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The Elements of Onstage Lighting and How it Could Impact the Emotion of an Audience

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An Honors Thesis by Kailee Morehart

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Introduction

Lighting, combined with other aspects of performance, can either make an experience extremely impactful for an audience or it can be completely unnoticed. Lighting is versatile in its ability to be manipulated in different ways to get the desired effect. In addition to having color, lights also have direction, shape, intensity, distribution, quality, movement, and may be changed over time. The combination of these elements can evoke certain emotions in an audience. Opportunities for creativity in this outlet should be explored in order to discover to what extent lighting can impact the emotions of an audience, if at all. In order to determine if the elements of lighting combined can impact the emotions of an audience, one can explore the many different combinations and potentially apply that knowledge to future projects that require onstage lighting. Along with doing more in-depth research on the various elements of light, I have had the opportunity to design lights for “The Old Man and The Old Moon" by Pigpen Theatre Co. - the 2021 Muse Project at Ouachita Baptist University. In conjunction with this project, I developed a survey regarding the lights to see if/how they played a role in telling the story and affecting the audience’s emotions. The data I have collected is qualitative, and while it cannot prove that onstage lighting does or doesn’t impact the emotions of an audience, the results of the survey are intriguing and at the very least have given me an idea as to how some students define light and how the production affected them personally. This has been an amazing opportunity for me to explore one of my passions in much greater depth than I would’ve otherwise been able to and for that, I am so grateful.

Element 1: Direction

Direction, as it pertains to onstage lighting, is referring to the angle of light hitting an object or performer while they are in different locations on the physical stage or while they are in less common locations such as in the audience. The direction of a particular beam of light comes from the place the light source is hung, and how that light source is angled and focused. Linda Essig, in her book *Lighting and the Design Idea*, states that "In controlling the direction of light, the lighting designer also controls the placement, shape, and direction of shadow." Shadow can mean many things to a lighting designer and can be utilized in many different ways to create different moods and effects. Many times, shadow can be mistaken for just blackness. More times than not, however, a shadow has a gradient of illumination and color. It is made up of different angles of reflected light which create a darker appearance to an audience. It is actually quite a challenge for a lighting designer to create total blackness onstage due to many outside factors. An excellent example of this is one that came from personal experience due to the COVID 19 virus. The doors at the back of the hall had to remain open and free of any kind of cover to ensure that airflow could circulate properly in an attempt to keep the virus from spreading. The light from outside the theatre could easily leak in and reflect on things that otherwise would not have had that extra light. It added a non-traditional light source that had to be incorporated into space somehow. The direction of light can provide an audience with important "visual clues" about certain unspoken details of productions, such as the time of day and orientation. Essig states that "The relationship between angle of light and shape of shadow is an indicator of time of day drawn from common human experience." Longer shadows are

created when a light source is below the level of the object it is hitting and the direction of that source is also aiming below a certain point on an object or person. Shorter shadows are created with a similar mindset but in reverse. The light source location itself would be usually higher than the object or individual and the point on the object where the light is aiming would be higher as well. A longer shadow on an object or individual is an indicator of early evening, sunset, or morning to an audience because that's what people see every day. Shorter shadows, contradictory to the long shadows, are perceived most often by an audience to represent midday or even midnight depending on what sort of colors are involved. The angles of lights can be changed during a performance in order to signify the passage of time. This is made possible through lighting cues. For example, if a light is refracting through a window of a house in the early morning and hitting a spot on the floor, it would be unrealistic for the same spot on the floor to be illuminated when the lighting is supposed to be signaling to the audience that it is now noon, so the light refracting through the window should move to give a clear picture to the audience about the passage of time. This concept of angle and shadow can be used to further portray reality to an audience. When a production relies on a sense of distorted reality, the angles of light can be used to give an audience this feeling of misplacement or distortion in order to show an audience that they are watching an alternate reality instead of merely telling them about it through dialogue. Direction for a lighting designer can be a part of a greater stylistic choice and establish the style for a production to an audience. Essig gives good examples of using direction to exemplify a particular style in a production. ..." low side light might support a more abstract style, stark uplight an expressionistic style, or an angle of light between 30 and 45 degrees a more realistic style." side light and uplight are the most commonly used and recognized as forms of lighting used to light the stage for more expressionistic dance

productions. Lighting angles between 30 and 45 degrees are most commonly used in the theatre and are, as Linda Essig stated, usually used to help convey the most realistic scene. The use of direction also plays a crucial role in how an audience actually sees an object or figure on the stage, in the audience, or elsewhere. Essig states that "the ways in which the audience perceives three-dimensional form are dependent on the direction of light hitting that form." When a beam of light coming from a light source makes contact with a three-dimensional object or person, the particles are obstructed and cause a shadow in the places where that particular light does not come into direct contact with the object or person. While reflected light might still make contact, it is not nearly as bright to the human eye and there will still be a significant change in the appearance of the reflected light. An example mentioned in Essig's book is the moon. When a person is looking at a full moon lighted frontally, it looks like a flat white disk. This same concept applies to other objects in space. When lighted frontally, a facial expression will begin to look two-dimensional, which is not typically what a lighting designer would want as it takes away from the effectiveness of an actor when they are portraying certain emotions. If the audience is viewing something that looks flat and non-expressive, the ability for the actor to impact the audience in an emotional way is affected negatively. In other words, the actor and the lights are not working together to tell a story that will evoke an emotional response in an audience and the lights have just made the actor's job more difficult. Frontlight is just one of many directional choices a lighting designer can make. There is also a downlight or toplight, where the light source is directly above the actor. It gives definition to objects and people, but not in a way that is representative of a descriptive image. It gives a vague shape of the face and is not good to use alone when facial visibility is of importance to a particular production. The backlight comes from "upstage," a term used to describe a direction coming from the back of the

stage behind the actor and toward the audience. This is used extensively for the silhouetted shapes of objects and actors and may also be used by itself for more abstract or moody scenes. It will also help separate the background from the foreground by highlighting what the audience needs to consider more important, or even to give more depth to a smaller theatre space. A diagonal backlight is very similar to a straight backlight, but as the name suggests, it wraps around a form or figure to show both outline and three-dimensional form as the light source is not directly behind, but rather at an angle behind the figure. Side light comes from either stage left or right and can be used as a kind of sculpting tool for objects and people. It is not used by itself when facial expressions are needed to be seen in detail because only one side of the face would be sculpted and visible. High, mid-high, and low side light are terms used to describe the angle at which the light is hitting a figure. Low side light suggests the light source is coming from a lower point compared to the figure and high side light suggests the opposite. Similar terms are used to describe front light as well. Steep front lights, refer to the light source coming from approximately 45 degrees above the actor. Straight front lights, as mentioned earlier, are typically directly in front of the actor. Low front lights or uplights, come from below a figure and give a very unnatural feel. Diagonal front lights refer to the light coming from approximately 45 degrees above the figure and 45 degrees to either side of the figure, giving the most natural and visible appearance. All the lighting directions described and listed above are usually used in a number of combinations to form lighting compositions. Lighting compositions can be used to create the perfect atmosphere for a particular style of scene or production. This gives the desired visibility, foreground-background separation, and sculpting so the designer can tailor the lights to fit the production's needs.

Element 2: Intensity

Intensity, as it pertains to onstage lighting, refers to the literal candlepower of a light source. Candlepower, lumens, or footcandles are all words that describe the “luminous flux," or the amount of light, coming from a certain direction. While exact measurements of intensity can be important for a lighting designer in order for them to accurately buy, or more likely rent, the correct lighting instruments for a particular production, a lighting designer has to be more concerned about the perception of intensity to an audience, the actors, and the director. Brightness, a term used to describe the amount of light actually visible on stage and in the audience in some cases as well, is dependent on many factors. The amount of light that leaves the lighting instrument will determine how bright the light on stage is. This can be controlled usually directly from a light board; different lights have different capabilities as far as intensity is concerned so they will not all produce the exact same brightness. The physical distance between the stage and a lighting instrument also makes a large impact on the perceived brightness. The reflectiveness of objects on stage also changes the perception of brightness. A good example of this is oncoming car headlights reflecting off of a freshly wet road in the middle of a storm. The perceived brightness of headlights is greater when the lights reflect off of the water pooling in the street and can cause annoyance to the driver or even loss of some visibility. It is important to note that the reflectiveness of objects, the physical distance between the lighting instrument and its point of contact, and the amount of light that leaves the lighting instrument can all affect perceived brightness and not intensity. Intensity is a measurement and therefore does not change based on the audience’s perception of how bright the light hitting the stage is. Linda Essig states “ the intensity of light, coupled with the careful orchestration of the surface finishes, constitutes the value composition of the stage picture.” The intensity of light can usually be changed by the

twist of a knob or slider on a light board, but that does not mean the perceived brightness is going to be what a lighting designer looks for when designing for a specific production. The objects and people on stage are going to be just as important for a designer to consider when working with the reflectiveness of light on surface finishes. If something is dark, it will absorb more light. Similarly, if something is light or white, it will reflect more light. Apart from colors, the actual texture of a surface can act as a reflector. For example, a shiny red car will be perceived to reflect more light off of it than a matte dark blue bedsheet. Because the surface finishes or textures, and the reflectiveness of objects on stage work together to form what the audience will view as a complete picture, the brightness of that picture is relative to how the "lightest light and the darkest dark" are perceived by the audience. The "dark" does not always mean truly black, but may very easily look that way when compared to the brightest object or point of focus on stage. All of these elements of intensity work together to form a "value composition," or the relative comparison of the "lightest light and the darkest dark" when a designer is looking at a particular scene or image they are trying to create on stage. The physical intensity of light can be changed in a multitude of ways. A dimmer can be used to alter the amount of electricity to incandescent light. The process is similar to that of incandescent light for fluorescent light, but rather than altering the amount of electricity, the current is altered by redirecting it to accomplish a decrease in intensity. HID sources of light or high-intensity discharge light bulbs are able to change intensity differently. A douser is a type of mechanical dimmer. Essig describes it as a "venetian blind that closes in front of a light source." A douser does not alter electrical current or the amount of electricity entering a light fixture. The blind physically opens and closes to gain the desired intensity. HID lamps are treated differently than fluorescent or incandescent lamps because they are a family of gas discharge arc lamps.

The light source that is chosen by the lighting designer, or sometimes just what the designer is given to work with, is important to consider when discussing intensity. The less wattage a lamp has, the less intense that lamp will be as a general rule. Lighting instruments that are meant to focus light on a very specific area will be more intense than the same lighting instrument spreading the light over a larger surface area. Neutral density filters may also reduce the amount of light produced by a lighting instrument. Essig compares this type of filter to “sunglasses"; the amount of light taken away is fixed with these filters as they are not able to be changed fluidly. The placement position of a lighting instrument can affect the amount of light that reaches the stage; this is called illuminance. There is a mathematical equation the designer may use in order to calculate the “incident light," the amount of light that actually hits an object or the stage. The “inverse square law” states that incident light is equal to candlepower divided by distance squared and multiplied by the cosine angle of incidence (the angle formed by a ray of light as it hits an object or surface and the perpendicular line to the point it hits). The incident light, or illuminance, is measured in footcandles. Because brightness is a relative term, there are many other factors besides surface finishes that can affect the audience perception of the brightness of an object on the stage. A person can see how different objects on the stage are not illuminated at the same levels or when one object is brighter than another. This ability for an audience member to compare brightness levels to objects on stage is from a comparison of two objects or areas in the same scene. Since a person’s eyes are able to adapt to brightness in a way that would make it less noticeable over time, the designer may have to gradually change brightness in a scene if he or she wishes to continue to impact an audience’s perception of brightness. The same can be said for multiple scenes throughout a production. If the designer wishes to make an impact with the relative brightness of the lights, he or she could juxtapose the light levels in two scenes for added

effect and impact over time. The change in lights would throw off the adjustment of the eyes of the audience and enhance the effectiveness at aiding the story.

Element 3: Shape and Distribution

The shape of light may also be controlled or manipulated by the lighting designer in order to get the desired effect for a specific production. The designer may manipulate the shape of light through the choice of a lighting instrument and the placement of that instrument in the theatre space. Essig defines the shape of light output as the distribution of light. Different light sources or lighting instruments can be used to distribute light in a variety of ways. One example of this is sunlight, "a full spectral light, meaning that it renders all object color fairly equally." Sunlight travels directionally in rays, and the distribution of those rays depends on the earth's atmosphere. When it is cloudy, the rays of the sun are "completely diffused by the atmosphere." The sky acts as one continuous sheet of light instead of the sun's rays coming directly from the sun down to earth as it would on a clear day. This source of light is different and therefore called a "sheet source," as the light is coming from multiple directions as it is diffused by the atmosphere on a cloudy day. The designer may use these same concepts in the theatre to achieve the desired effect needed to help convey important parts of the story to the audience. The designer may also use artificial bulbs because of their diverse properties. Incandescent bulbs have tight coils in the center and are omnidirectional. Because all the light is coming from a particular point and spreading out from that point in all directions, this type of light source is called a "point source." The shape of a fluorescent lamp is usually a straight glass tube, but may also be circular or u-shaped. This unique shape of the bulb itself causes the light rays to be distributed more in a line than a point source or sheet source would. The classification of these kinds of fluorescent lamps is "linear sources" because of their more line-like or linear distribution of light. Point sources alone may be controlled optically to produce numerous shapes. By directing the light through many reflectors and lenses within a lighting instrument,

the shape of the light can be changed into nearly any shape imaginable. An ellipsoidal reflector spotlight is just one example mentioned by Essig to have these capabilities. Shutters and gobos can be used to change the shape of light as well in slightly different ways. Shutters are built into most lighting instruments and can be pushed in or pulled out to create square or triangle shapes with the light on the stage. Gobos are interchangeable in a lighting fixture and are inserted into a "gobo slot." These gobos most commonly have a metal template pattern that when inserted into the lighting instrument, can project almost a limitless number of shapes and patterns onto the stage. Some lighting instruments have the ability to project multiple gobos and have shutter and beam effects. Light is only visible to us when it is hitting something else, but that something else may not always be solid. Consequently, the target of light may be an actor or object on the stage, the stage itself, a backdrop, or pieces of set or scenery. The designer may decide to show the light reflecting off other objects in its path to the target as well. Since light reflects off particles in the air, atmospheric haze or smoke may be used in order for the audience to see the shape of the beam of light as it travels to its final destination. Laser light shows are mentioned by Essig as an example of a production that employs atmospheric haze or smoke in order to show the shape of the beams of light. The shape of light may also refer to the combination of many lights distributed across a stage to form a larger picture; the shape of light does not always refer to one lighting instrument or source. According to Stanley McCandless, "the distribution of light over the acting area should give what might be called dramatic visibility." Some areas of focus are more important to the story-telling than other areas, and sometimes the best choice a lighting designer can make is to not allow a clear sense of visibility and form. The purpose of dividing the stage into areas of emphasis through the distribution of light is to allow for flexibility of visibility and emphasis so that the entire stage does not have to be static. In controlling the shape

and distribution of beams of light, the designer is also controlling the shape and distribution of shadow. Certain angles of light create undesirable or distracting shapes in shadow. Although sometimes certain distributions of light will cause distracting or unwanted shadows, the distribution of light may also be used to intentionally cause shadows that become the focus of the image on stage instead of the lighted target itself. A lighting designer can communicate just as effectively using negative space or shadow as he or she can using light or positive space. Instead of projecting an image of trees in the light, the light may be blocked out or inverted to create the design in shadow or negative space instead. This adds a completely new balance and a number of challenges for a lighting designer as they are trying to control the shape and distribution of light as well as shadow. This reminds me personally of the Yin-Yang symbol that can be found in Taoism or Daoism, a Chinese religion and philosophy. One meaning found for Yin is "the sunny side of the mountain" and Yang is "the shady side of the mountain." Interestingly enough, the lighting designer must recognize that there cannot be shadow without light and vice versa. The relationship in these contrasts makes a lighting designer's abilities that much more impactful. As previously stated, lighting is most effective when giving the audience important visual cues that aid in the perception of important context without the actors having to mention it in dialogue. Since the options for shapes projected is extremely high, the lighting designer can provide visual cues such as time of year by projecting leaves falling off of trees. The designer may give the audience a sense of location by projecting a forest of trees or a city skyline onto a backdrop and provide a sense of atmosphere with the shapes of the projections to make the scene seem peaceful or eerie. Text and logos may even be projected onto a backdrop. All of these options, working in conjunction with the other elements of light, give the lighting designer the

capability to accurately convey the style of a specific production to an audience without the use of dialogue.

Element 4: Color

The color of light is, in my experience, what people notice most about lighting design and it's used to further the experience of a production for an audience. Color may be defined as reflected light on the visible spectrum. Objects on stage absorb certain waves of light and reflect others back; what the audience sees in a live performance is those reflected waves of light. The human eyes and brain work together to perceive those visible light waves as color. Performance on stage in front of a live audience is where color is used quite frequently, even if it is not noticeable to the audience. Just as different types of light bulbs or lamps have different shapes and distributions, they may also possess different colors. Although sunlight has different colors depending on the condition of the atmosphere and where it is reflecting on the earth, it tends to be a mixture of warm and cool colors. Incandescent bulbs tend to have a warmer, amber color, or glow to them in comparison to other types of bulbs. Fluorescent bulbs tend to be a more bluish-white color or a cooler color when compared to an incandescent light source or bulb. Just as there are ways to control the other elements of light, the color of light may be manipulated by the lighting designer in order to achieve the desired effect for a specific production. As the distribution of light can be controlled by neutral density filters, the color of light may be altered in a similar way. Through the use of polyester gels or glass filters placed on a light source, or more commonly slotted into a lighting instrument, the color of light can be changed. The gel or filter is put in front of the light source to absorb all colors except the ones allowed to pass through. The colors that pass through are what is projected onto the stage and visible to the human eye. Because many productions call for “natural light,” or something that mimics as close to natural sunlight as possible, the filtration of light in order to get a specific color on stage is virtually used in almost every production. Sunlight is a mix of cool blues and warms, so

generally, two lighting instruments, one with a cool blue gel and one with a warm orange gel, are aimed at the same point on a stage so the waves of light will blend to closely mimic “natural light.”. Aside from natural light, there are additional uses for light filtration. Although it is extremely difficult for a lighting designer to create a true blackout due to the many outside factors affecting light, it is possible to limit the amount of detail an audience sees on stage using colored lights. A very dark blue gel, when combined with a very low-intensity light at the correct angle (usually directly above the stage), can create the perfect atmosphere for a scene change. The actors will have just enough visibility to comfortably navigate the stage, and the audience will only see slightly silhouetted black figures moving around due to the angle, color, and intensity of light all working together to give the perfect amount of suspense and wonder. Just as an actor may be made to look natural using a combination of colored light sources, they may be made to look sickly or discolored using the same concept. A well-positioned cool green gel or yellow gel in front of a lighting instrument in combination with stage makeup can genuinely make an actor look like they are on death’s door. Being able to change the color of light gives so much more flexibility and room for a designer to be able to create a believable scene for an audience and is an extremely important element. Another property of color that makes it similar in concept to brightness is the relative human perception of brightness and color. The audience perception of brightness will change when two adjacent objects are at different brightness levels. Just as the brightness of objects have a relationship that can be altered, an audience’s perception of color may be changed and manipulated through its relationship with the other colors around it. The audience’s perception of brightness was a combination of the light source and the object the light was hitting. Similarly, color has the same relationship with objects and people on stage. The color of an object ,and any added color of light to that object,

will interact to change the perception of color. The elements on stage such as people in costume, set pieces, props, and backdrops all have “object color." Object color is the ability of an object or element to reflect certain visible wavelengths of light. When a set piece is painted red, the “object color” of that set piece is some form of red. When a lighting designer wants to incorporate colored lights on stage, it is important for him or her to consider how “object color” will interact with the choice of light filtration. If a red set piece is targeted with a light that has been filtered with a very blue gel, the resulting appearance of the set piece will not be red, but purple. This mixing of color to produce a new perceived color is called “color addition." If a designer did not take into consideration the color of objects or people on stage, the perception of color by the audience may be changed and someone who was supposed to look healthy on stage now looks sickly and unnatural to the audience. It is also possible for an object color to be completely canceled out when a lighting designer adds a source color and the two wavelengths blend. For example, if a costume material is capable of absorbing blue light and blue-green color, such as cyan, is targeting the material, the color blue is not reflected off the material and the costume is perceived as much more green than intended. This process is called color subtraction. A combination of two colors was targeting the material and only one of those colors was visibly reflected from the material. A lighting designer should be intentional with their color choice for these reasons. They must be able to anticipate how the colors on the stage are going to interact with one another so that the design can create an atmosphere and color wash on stage that makes sense in the context of the production and can make a lasting impact on the audience.

Element 5: Quality

The quality of on-stage light can be referred to as the hardness or softness of the light or the overall combination (or composition) of the light on the stage. The overall hardness or softness of light can be the result of scattering the light source using some form of diffusion media. Frost, or another form of diffusion media, is similar to the gel media used for color in that they are filters placed in front of the lens of a lighting instrument. Diffusion media may be used to scatter the light uniformly, which creates a softer appearance on the outer edges of the light when it makes contact with a stage. This helps to smooth over a transition from a lighted area to a darker area by softening the outer edge of the light so that it is more of a gradient from light to darkness rather than an abrupt stop of light. Directional frost or "silk" is similar to regular frost but it can be used to scatter light in one direction. These techniques may be used to make a light appear softer to an audience, but there is not any form of media that can make a light sharper than it already naturally appears. Linda Essig states that "there are some optical tricks that can make some instruments appear to have a sharper edge by restricting the halo of light around the beam edge (halation)." This makes the physical beam of light smaller on the stage but will help the light appear to have a sharper edge. Just as varying light sources have different distributions, they also naturally have different qualities. The ellipsoidal reflector mentioned by Essig has a very sharp, defined edge when compared to color PARs or fresnels which have a softer, more gradient, and scattered edge. A sheet source or fluorescent source will have a more scattered and soft appearance on stage. Light on a cloudy day can be described as a sheet source. The quality of light is proportional also to the quality of shadow. A lighting designer is indirectly manipulating the quality of shadow when he or she is manipulating the quality of light. Shadows cast by objects on a cloudy day are somewhat hard to see, if visible at

all, and appear very soft and scattered or “diffuse” in Essig’s wording. Just as there are overall interpretations of color and shape, an entire stage composition with its value and color contrast levels can change the interpretation of an audience. If a stage has very little value contrast, as in lights and darks, and/or is also very monochrome, using shades of greys, the overall interpretation of the quality of that particular stage composition would be rather soft, scattered, or “diffuse." If the stage has very high value and color contrast, the interpretation by the audience would be quite different in that it would be perceived as sharper or harsher. Essig also interestingly states that “quality of light can also be said to encompass the subjective responses that result from a reaction to a light source.” In other words, like color, quality of light is relative and may be interpreted differently by different people. The cool blue color and the distinct hum of some fluorescent lights in many offices have a naturally softer beam edge and scatter, but many people, especially workers who work under them for 8 hours a day perceive them as being harsh. The perceived harshness of these lights is due to a combination of perceived color and distribution quality. Essig states that “because discharge sources do not emit a full spectrum of wavelengths of light, our perception of object color under those sources can be distorted.” Not all light sources emit white light, which are rays that encompass every color. Since certain wavelengths of light are filtered out of sources such as fluorescent light, the cool blue color can interact with “object color” to alter the color perception of what people see day-to-day. The overall quality of light on stage is more than just a function of hardness or softness. It is an interaction of softness or hardness of light with the combination of intensity, direction, shape, distribution, and color of a stage composition that creates subjective impressions on the audience. The designer must take into consideration the interaction of all these properties of

light in order to create something that is representative of the world in which he or she is trying to bring the audience.

Element 6: Movement and Change

The movement of light is a type of change. A lighting designer can accomplish change by using cues on a light board in order to transition smoothly through various lighting compositions for different scenes. Each cue has a specific place in the script or blocking and duration of time that they take to complete, which can be altered by the designer on most light boards. The details of an individual cue and cue list are just as important for a lighting designer to consider as how the lights will actually look on stage. The movement of light can be very distracting to an audience. In some cases, the distraction is exactly what the designer needs in order for the audience not to notice something else going on. In other cases, a designer must be careful not to distract the audience with quickly moving lights, because it takes away from the actor's performance. It is up to the designer and director to come to a consensus about the intended effect of a cue and how the placement of that cue may impact an audience. Automated lights are the primary reason that cues may now be almost seamlessly incorporated into a scene. These lights can pan and tilt to change their direction and can, in some cases, change intensity, color, quality, and shape all from the press of a button or turn of a knob on a light board. This was not always the case, however. Before the advent of electricity, many theatres were lit by candlelight. This idea of a follow spot to bring focus to one section of the stage or one actor is not new. Limelight follow spots were used in the 19th century in order to accomplish a follow spot without having access to electricity. Usually, the actor would be located at the front and center of the stage. Limelight, also known as Drummond light or calcium light, is created when an “oxyhydrogen flame” targets a cylinder of “quicklime (calcium oxide)." This type of light

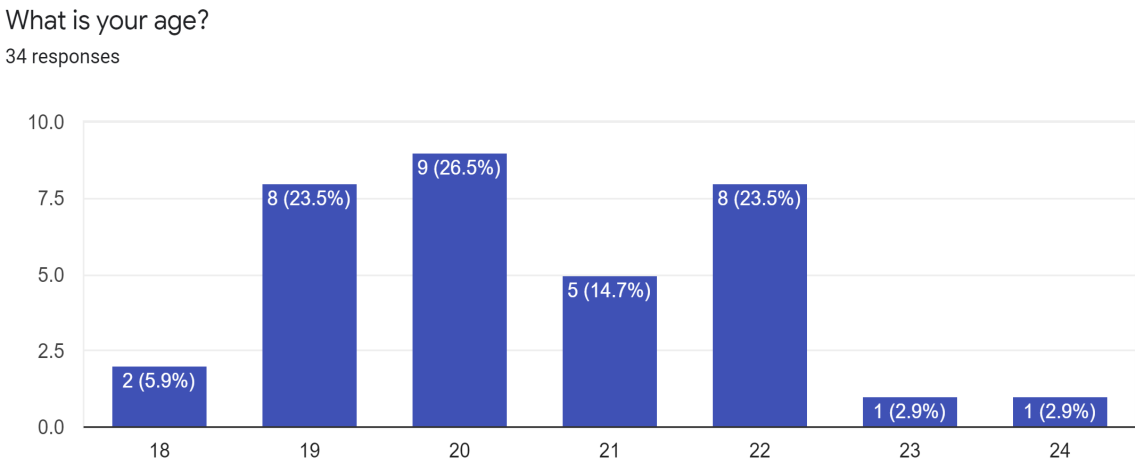
can reach extremely high temperatures before melting any components so it worked well for the theatre. Today, electric follow spots are used in certain situations where there is a need for visibility of an actor without catching too much of the stage around them with the light. These spotlights are not intended to be as noticeable to an audience and are used to provide a bit of extra visibility to the main character in a particular scene. Another way to create a sense of movement on stage with light is through "cross-fading." Essig describes cross-fading as taking "one light out as the next is brought up." When two lighting instruments are focused on different points on the stage, as one light fades to darkness, the other light fades in and creates a smooth transition of focus. If the cross-fade was not there, the transition of light would be very abrupt and could be interpreted as more rough or jarring to an audience. This helps with fluidity and the flow of consciousness that is created in a scene or production and is not interrupted by extra effects. These effects should work together to aid the telling of the story and not be a distraction to the audience. There are multiple ways to effectively execute a cross-fade. The first is for the light board operator to manually activate two cues in such a way that the second cue is activated right after the first cue so that the two are happening at the same time. The second, and more consistent way, is for the designer to program a series of linked cues, or an effect according to Essig, "so that as one dimmer or control channel is brought down, the next is brought up." This method mimics the board operator manually creating a cross-fade using well-timed button presses but admittedly is more consistent as the programming allows for the cross-fade to be timed the same every cycle. Essig also interestingly mentions the "rhythm with the lighting." This term is used to describe when all of the properties or elements of light are changed through the length of a scene or event. "This rhythm may be repetitive and quick, as with a strobe light, or slow and subtle as with a series of cues that mimic the setting sun." The rhythm of the light

described is another way for a lighting designer to read in between the lines of a script and create an atmosphere that will fit a story. Some short stories or skits really could be done without changing the lights at all. This is also a valid choice for the lighting designer to make when the movement of light of any kind would take away from what little time the actors have on the stage. The movement of light, when combined with the other elements of light or when used individually, is an important tool for a lighting designer to consider. Movement in light helps the audience to see the "reality" that is being created on stage by a combination of the actors working with the scene, lighting, and costume design. The lighting designer is helping to create a living, breathing world when he or she incorporates the movement of light into a space.

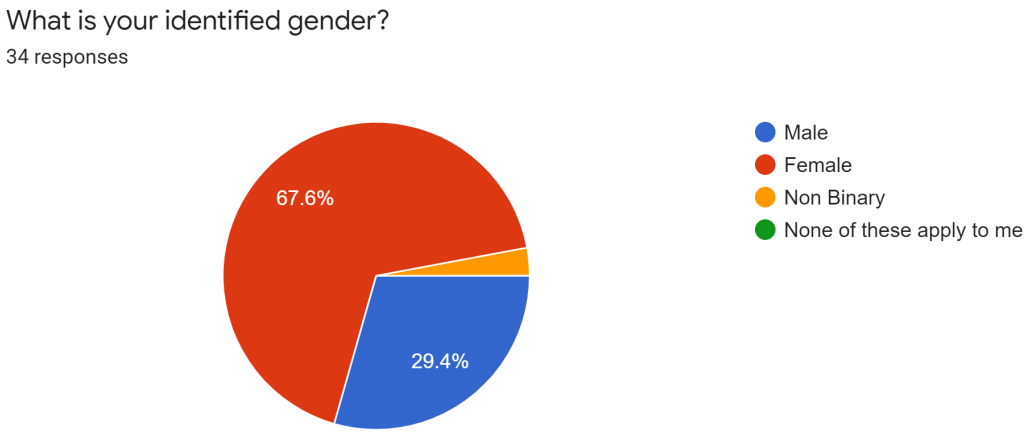
> "The properties of direction, intensity, shape, color, quality, and movement, when adjusted individually or in combination provide the lighting designer with a nearly limitless palette of choices in the creation of lighting compositions. Every dimmer reading, lens adjustment, or color choice affects the stage picture. Therefore, before the first instrument is specified, the first gel color chosen, and long before the lights are plugged into circuits in the theatre, the lighting designer must decide what the stage should look and feel like- and why."- Linda Essig

The Survey Results

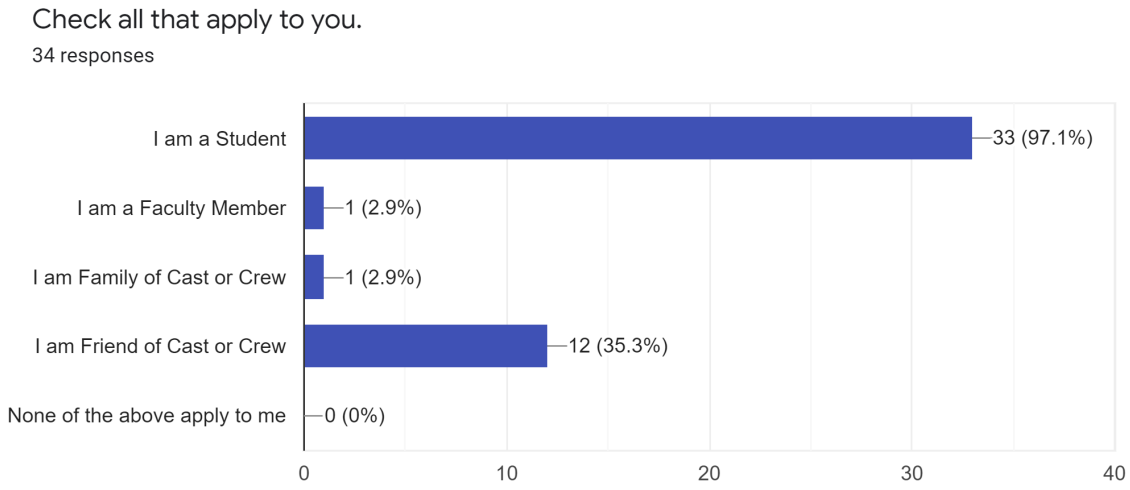
The production ran for a week, and there was a QR code posted in the lobby of Verser Theatre so that audience members could conveniently be directed to the survey after the production. I received a total of thirty-four responses to the survey questions. I used the PANAS-X manual suggested to me by members of the psychology department to format my questions. I intentionally phrased questions in a way that would leave them open-ended because I did not want to influence the responses. All the participants of the survey were told that their personal information would be kept completely confidential and that they were agreeing to allow me to use the data from their responses in my honors thesis. A special thank you again to anyone who participated in this section of my honors thesis. The survey tool is in Appendix A. The participants of the survey ranged in age from eighteen years of age to twenty-four years of age.

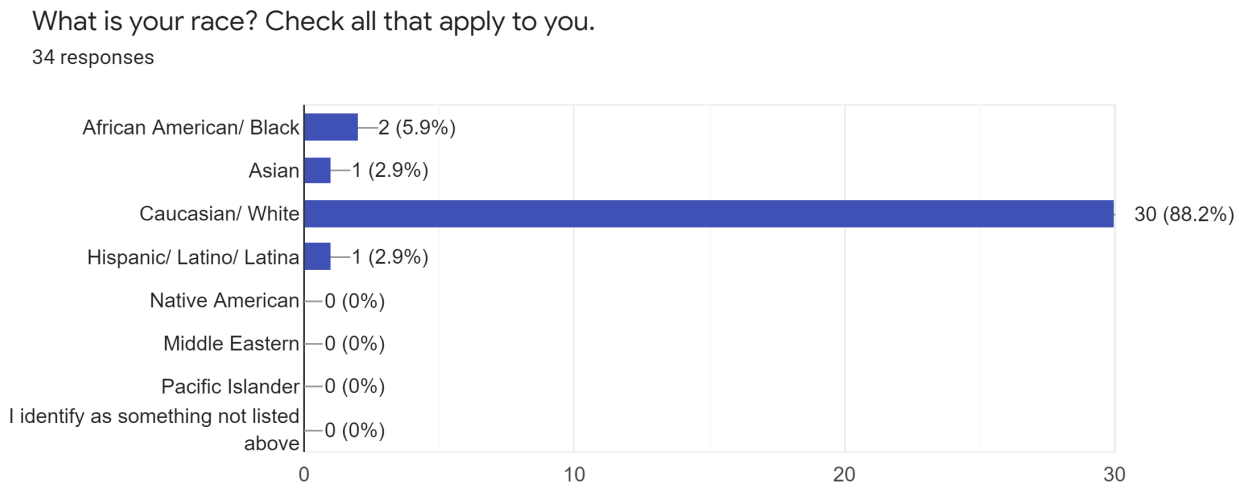


A majority of the participants selected their identified gender as female, with male having the second-highest percentage and non-binary being the lowest percentage.



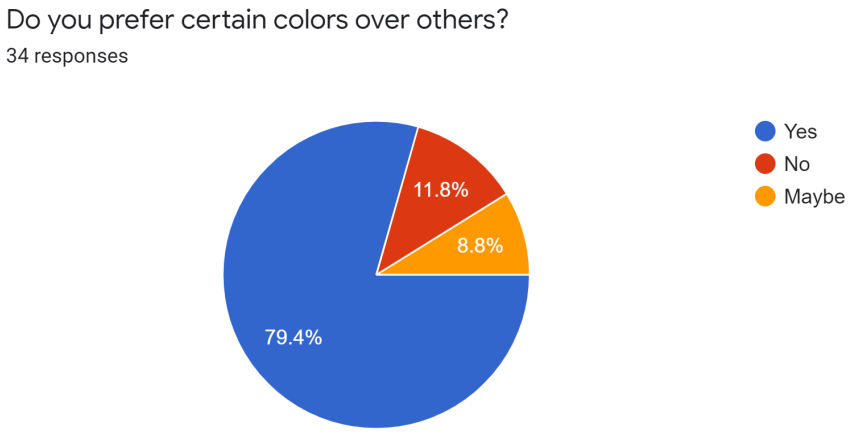
The next couple of questions were demographic in nature. The majority of participants identified as caucasian/white and the majority of participants who completed the survey also said that they were students with "I am friend of cast or crew" being the second-highest choice selected.

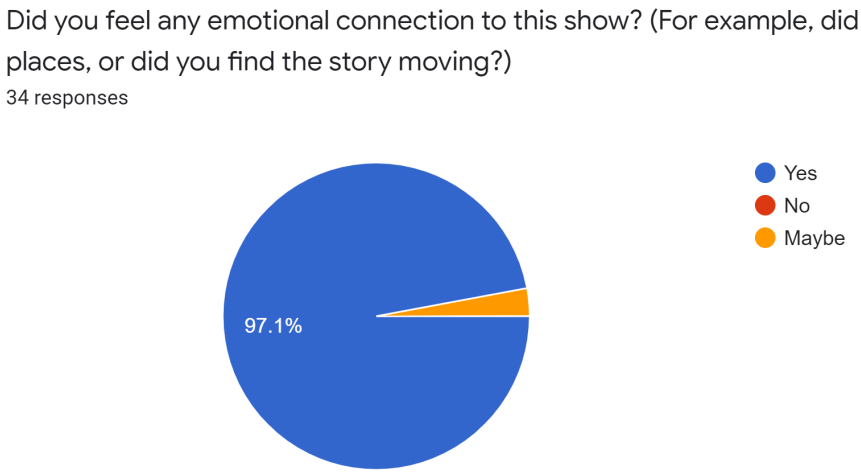


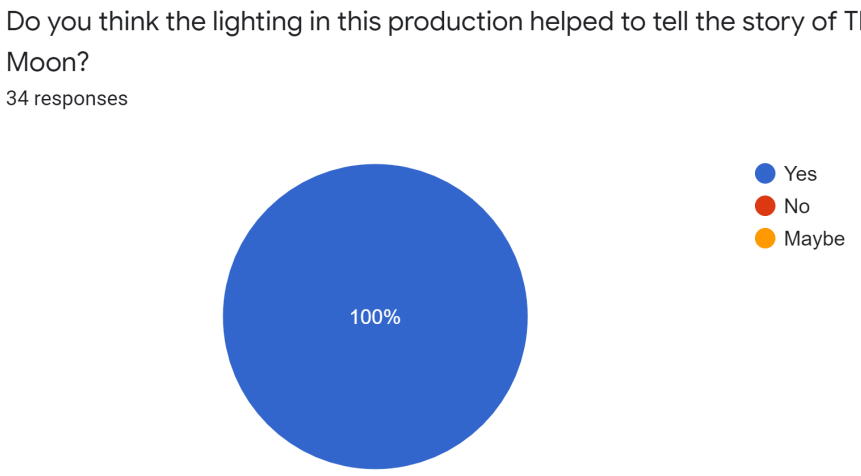


The next few questions were asked in order for me to measure the preferences of the participants and how those preferences shape the way that they answer the questions about specific scenes. The first question in this category was “Do you prefer certain colors over others?." My assumption to this question is that everyone has a favorite color or at least likes looking at certain ranges of colors rather than others, and the majority of people answered “yes." I’m surprised to say that around twenty percent of participants did not have a favorite color or didn’t know if they preferred certain colors over others. The second question in this category was “Did you feel any emotional connection to this show? (for example, did you find it funny or sad in places, or did you find the story moving?)” Around ninety-seven percent of participants responded “yes” they did feel at least some emotional connection to the show. I did not specify if they thought it was because of the lighting or because of some other reason; the lighting is just one factor out of many (such as costumes, acting style, depicted emotions of the cast, scene design, and props) that can help tell a story and can also contribute to the way an audience responds emotionally. However, I did ask “Do you think the lighting in this production helped to tell the story of The Old Man and The Old Moon?” and every single participant responded “yes." That is interesting

to me as it could mean that they see onstage light as more than just a means of illuminating the actors and actresses on stage. Below are the charts for the three questions I mentioned above.



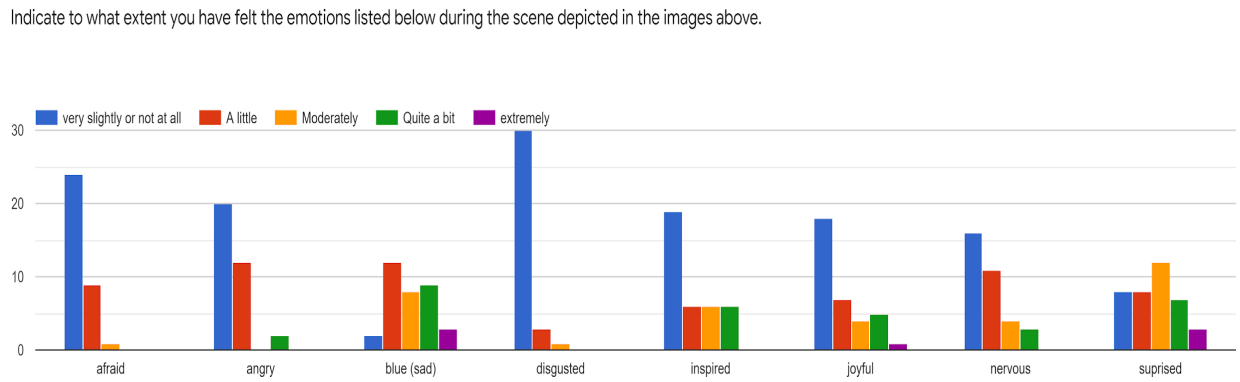




The next section of questions were specifically depicting certain scenes in the production where the scenes in one question all have a similar theme color-wise, but they also have a thematic element that makes them an essential part of the story as well. The questions were formatted using the PANAS-X manual. The participants were given words that describe certain emotions (eg. sad, joyful, afraid) and were asked to rate to what extent they felt each emotion during the scene depicted for each question. The scale gives five options for each emotion: “very slightly or not at all," “a little," “moderately," “quite a bit," and “extremely." There were a total of five questions formatted this way on the survey. The results were surprising to me because many participants indicated at least some emotional response to every single scene. The scenes were different from each other in both lighting element combinations and thematic content, and the participants' answers reflected that. In my opinion, that is very interesting and helps to further explain why the elements of light, combined with the other elements in a production, affect an audience’s emotions and response in general to a particular production. The five charts that display the results are below, but the question itself in the survey has the images that go along with each result chart, so I suggest looking at these charts with the survey questions in order to

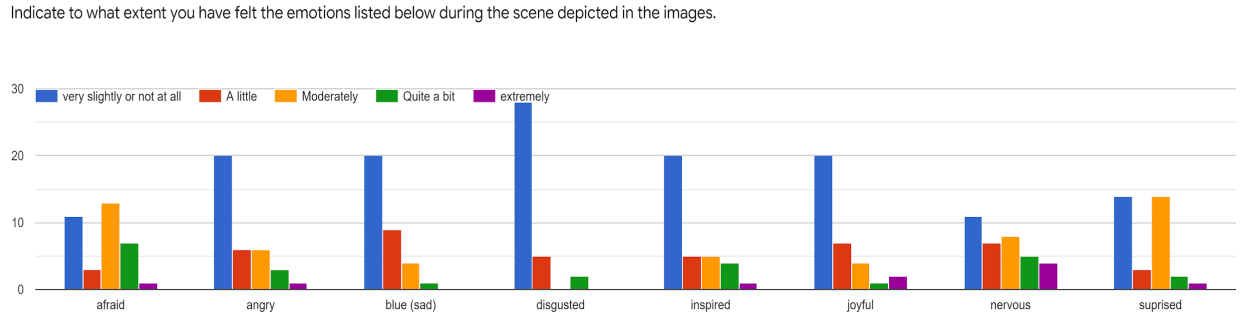
be able to better interpret the results. The first two images depict when the captain died after a rebel attack. (Table 1) Thirty-two out of thirty-four participants felt at least “A little” sadness when the captain died. Many participants also selected that they felt surprised, inspired, joyful, and nervous. I should mention that this particular production makes light of certain situations like death and danger, so it is expected that the audience has mixed emotions to these scenes especially after viewing the entire production and not just the pictures with no context.

Table 1- Results matching with the scene where the captain dies on the survey



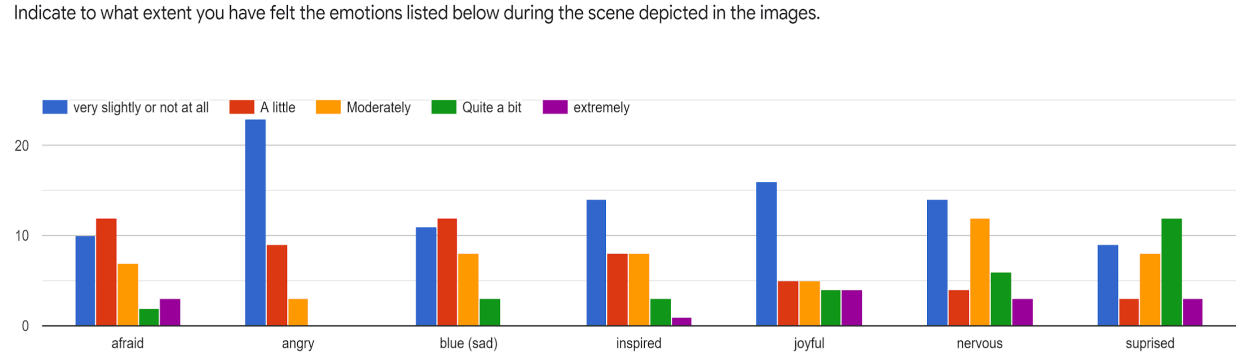
The next question on the survey depicts images of danger and excitement as the crew is traveling the high seas. (Table 2) The participants' selections are shown in the table below. Again, there is a range of emotions chosen, but it is interesting that certain emotions such as “nervous” were felt more strongly by a majority of the participants and not others such as “disgusted."

Table 2- Results matching with the scenes depicting danger on the high seas



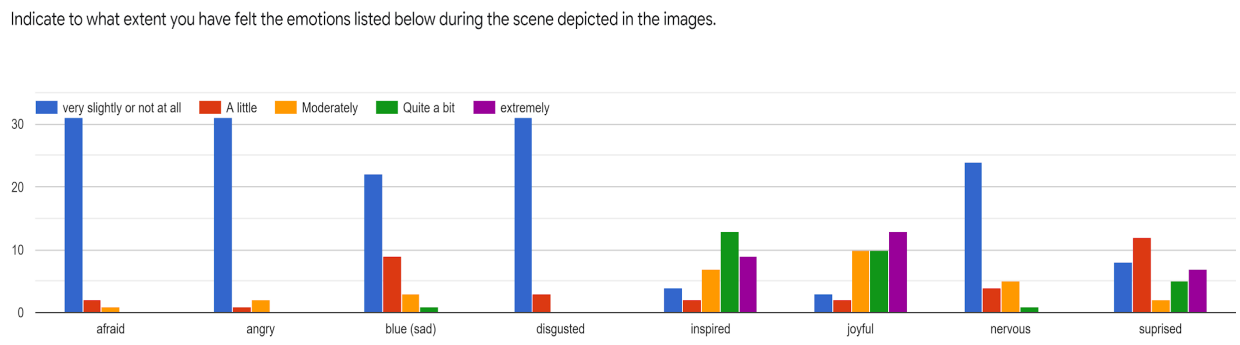
The following question depicts some scenes that are difficult to put into words, but the scenes take place inside a giant tuna. (Table 3) The lighting is ambient here and the downlight slowly fades in and out to give the feeling of the giant fish breathing as the actors are inside it. The selections of the participants are again shown in the table below. Interestingly, the range of emotions felt by participants is more diverse on this one. I personally think it might be because the other scenes are somewhat more feasible than ending up inside the belly of a giant fish, and therefore make them somewhat more predictable as far as how an audience will respond emotionally.

Table 3- Results matching with the scenes depicting the inside of the giant tuna



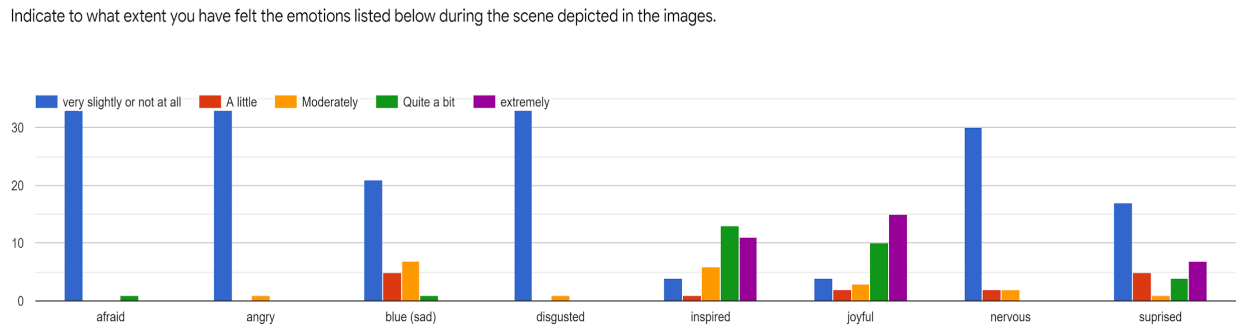
The next question depicts scenes from when the city of light is mentioned. (Table 4) The scenes have a sunrise or sunset feel. The acting area is washed with a golden-warm color. The selections of the participants are shown in the table below. Significantly fewer negative emotions are selected by the participants when referencing these scenes. These scenes are meant to be endearing because the old man is getting his memories back as well as getting closer to his wife who left home without a trace.

Table 4- Results matching with the scenes depicting the city of light



The final question with this format depicts the final scenes where everything ends happily, the husband and wife are reunited, and the narrator tells the audience of the new adventures they go on. (Table 5) The selections of the participants are shown in the table below. The end of any show can impact an audience in different ways, but my intention when designing these scenes was to give the audience some closure and a sense of joy and happiness that everything worked out in the end. Many participants selected that they felt inspired, joyful, and surprised. It was nice for me to see that the choices that I made as a designer could have impacted the way that the participants responded to these questions, and gave me a sense of accomplishment knowing that I had finished what I set out to do with this production.

Table 5- Results matching with the scenes depicting the end of the show



The final section of questions were short answer questions, and I didn't give strict guidelines for these because I wanted participants to give me some creative and unique answers. The first prompt formatted like this was "In one to three sentences, define light in your own words." I got a range of answers to this prompt and wanted to post all the responses for anyone to read. They are all unique people trying to define something that isn't at all easy or simple to explain or define, which is why I enjoyed reading the responses so much.

The responses to the first short answer are below:

-Light allows people to see, but also tells a story.

-Light is the means of defining an object, person, or emotion through visibility, color, and contrast.

-The absence of darkness

-Light is what guides us to our destinies whatever they may be.

-Light is a form of expression.

-The interaction of brightness and darkness that relies on some sort of source.

-Light is a form of visible rays. Light is how we see color. Light is something we take for granted sometimes until we lack it enough to notice/be inconvenienced.

-Light is what allows us to see life in color.

-Light is what fills the darkness. Light is what allows things to be seen or be hidden. Without light, life might not have a guide.

-Full of energy. Bright to allow sight. Colorful is happy to me.

-The moving of photons (science)

-Light is what brings you purpose in your life.

-Light is what allows you to see things in the darkness.

-Light has great power. I believe this was symbolic of the show.

-Very simple but yet poetic

-Light illuminates the darkness.

-Various shades of energy that makes thing visible

-Light is the thing that enables us to see the word around us clearly. Without it, we have nothing.

-Light has the power to shift emotions depending on how it is used.

-Light, scientifically, is hard to define because it's constantly changing. But personally, light is something that that not only gives clarity to the world, but can help set the mood too

-Essential, bright, hopeful

-Light is a form of expression that can show what the character is feeling on the inside

-Light is a natural occurrence that illuminates the earth.

-The subtraction of darkness and addition of life.

-Light is a thing that combats darkness.

-Light, as used in art, can be used to create contrast and focal points within a composition.

-Wave and particle substance which is absorbed and reflected by things giving them color and visibility.

-The absence of darkness.

The second short answer question I asked was even more open-ended than the first. I wanted to make sure that if anyone had anything else they liked about the lighting from a particular scene, that they had an optional space to do so. I asked “Is there anything specific you liked about the lighting in a particular scene? If so, describe what you liked down below.” The answers I got here made me smile from ear to ear. I had many doubts that when I released this survey that no

one would really have anything to say about the lighting or there wouldn't be very much to talk about when I got the results in. I was absolutely and gladly mistaken. The participants had much to add and their responses are listed below.

The responses to the second short answer are below:

-I thought the lighting was always on point.

-There were some really amazing shifts of color. I truly enjoyed it. I got chills when the show shifted to the color of the City of Light. That beautiful Golden mixed with the words of the narrator talking about memory and how it makes you feel affected my entire body. I felt it emotionally and physically. Also the end scene where it faded to the purple blue with the old man and the old moon sign made me cry. It was so sweet and moving. I also loved the LIGHTENING! It had the flashes of white surrounded by that aggressive blue/purple. There was a storm later with lightening and it looked just like what was shown on stage. It caused anxiety in my heart (i don't like storms) but in a good way because i knew i was safe inside but for a second it felt so real. Astounding job, really!

-The city of light touched my soul! It felt heavenly.

-The city of light scenes were beautifully done, and the lighting helped convey the intended message well!

-I really enjoyed the lightning effects and the addition of purple in that part.

-I liked that it wasn't a single color all of the time

-The light with the figures behind it was cool hi this is ……. you did great!

-All of the lighting reminded be of a "sunset" vibe. The lighting inside the belly was extremely interesting also the scenes with taking with no lights was VERY powerful but the end scene with the Old Man and the Old Moon logo and background lights with no stage lights was the most powerful

-The shadow puppets

-I loved the sunlight on the screen in the beginning and the shadow puppetry

-I can’t remember this exact moment but at one mentioning of the city of light, the entire backdrop lit a beautiful yellow/orange. This was a very moving moment and it actually gave me goosebumps.

-I loved the black stage when the Old Man first gets swallowed by the fish. It felt very solemn and secluded.

-She did an amazing job!!

-The belly of the fish. It was gorgeous and just captures the beauty of the show as a whole. The lighting was my FAVORITE part!!

-I just like how color was used to convey tones in the story. I noticed it throughout the play.

-I just loved the use of the moon as a constant visual cue of the plot.

-Its color, it helped give character to the story.

Concluding Thoughts and My Experience

This project has been a long time in the making. I have definitely learned a great deal about the elements of light and how they can work together to change the perceptions of an audience. I also gained a much-needed understanding of how the design process works for a production. There is so much collaboration that goes into creating the mood and concept for a show. I have to make it clear here that I did not by any means design the entire production by myself let alone design or manage the lighting by myself. Two instrumental people in helping me design the lighting were Eric Phillips and Matt Snook (the board Operator). I also got to collaborate with Molly Kenedy, the student director for this production, in order to make sure that the designs the team envisioned and produced were something that she was happy with and that it matched with the overall design concept. A lighting designer that had some insight into what it means to design lights for a show and played a role in influencing how I approached it is named Natasha Katz. In a documentary by the American Theatre Wing, she describes herself as a chameleon. She said "I think of myself as a chameleon in many ways. I do believe that my job is to respond to the rest of the collaborative team... I believe that my style is the style of the chameleon and working with other people." This resonates with so much of the work that I did as the lighting designer for this production and the many people who worked together to make the Muse project something we could all be proud of as a department to produce. In my opinion, I do believe that the elements of onstage lighting can and do influence an audience's perception of a show and their emotional responses. I maintain that the actor is the most important story piece of a production and that all the design elements are there to incorporate and help the actor to tell the story. In other words, to answer the question "Could the onstage light of a production

impact the audience's emotions and help to tell the story?" Yes - onstage lighting could contribute to both.

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See Appendix A Below: