does the play take place? What year? What *time* of year? What time of day? Is it a warm summer evening or a crisp fall morning? What is the weather like?

What is the world like where the play takes place? What kind of government? What kind of church? What are the character's social beliefs about everyday conduct, relationships, marriage, sex, children?

What happened before the play began?

What type of action does the play call for? Will the characters be tumbling around on stage? Is there fighting? Food? Sex?

What kinds of clothing references are in the text? These might be very direct, as when a maid asks a gentleman for his hat, or they might be inferred if, for example, a character remarks that someone looks "all dressed up."

Who should the audience be focusing their attention on? Who are the protagonist and antagonist? Who are the supporting characters? Visualize the scene in your mind and think about where you would want the audience to be looking at any moment. It is the lighting designer and the costume designer that direct focus around the stage. The lighting designer does it with intensity of light; the costume designer with color and style. When Mame enters on the arms of ten black-tuxedo'd gentlemen, the last thing you want to do is put her in a black evening gown. A bright red dress lets the audience know they should be looking at her.

Therefore, when creating costumes for each character, you should know the following:

- Age
- Social class
- Financial position
- Marital status
- Health
- Moral beliefs
- Job
- Mental state
- Education
- Country of origin

All of the above information can determine what they would wear and how they would wear it. Costume designers must understand how these characters choose to reveal themselves to the world—their habits, their place in society, their career, health, education, and so on and so on. They will do much of the same research as the actor, and may end up knowing as much about the character as the actor who plays him. The director should also be

sharing his ideas for the character early on, as the designer will want to build on them. This relationship is most useful when it goes both ways, of course. A costume designer will often discover tasty details in her research that may influence the director's conception.

Costume design often dips into metaphor, whether the audience notices it or not. One production of *Hedda Gabler* envisioned her trapped in her fate like a prison inmate, so her costumes were all tightly laced like straitjackets and decorated with thin stripes. Whether or not the audience understood the metaphor directly, the costumes confined and restricted the actress, giving her a valuable tool to create this tortured character. These sorts of metaphors often hit the audience on a subconscious level as well, though they rarely realize it.

One way that a costume designer can influence a performance early on is with the introduction of a costume prop. Costume props are things like umbrellas, pocket watches, boas, canes, and so forth. If the prop is an interesting choice, it can become the center of a great deal of business in the hands of a creative actor and a clever director. These sorts of props need to be provided early on, so they can grow in personality throughout rehearsal. Give Mame that boa early on, and you may find her weaving the male chorus line into it by opening night.

Costume designers are often looking for a "keynote" piece for a costume: a single element that expresses the inner workings of a character's mind. It might be Madame Arcati's exotic turban in *Bliithe Spirit* or Henry Higgins's frumpy, slightly out-of-fashion suit coat in *Pygmalion*. It could be as simple as a piece of jewelry or as elaborate as a suit of armor. This single signature piece can offer guidance throughout the design period, much as a single piece of scenery or furniture can keep the scenic design process on track.

The director generally comes up with an overall stylistic theme—"a flashy carnival spectacle," "a bizarre Fellini film," "a fascist diatribe," "a wacky comedic romp," "a passionate romance novel," and so on. This helps the designer get a sense of style for the show. This shared style helps hold the visual style together onstage, so that all the characters look like they are part of the same story.

Besides revealing a character's inner workings, costume design can often help the audience to follow the story. If a play is packed with characters, a designer may create a sort of color-coding for the players. This set of lovers is in blue, that one in orange, and so on. The usefulness of this technique is in direct proportion to the potential for confusion in the story.

An Exercise

I think you know where this is going. That's right, to a closet. This exercise is best done with a friend, because it can be hard to see yourself objectively.

Have your friend reach into her closet and pull out twenty articles of clothing: shirts, dresses, pants, skirts, bathrobes, underwear, whatever. Tell her to get a good assortment, but concentrate on the ones that she wears most often. Lay them out on a bed, the floor, or a couch so you can see them all.

Take a good, hard look at these clothes. What do they say about her? Do you see a common color palette? Are there shapes and textures that run through them? Try answering the following questions about your friend based on her clothes:

- How old is she?
- What is her financial status?
- Is she married?
- What does she do for a living?
- What is her attitude about her own body?
- Is she involved in a romantic relationship?
- Is she shy? Confident?
- Where did she grow up?

Ask yourself: If she were a character in a play, how would these clothes reveal her personality to the audience?

Period

Choosing a period has a tremendous influence on the costume but, interestingly enough, getting it a little wrong isn't a disaster. Costumes serve characters who, in turn, serve a story. Unless you are doing *The Abe Lincoln Story*, you can fudge the years a little in most cases. Period is not just about historical accuracy. It is about putting the play in a place in time that fits the story. It's not enough to say *when* the play is taking place. You must answer the question, "Why then?"

In some cases, period is determined for you by historical events depicted in the story. If the family owns slaves, it will be challenging to set the play after the Civil War. (Actually, now that I think about it, that might lead to some interesting political theater.) In other cases, a play will set itself in a period because of a style of language. Nobody really talks like Noel Coward these days (more's the pity) so setting *Hay Fever* in the present might be a bit unsettling.

What really sets a play in a period, however, are the issues that are treated in the text. When Orson Welles directed his brilliant *Julius Caesar* in 1937, he set the play in the then fascist Italy, not because he liked the uniforms, but because he wanted to make a statement about the abuse of power and the

ultimate failure of political will among the liberal ranks. Shakespeare's plays seem to endure being set in all sorts of periods, in fact. Seeing an Elizabethan *Hamlet* these days is almost a novelty.

Because of her historical knowledge and clothing sense, a costume designer can actually be a great deal of help in choosing a period. Smart directors will consider including her in this decision.

There are also times when it is useful to strategically ignore the period. For example, if you are setting *The Merchant of Venice* in the Italian Renaissance where Shakespeare envisioned it, you might discover that all Jews were required to wear a bright yellow hat at that time. Personally, I don't recommend putting your lead character, Shylock, in a big yellow hat. People will think you are doing *Curious George*, and speculate during intermission if Shylock's mischievousness at the zoo is what got him in trouble. In this case, ignore the period and find another hat for your lead.

From time to time, a director will throw the idea of period out the window, insisting that "This play takes place in no particular time." This is a problematic decision, for two reasons. First, it often turns out that the director *does* have a particular period in mind for most of the characters, but wants to cheat mightily with a single character to make a point.

Tweet! Five yards for not trusting your designer.

If you want to plop a French maid costume in the middle of a prison camp, it's your call, but don't yank the entire work out of period to do it. Challenge your designer to embody the idea of a French maid costume into a prison uniform. If you provide her with the tools she needs—a clear understanding of the character being paramount—you will be amazed at what comes out of some people's sewing machines.

The second reason that "no period" is problematic is that it sometimes means "no clue." Directors will decree that a play is about "universal themes" that transcend time and place, and thus each character should wear what suits him individually.

Tweet! Fifteen yards for delay of production while you figure out your concept.

Sure, love, hatred, passion, jealousy, rage, and all other emotions have been with us since time began, but that doesn't mean that they have always been felt and treated the same way. These emotions do not make a theme by themselves. Plays are about relationships—between people, between people and places, between people and society, between people and time. When you ignore period, you risk setting your play adrift, not only in time, but in concept.

I didn't say you couldn't do it. I didn't say you shouldn't. I just said it's tough.

A period doesn't necessarily have to be a particular year, however. It could be the world of a particular painter, for example, or a fantasy book. Vincent Van Gogh's late paintings have no particular year, but they do have a particular look and feel. The same might be said of *The Hobbit*.

Now that I have that out of my system, let's look at what the past gives us to work with. While history does not always give us the benefit of clearly defined periods, Western historical style basically breaks down as follows:*

- Prehistoric and Babylonian
- Ancient Egyptian
- Ancient Greece
- Ancient Rome
- Byzantine
- Barbarian Europe
- Medieval Europe
- Italian Renaissance
- Sixteenth Century/Northern European Renaissance
- Seventeenth Century
- Eighteenth Century
- Regency and Empire
- Victorian Era
- Edwardian Era
- 1911–1920
- 1920s
- 1930s
- 1940s
- 1950s
- 1960s
- 1970s
- 1980s
- 1990s
- 2000s

Note that, in this list, historical periods tend to get shorter as we move further forward in history. As it gets closer to the present day, the periods tend to subdivide more. If you are doing a show in the Edwardian Era, you don't have to worry so much about the differences between early Edwardian and late. If you are doing a show in 1982, however, you can get busted for rolling out an outfit that didn't make its appearance until 1988.

First and foremost, period determines the **silhouette** of the costume, that is, the overall shape of the garments, irrespective of color, texture, and fabric. In any given period, there is a choice of silhouettes. The designer will pick the one that is appropriate for a character, then build it with one of the fabrics that she has chosen for her palette.

Function

Actors move. There's no way of getting around it, and we wouldn't even if we could. It is the dynamism of the live performer that makes theater a wonderful experience.

*Thanks to Tara Maginnis of *Costumes.org* for this list.

That dynamic performance, however, can create some headaches for the costume department. As I said in the introduction, a costume can be a tool, even a toy, for an actor to use and play with to discover a character. Those toys, however, should be built to match the level of punishment they are going to get. You wouldn't play baseball with a long-stemmed rose, and you shouldn't stage a fistfight in costumes that weren't built for it. One designer I know always goes by the rule, "Dress up singers, Strip down dancers," which basically expresses a general philosophy about how clothes must serve the action.

Here's what the costume designer wants to know about how a costume will be used:

- *Does the actor need to dance, fight, climb ladders, or otherwise move in a highly physical way?* In this case, the seams may need to be strengthened. The costume may also need to be cut with more room around the joints, so the actor can move smoothly. Long trains on dresses may want to be reconsidered. Obviously, different types of dancing (tap, ballet, folk, etc.) will require different shoes.
- *Does the actor need to sing?* Singers need more room around the diaphragm, and may find it difficult to sing in corsets.
- *How big are the doors?* Women have worn some pretty bulky stuff through history, and you really don't want your rehearsal to grind to a halt because the four-foot-wide bustle skirt won't fit through the three-foot-wide door. The same goes for furniture. Ever seen what's underneath a hoop skirt? You will, if the actress sits down on a chair that's too small.
- *Is there food or drink involved?* Will this actor eat? Do they need to spill anything on themselves, have a food fight, or laugh so hard they shoot milk out their nose? These types of messes may affect which fabrics can be used. Protein stains will not wash out of some fabrics, and there may not be time or money for constant dry cleaning.
- *Will there be blood?* Never depend on the costume shop reading the play. They do, of course, but you should still let them know who gets stabbed and whom they will bleed on.
- *Will there be fast changes?* This is something the costume designer should be aware of well ahead of time, but it doesn't hurt to confirm it. People have different definitions of "fast," but I believe that any time an actor is in two consecutive scenes with two different costumes, it should be considered a fast change.
- *Does the performer need to dress or undress onstage?* This could happen for various reasons, from lovemaking to dressing for a joust. Any time

a garment is put on or removed in sight of the audience, the costume shop needs to know. For one thing, the fasteners that hold the clothes together must now be historically accurate. There were no zippers in Renaissance Verona. The costume shop can also do things to make the costume easier to remove or put on.

- *Does the costume need pockets?* Finding out during tech week that a costume needs a pocket makes costumers grumpy, and for good reason. It's always easier to install a pocket when a costume is being built.

You can address many of these issues ahead of time by putting the actors in **rehearsal clothes**. Most costume shops can provide rehearsal skirts for period plays, as well as corsets, hats, and other period pieces that will seriously affect the actor's ability to move. In the vast majority of cases, you won't get the actual costume until dress rehearsal, but you should get something that approximates the size and weight of the actual item. Male actors should plan on wearing their own suit coats and everyone should plan on providing appropriate footwear for rehearsal. The shop can and should provide costume props, like fans, pocket watches, cigarette cases, and so forth, particularly if those props are involved in **business**, a bit of action that is meant to draw the audience's attention.

The most important thing about all these issues is **ASK EARLY**. It is far easier to accommodate all these things when you are still a month from dress rehearsal.

The Costume Sketch

All of this design work is of no use if it is not communicated to the director and the costume shop. Costume design is communicated in a series of sketches that start with rough thumbnails during the design period and culminate with a fully realized costume rendering that is delivered to the shop for construction. In the world of scenery, the rendering gives a sense of what the final product will look like while the set is built from drafted plans. The costume designer depends entirely on the rendering to communicate her design both to the director and to the shop.

The rendering should depict the costume on the actor in a standing, full-body pose. Earlier versions that are done for the director will not include construction details, but the final version must contain all the information that the shop needs to build the costume. A rendering will often be accompanied by swatches, to show which fabrics will be used.