I think that the reason I find lighting design so fascinating is because it is the meeting point of art and science. In no other field is the relationship between the aesthetic and the technical so delicately balanced. Lux levels versus subjective impression of brightness. The physics of colour mixing and the creation of mood. All these elements playing together in, hopefully, perfect harmony.

I am a lighting designer. I spend my days, and quite often my nights, in darkened theatres and other gloomy spaces. More often than not working against the clock to make sure that the lighting is ready for the 8 o’clock performance. Why? Well, quite simply, I love light. Of all the art mediums, I think that light is the most fantastic one to work in. Light can reveal an object. Light can sculpt an object. Light can create a mood. Light can toy with our emotions. Light can tell a story. But enough of waxing lyrical. Let’s get down the nuts and bolts, or rather the lamps and lenses of how we do what we do.

Properties of light
There are four properties of light that we as designers can control - Intensity, Colour, Distribution and Movement. Intensity is just that. How bright the light is. Of course, brightness is relative. A single candle in a dark room will appear to be quite bright. In theatre, we are less concerned with how bright the light actually is, but are more concerned with how bright it appears to be. In television and architectural lighting, the light levels are sometimes very important. Cameras require certain light levels to function properly and architectural spaces needing specific light levels for different applications. The most common wattages we use are 500 W, 1000 W and 2000 W.

Colour is, in my opinion the most important element of any good design. Colour can alter the way an object appears, it can also help to create mood and emotion. There are hundreds of colour filters available and each one will produce startlingly different results.

Distribution refers to the way in which we focus the light. Is it a general flood of light, or a very tightly focused spot? The direction of the light is also important, as a top light will give a different look to a low sidelight. Some angles are intended more for visibility and others for sculpting. We try to choose those angles and lighting positions that do both jobs. We have to be able to see things clearly, and they have to look good. More often than not, a single light won’t do it. We combine several fittings in different positions and colours to get the right balance between sculpture and visibility.

Movement does not really refer to the physical movement of the light beams – a technique that is popular in modern stage and concert lighting. It is actually the changing from one lighting state to another. Each of the other three properties can be varied either quickly or slowly and it is this shift in intensity, colour or angle that we refer to as movement.

Objectives
When lighting a show, and these principles can be applied to all aspects of lighting design, there are five objectives that we must aim for if we are to produce a successful lighting design. These are: visibility, revelation of form, composition, information, and mood. Each of the four properties of light plays a part in helping to achieve each objective.

Visibility
One would think that this is pretty self-explanatory. I prefer to think in terms of “selective visibility”. This means that we tell our audiences where to look and what to look at. We can also determine how we want the object to appear. Intensity is the biggest contributing factor to achieving this objective, closely followed by colour. Our eyes are naturally drawn to the brightest object. By making someone, or something,
brighter than the surrounding, we will automatically focus attention that way. Likewise, by altering the colour of an object we will again be drawn to the different element.

Revelation of form
By changing the angle of our light source, we can make the object we are lighting more interesting to look at. Shadows reveal form and texture. By choosing angles which create shadows, we begin to sculpt and mould the object and create a real sense of three-dimensionality. Flat, front light, while excellent for visibility, does little to sculpt and tends to make things look flat and uninteresting. Sidelight, top light and backlight are great angles to use when wanting to sculpt objects and give them a three-dimensional look.

Composition
As lighting designers we are charged with presenting the audience with a ‘picture’ which is pleasant to look at while still achieving suitable levels of visibility.

Information
A good lighting design will be able to show time of day, location and even season. Our choice of colour, angle and intensity all contribute to telling the audience where and when the play is taking place. There are times where we just use bold slashes of colour purely for effect, but for me the real art is in trying to re-create the work of Mother Nature. Mimicking the light of the sun, or the moon for that matter, is incredibly hard to do on stage. The biggest reason is that sunlight only tends to wash out any effect we may be trying to create. Likewise, by altering the colour of an object we will again be drawn to the different element.

Mood
This should be the result of the correct balance between all the objectives and should not be achieved to the detriment of everything else. It is relatively easy to create dazzling sunsets on the cyclorama, but it is considerably harder to create a real sense of three-dimensionality. Flat, front light, while excellent for visibility, does little to sculpt and tends to make things look flat and uninteresting. Sidelight, top light and backlight are great angles to use when wanting to sculpt objects and give them a three-dimensional look.

Variety
Lighting instruments have improved dramatically over the years and there are a number of different fittings to choose from. Modern stage lights can be broken down into four basic groups, namely: Floodlights, Beamlights, Punchlights and Focus spots. In most cases theatres will have an assortment of all these and we use them in varying combinations for different effects. While there have been several improvements in recent years, including the addition of “automated” or “moving” lights, they essentially still do the same job, some better than others. I don’t refer to them as “intelligent” lights. That’s because there are no such things. There are only intelligent lighting designers!

Focus spots
Focus spots can be divided into three sub-groups, namely Fresnels, PCs and Profiles. The Fresnel and PC are similar in that they consist of a lens in a fixed position and one varies the beam angle from a narrow spot of about 8°, to a wide flood of about 50° by moving the lamp and reflector toward or away from the lens. The light beam is round and is soft-edged. The lamp and reflector assembly is one unit and the fitting makes use of a spherical reflector. The Fresnel and PC are both named for their lenses. The PC is an abbreviation for ‘Plano-convex’ of asymmetrical reflectors as we use them to light cloths and cycloramas (large white cloths used for creating skies). The lights will be positioned top and bottom and will need to be able to wash light up (or down) the entire cloth – hence the shape of the reflector. The light from a floodlight is largely uncontrollable, with exception of intensity and colour. Some fittings will have a row of ‘teeth’ along one edge. These are there to take the hard edge of the light away. If the floodlights are on the floor, then the teeth need to be at the top of the fitting, and vice versa.

Beamlights
Here we have the exact opposite of the floodlight. They emit very bright, intense beams of nearly parallel light. They make use of a parabolic reflector to focus the light into a very concentrated beam. They are generally used for effect only, but are occasionally used as a follow spot.

Punchlights
Commonly known as PARcans, they were developed for the rock and roll industry and have become commonplace in most lighting environments. They consist of a PAR lamp and a housing. PAR is an acronym for ‘Parabolic Aluminised Reflector’ and is a sealed beam lamp, containing lamp, lens and reflector. We generally use PAR 64’s or PAR 56’s, but the other PAR lamps are not uncommon. The ‘64’ or ‘56’ refers to the size of the lamp, and is 8 times the circumference of the globe, in inches. A PAR 64 is therefore 8 inches in circumference. There are several beam angles available, ranging from a very narrow beam (CP60 – 9 x 11 degrees) to a wide flood (CP62 – 14 x 24°) lamp. This is determined by the lens on the lamp itself. The beam from a PAR lamp is not round, but in fact slightly oval, meaning we can also adjust the orientation of the beam by simply rotating the lamp in the housing.

Floodlights
These are the most basic of all light fixtures. They are literally a lamp and reflector in a housing. The reflector is usually “hammered” to soften the light slightly. There are two types of reflectors commonly found in floodlights, these being ‘symmetrical’ and ‘asymmetrical’. Theaters will generally only make use...
and the Fresnel is named after the Frenchman who designed it, originally for use in lighthouses. We use these lights in almost every position, as there is a fair amount of control over the light beam. We cannot only adjust colour and intensity, but the size of the beam as well. By using a ‘barndoor’ (an accessory with four ‘doors’ that fits onto the front of the light) we can roughly shape the beam, or at least prevent it from spilling into unwanted areas.

Profiles are the ‘Italian tile’ of light fittings. They make use of an ellipsoidal reflector and a set of lenses to focus the light into a concentrated powerful beam. They are available in ‘fixed beam’ and ‘zoom’ options. Fixed beam profiles are generally available in 5, 10, 19, 26, 36 and 50° beam angles. They can be focused to have either a hard or soft edge. Zoom profiles are typically available in 15 – 30° and 25 – 50° beam angles. Zoom profiles have a double set of Plano-convex lenses. By adjusting the lenses we can alter the size of the beam. The edge of the beam can be either hard (clearly defined) or soft (similar to the PC). To adjust the size of the beam on a fixed beam profile, we use an iris.

Images

A profile is also capable of projecting an image called a ‘gobo’. This is a metal (although glass is being used now as well) image, which is inserted into the focal point of the light fitting, or ‘gole’. This image will then be projected on to stage. The most common use of a gobo is for projecting an image of a window or dappled light effect. We mentioned earlier that information was one of the objectives. Gobos are an excellent way of setting location. Window projections suggest indoors, trees for outdoors, etc. Profiles are capable of projecting their beams over great distances and as such are often the furthest from the stage.

Most modern fittings make use of ‘cold mirror technology’, which means that the reflectors are no longer polished metal. They are made of glass which had a dichroic coating that does not reflect the infrared portion of the electromagnetic spectrum. The heat (infrared) is passed through the reflector and out the back of the fitting. This means that the gobos and gels (colour filters) last longer and we have a ‘whiter’ light to work with.

Light sources

There are several different light sources that we use in theatre. Tungsten-halogen (TH) being the most common, but we use discharge sources such as HMI, MSR and Xenon as well. Fluorescent and neon also pop up occasionally, although the cost and difficulty in dimming them makes their use rare. TH lamps are most practical as they are easy to dim, intensity being an important element of any design. Discharge sources can be dimmed, but this has to be done mechanically. With the different sources, colour temperature (CT) comes into play. This refers to how ‘white’ the light is. CT is measured in degrees Kelvin, and the higher the value, the whiter, or bluer, the light is. If we compare a TH lamp to a discharge source, the TH lamp will appear quite yellow. This is because the TH lamp has a CT of about 3200° K. An HMI source is in the region of 6000° K. Daylight is considered to have a CT of 6500° K. There is a range of colour correction filters which we can use to raise or lower the CT of a light to try and match the colour of the different sources. A light with a higher CT will appear to be brighter, and often we use this principle as one of the tools in achieving ‘selective visibility’.

Colour in design

Colour plays a very important role, if not the most important role, in the execution of a good lighting design. Colour choices should always be motivated. Whether we choose a colour to mimic a particular time of day or whether we want to underline the emotion of a particular scene, colour must be chosen carefully. The difficulty in working with colour is that it is largely a personal thing. My favourite blue may be the director’s worst. I have often had to use colours that I hate, simply because they were the right ones for the piece. A bad colour choice can alter the colours of the costumes or scenery and make them appear to be quite dull. Colour choice should always be motivated, and these are the guidelines I use when deciding on my palette.

Colour to enhance

Colour can be used to enhance the appearance of an object. Occasionally white light is not the best light to use, no matter how good the colour-rendering index of the source may be. We may want to fool the eye into believing an object looks better than it really does. This is where additive mixing can be put to good use. If an object is lit with two sources, one in a colour that complements it, and the second in white light, the result can be fantastic. For example, a source with a high magenta content will help to make reds more prominent. This method also introduces coloured shadows, which can add an interesting new dimension. We try to use colours that are not only flattering to skin tones but also make the scenery and costumes look richer and more natural. We can, and often do, use colour to emphasise the emotion of the play. For example, we may introduce a red backlight to help suggest the anger or passion of a particular scene.

Colour to create space

Colour can be used to create a sense of depth. Cooler colours create a sense of space and openness, causing objects and surfaces to recede, while warm colours tend to make objects advance and can make spaces seem smaller.

Colour to identify

The old cliché of the green light for the pantomime witch is a radical example, but colour can be used to associate an idea or concept. For example, a dream sequence could be lit in a specific colour to suggest that it is not a part of the normal scene.

Colour to inform

Information can be conveyed through clever use of colour. A warm amber may suggest sunset. A pale blue, moonlight.

Colour for effect

There are occasions when we simply wish to create an effect, usually where music is the base on which we create our moods. Here the more saturated colours are very useful, making beautiful stage pictures, which enhance the mood of the piece.

Conclusion

Each production is different and I try to approach each one from a unique point of view, using new sources, experimenting with new angles and colours. Light is a form of energy, and being a lighting designer is about harnessing and controlling that energy and using it to reveal, to sculpt, to inform and to be beautiful.

I used to think that people who lived in glass houses shouldn’t throw stones. After 12 years of professional lighting design, I know that people who live in glass houses have a better quality of light.

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