



Behind the Scenes: The Role of Theatrical Techniques in Modern Production

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Abstract

Objective: The study looks at how concepts of theatrical lighting, sound, wardrobe, and special effects have changed and been adapted to extraordinary roles in contemporary plays. Specifically, it explores the degree to which technological past has altered the functionality of the elements of a play to be used to create a mood, to grab the audience's attention, and to serve other express functions.

Methodology: This research tracks the history of theater lighting, beginning from early oil lamps to current LED/digital systems. It also deals with costume design as a function of history and culture, mostly dealing with character relation and a collaborator medium with directors. The study goes on to show how sound design is incorporated through case samples that demonstrate some of the contemporary practice's latest state-of-the-art contemporary technologies, including 3D printing, automation, and scent dispersal. It also sets the manual effects off against highly intricate, sophisticated, computerized systems.

Findings: This research demonstrates how much technology has improved the depth and engagement of theater today. Lighting technology now allows control over the Mood and Symbolism of a play to a much better level of detail. Costume Design is more closely associated with historical and cultural plot strings. Special Effects and Sound Design have evolved to create more realistic Psychological effects on the audience while introducing new methods for the design and performance of stages.

Conclusion: Basically, these complicated theatrical techniques and tools have succeeded in helping theater break the boundaries in which art can be felt. Theaters should continuously reach even beyond the borders toward increased sophistication and involvement in the future as their technology keeps advancing.

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1. Introduction

The social turmoil that followed the French Revolution both supported and, in numerous ways, propelled the theatrical headways of the 19th century. The working class involved venues across Europe, changing the repertory, the style, and the habits. National theaters centres were laid out to address the sentiments and beliefs of the working class, whose objectives in these occurrences lined up with a more extensive public freedom development, in those countries that went through progressive commotion or disappointment (Bezruchko *et al.*, 2024) ^[5]. An unmistakable example of improvement arose in western Europe, varying enormously among countries however sharing the normal component of calling for "realism" in front of an audience — that is, a dedicated depiction of the sad and comedic parts of the rising class' lifestyle and home climate — as well as expanded dignity and tidiness in the auditorium (Karcz-Ryndak, 2024) ^[30].

The two patent houses (licensed by the Crown), Drury Lane and Covent Garden, had a practically complete imposing business

model on dramatic theater beginning around 1660. The working class in Britain, where the Modern Transformation was further developed than in other European nations, needed to battle for its own theaters. Endeavors were endeavoured to avoid the regulations disallowing the development of extra auditoriums as soon as 1789 (Zhang, 2024) ^[50]. The Theaters Act of 1843 conceded London a "free theater," following the Reform Bill of 1832, which gave the propertied working class political power and testimonial. There was not the expected flood of new theater development, and there were no huge development projects for quite some time. This is no doubt because of the way that when the regulation was passed, there were at that point an adequate number of illegal performance centers working (DeCelle, 2024) ^[8]. The Parisian road theaters made some simpler memories getting laid out. The Comédie-Française, France's public theater, and the London patent houses both declined because of the rise of working class theaters. Following an extended political fight that fixated for the most part on control, the Comédie-Française surrendered and started showing the new school's plays to new crowds since matching the lane theaters couldn't.

The venues were cleaned before the new class entered them. At The Sadler's Wells Theater, Samuel Phelps carried out crowd decides that constrained out the past group and accounted for decency. As significant of the new development as any, the Bancrofts assumed command over the bedraggled Sovereign of Ridges Theater, cleaned it up, and organized antimacassars on the seats. Moreover, they abandoned the drama and utilized Tom Robertson's social comedies to attract a huge crowd, procuring a sizable fortune all the while.

Urban communities developed quickly all through Europe and North America in the nineteenth hundred years, and modern focuses attracted workers to their plants and production lines. Huge venues were worked because of the requirement for diversion that the average rural areas of urban communities and modern towns produced.

The extension of the rail lines hurried this shift. At the point when shows were mounted in London and sent on visit, the English theater scene was overturned. Old commonplace stock organizations left business, and theaters moved from being creating houses to visiting areas. A kind of director arose who didn't show their own exhibitions; all things considered, they benefitted from claiming the physical business. The New York theaters and the basically boundless voyaging circuit made conceivable by the rail lines permitted the Theatrical Organization to accumulate tremendous abundance in the US. The West End in London and Broadway in New York City are instances of business theater frameworks that rose up out of the change in status from business to industry. Right off the bat in the twentieth 100 years, enhancements in movement for the most part considered a development of the associations between the two frameworks, and the trading of creations further expanded the potential for fruitful double-dealing.

Around 1885, a more youthful age rebelled against the material treacheries of society, leading to present day theater. The extremists laid out "independent theaters" to lift themselves past obscene realism through the development of tasteful norms, or "free theaters" to offer a more basic or logical point of view of society's operations. The Meiningen Players filled in as the model for free theaters. Wagner was referred to by the craftsmanship theaters as an inspiration.

1.2. Historical Development of Theatrical Techniques

Aristotle identified or deduced four Theatrical Techniques forms: tragedy, comedy, melodrama, and drama. These forms can be expressed in a variety of ways (Gailea, 2023) has been showed in figure 1.



Fig 1: Forms of Theatrical Techniques

"Style" can be defined as "the way something is done." The time and place, creative and other societal systems, as well as the unique style of the specific artist or artists, all have an impact on theatrical styles. Theater is a hybrid art form, therefore a production's artistic integrity in terms of the script, acting, directing, design, music, and location may vary.

1. Tragedy

One of the purest and most ancient genres of Western theater is tragedy. It addresses matters of broad concern with gravity and delves deeply into ethical and philosophical questions. Ultimately, tragedy is about the fall of a tragic hero or heroine—those characters who are usually portrayed as essentially good or virtuous but whose shortcomings or external circumstances cause them to ultimately fail (Gołąb, 2023) ^[14]. This fall will serve to represent a greater or cosmic moral order beyond the fate of the person, in addition to evoking sympathy from the viewer. Tragedies traditionally revolve around powerful figures, such as kings, queens, or nobles, whose tribulations and ends are viewed as both inevitable and emblematic of larger societal or existential themes. For the last 200 years, there has been a heated debate about whether a tragedy centered on common people might hold the same significance and weight (Gram, 2024) ^[16]. Out of all of these subgenres, tragicomedy has remained the most serious since its inception in the Renaissance, albeit with a more hopeful or sarcastic ending. With an emphasis on emotion, atmosphere, and the conflict between human idealism and weakness, another related movement, Romanticism, rebelled against the strict norms of Neoclassicism. At times, the free, episodic structure of Romanticism reflected the loose, episodic structure of Shakespeare's works.

2. Comedy

Comedy is a type of drama where less serious topics are handled in a lighthearted manner with the goal of entertaining and amusing the audience. Comedy deals with scenarios and characters who make you laugh and have joyful endings, whereas tragedy deals with themes of a fall and its moral ramifications. Comedies, therefore, focus on humor and exaggeration while addressing human foolishness and societal quirks. They serve as a mirror to everyday life. A kind of comedy known as farce is performed using physical humor, character and scenario exaggeration, and absurdity, all of which are meant to elicit laughter through the use of quick cuts and dramatic effects (Ingham, 2023) ^[26]. Satire, which typically has a social or political theme, exposes human depravity, foolishness, and hypocrisy through irony, humor, and exaggeration. Commedia dell'arte is a type of improvised drama that originated in Italy in the sixteenth century. It features prefabricated characters, like the shrewd old man or the astute servant, who have distinct appearances and behaviors. A humorous parody of somber theatrical works is called burlesque. Like satire, it is a shallow form that makes fun of and parodies other genres and artistic endeavors.

3. Melodrama

Melodrama is a type of drama with well-defined moral poles—good versus evil—and stock characters that evoke strong feelings in the audience as shown in Figure 2. Melodrama was incredibly popular in the 19th century, and its plays were usually enhanced by music and focused on action, suspense, and spectacle (Bezett, 2023) ^[4]. This is a high-stakes genre that typically features archetypal characters, whether they are villains, heroes, or both, and centres their confrontations on clear-cut moral decisions. Strong audience emotions are encouraged by the victory of good over evil, which almost never has equivocal results. Domestic melodrama explores topics such as societal strife, family hardship, and the weight of daily life by focusing on the personal issues and objective problems of middle-class or lower-class people, frequently pertaining to family matters. Naturalism, closely related to realism, treats life with a scientific mindset and approach, sees life objectively, and acknowledges the social factors that contribute to personal suffering while portraying the harsher realities of life in a documentary-style.

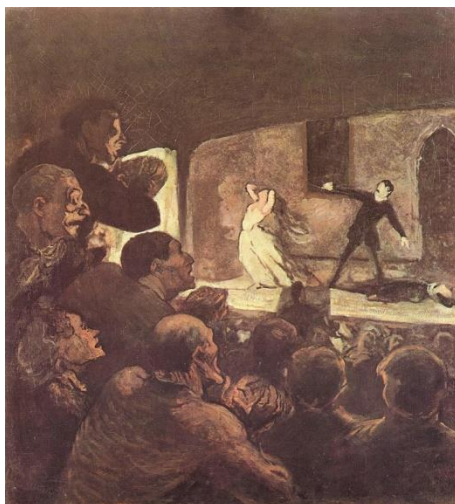


Fig 2: Melodrama

4. Drama

Drama is generally understood to be a type of theater that frequently seeks to authentically depict human behaviors and circumstances in real life. This type of drama, which is distinguished from melodrama by its overabundance of emotion and clearer moral boundaries, features characters and circumstances that are, at the very least, less defined. One of the primary subgenres that aim to portray life on stage is realism, which uses copies that closely resemble real life and the people who live in it. Because realism allows listeners to see them reflected in the performance, the stakes become more important and personalized. The latter is a catch-all word for a number of theatrical genres that depart from conventional realism, including fantasy, expressionism, and symbolism (Schwanebeck, 2022) ^[41]. These forms are frequently employed to explore deeper truths or emotional states in conjunction with metaphor, allegory, and abstract representations. It's also crucial to note that modernism in theater embodies an idea of art that is detached from reality but has the political ability to critique it. Because postmodernism permits work to have various perspectives and open meanings, it subverts conventional structures and norms much more thoroughly. Absurdism is a theater movement that began primarily after World War II.

3.1 Objectives of the study

- To research how the role of costume design has been changed in developing the character and plot in the history of theatre.
- To examine the costume designers and directors collaborate on ensuring that whatever is seen in the production aligns with the vision of the play; if and how this collaboration impacts the stories and, in turn, the audience reading.
- To examine how historical, cultural, and technological elements affect theater costume and sound design and audience experience.

2. Set Design And Stagecraft

As Set Design and Stagecraft show, set design plays a huge role in storytelling. It reveals how set design influences audience perception and enhances a story. The set design does much more than providing the performers with beautiful scenery; it also forms a part of the storytelling process to a large extent—successfully portraying time, place, and mood of the play or performance (Gröndahl, 2024) ^[17]. This, as an element in stagecraft, is primary to engaging the audience into the world of the story by providing visual cues that reinforce and heighten it.



Fig 3: Display of Set Design and Stagecraft

2.1. Storytelling's Use of Set Design

Set design functions to a great extent as a representation of the setting and tone of a story; it is one of the essential facets of storytelling within a theater. This aspect sucks the audience right away into the universe of the play by setting a physical and temporal framework and setting for the drama. By deliberately using color, texture, and architectural elements, set designers can also evoke specific moods and describe the socioeconomic and cultural conditions of the surroundings in which the characters move (Karakuş, 2023) ^[29]. Indeed, while a cramped and neglected setting would convey an impression of poverty and neglect, a big, polished set would render an image of richness and contemporaneity, and disorder or poverty may be expressed with a setting that is disorganized and dimly lit. Set design will be an important element in the development of emotion through attitudes that it sets up toward characters and their relationship to one another (Zhang, 2023) ^[49]. It will also help to shape audience response and draw attention to important details. In the end, the set changes into a powerful, silent narrator who, by its very presence and visual component, both reinforces and balances the language and action on stage.

2.2. Key Elements of Stagecraft: Construction, Lighting, and Props

The success of set design depends on the essential stagecraft elements that go into building, lighting, and props. Construction is the process of creating a real location for the action by constructing the stage setting, which includes platforms, buildings, and scenic elements. A significant amount of this preparatory work is necessary to ensure that the set is not only safe for the performers and functional, but also beautiful. Another one of these essential parts is lighting because it helps the audience get involved, changes the mood of the scene, and adds visual interest (Aronson, 2023). It can produce intense drama or mimic natural lighting, altering how situations are viewed and highlighting actors. Even though the props are just things that the actors move around during a performance, they are very important for making the story stronger and more real as shown in Figure 4. They could provide the character with context, advance the plot, or interact with the props to bring the setting of the play to life. These parts work together to create a scene that is informative for the audience and fits the story (Malloy, 2022) ^[34].



Fig 4: Scenic, Lighting, Sound & Props Design

2.3. Contemporary Design in Sets

The theater space is made more efficient by a new wave of inventions that push set design to the cutting edge of new materials and technology. Digital projection and LED displays are enabling dynamic set designs and dynamic

backdrops that seamlessly blend together and change in real time. These new developments allowed for highly variable and complex sets without the lengths of physical movement of the set itself. Another is the quicker change of scenes, which is also sustained and enriched by visual communication. In addition, the multiple staging needs of a play may be well served by modular set pieces, easily relocated and reconfigured, rapidly rearranged (Gröndahl, 2024) ^[17]. It encourages imaginative solutions to spatial problems. Other key advances, for example, 3-D printing and sustainable materials, further the ability for new methods to manufacture set piece in an eco-minded way of the future. These modern advances create a much more engaging, versatile, and environmentally responsible field in work for set design, extending the potential of traditional stagecraft as well as the theater-going experience (Gottwald, 2022) ^[15].

3. Lighting Techniques And Their Impact

The history of lighting in the theater has paralleled that of aesthetics and technology. At the beginning, most of the lighting was supplied by crude oil lamps and natural light with scant control over direction and intensity (Tamang, 2022) ^[43]. With the turn of the late 19th and early 20th centuries came electric lighting, which really began to create almost a revolution in theater lighting. The introduction of incandescent lights introduced a bit more freedom and control over manipulating the lighting on stage to achieve the desired mood and various other effects (Kong *et al.*, 2022) ^[32]. As a result of the unparalleled precision and variety brought about by digital technologies, modern theatrical plays are becoming more complicated and creative. This is because subsequent inventions like color filters and dimmers, and eventually automated lighting systems, continued to create new avenues for innovation (Portnova, 2021) ^[37].

3.1. Types of Light and Their Functions

Various theater lighting designs serve a number of purposes that work together to produce the overall visual effect of a play. There are four main types of these lights: fill lights, which lighten shadows and balance the light on stage; backlights, which outline the edges of actors and set pieces to create depth; and spotlights, which are focused lighting that highlights specific areas or characters in front of an audience (Panagou *et al.*, 2021) ^[36]. Key lights are the main lighting of the actors and are therefore necessary for visibility. Furthermore, the wide, diffused light produced by floodlights can illuminate large areas, and the purpose of gobos and filters is to project patterns and colors so that the viewer can experience the mood and texture. The many forms of lighting have a significant impact on how this visual narrative is shaped, how scenes are seen, and how the overall theatrics of the experience are enhanced (Karakuş, 2023) ^[29].

3.2. Use of Light for Mood, Focus, and Symbolism

Lighting designers set up moods and atmosphere through the manipulation of the color, intensity, and angle of light. Warm, soft light might be used to elicit emotions like love or nostalgia, while cold, harsh light would elicit unease or anxiety (Edensor, 2015) ^[10]. This can also be used to direct the audience to a specific understanding of the story by providing special focus to certain characters or actions. Many colors and light patterns could represent symbolically the themes or character traits; for example, the red tints would stand for danger or passion, while the blue ones for sorrow or

tranquillity (Balogh *et al.*, 2021, June) ^[3]. These lighting designers strengthen the narrative line, emotional, and thematic depth of the production very strongly through the use of such techniques (Guindy *et al.*, 2021, April).

3.3. Modern Technology in Lighting: LED, Projection Mapping, and Beyond

LED lighting, superb control technologies, and even projection mapping are examples of some of the present and most vital contemporary technologies used in lighting up theaters. LED lights are used in theater due to the fact that they have low electricity consumption, higher intensity and have the capacity to take any color in theater without needing Gels or filters in them (Hunter *et al.*, 2021) ^[25]. Lighting schemes can, therefore, be made much more dynamic and intricate. The latest technology can be used to project images and patterns on non-regular surfaces to instantaneously turn a theater's front by visual effects about something stunning. Such technology is referred to as projection mapping. Designers may platform a variety of sets using media graphics and lighting a diversity of ways for sets and scene alternation. Moreover, high level lighting control frameworks empower exact programming and computerization, empowering the consistent activity of complicated lighting impacts and signals. With these advancements, lighting design has a better chance of enhancing a theatrical production's artistic and dramatic potential (White, 2021) ^[46].



Fig 5: Projection mapping

4. Costume Design and Its Role In Characterization

The history of theatrical costumes is closely related to the development of theatrical techniques and social norms. Development in ancient Greek theater wore masks and robes that were meant to convey social standing and character through dramatic exaggeration when expressing emotions and playing certain roles (Yin, 2023) ^[48]. This attire was simple but symbolic. For stage productions, elaborate and meticulously designed costumes have been made since the Renaissance. The ostentation of the time and the significance of visual splendor to the performers' performances are both reflected in these costumes (Ryan, 2018) ^[39]. People began to expect true character portrayals, so the 18th and 19th centuries saw an increase in the popularity of more realistic and nearly historically accurate clothing (Han & Hamid, 2024) ^[20]. The avant-garde and conceptual clothing experiments were expanded by the 20th century's creations. The state of culture as a whole and the growing trend toward showcasing personal expression in a theatrical setting received special attention. This evidence of how the costume

has changed over time demonstrates how the design of costumes has always evolved to accommodate both the changing aesthetics of age and the practical requirements of its home in theatrical narrative.



Fig 6: Costume design

4.1. Role of Costume in Developing Character and Plot

Characterization in theaters is fully developed through costume design. Good choices in materials, colors, and designs will help in expressing a rank and personality of a character among other features (Figueiredo & Cabral, 2018) ^[12]. For instance, a figure who is dressed in tattered and worn-out clothes is more likely to elicit a sense of poverty or troubled past than a person who is dressed in elegant and tasteful attire. The costumes also support the plot when telling how a character develops and changes through the course of the storyline. For instance, a person's position or personal development may be changed as part of the event of character development from an ordinary to ostentatious attire (Hall, 2013) ^[19]. Basically, clothes are not just decoration; they define meaning to the audience, especially in terms of defining characters and setting relevant settings through which the plot would unfold.

4.2. Collaboration of Integrated Designer and Director

There are a director and a costume designer who have many different opportunities in which they can collaborate and improve the play performance. This is quite indispensable. The latter works, collaborating with the director, to ensure that the choice of the costumes is commensurate with the aesthetic and practical needs of the performance, as well as fulfilling the director's vision for the production (Han & Hamid, 2024) ^[20]. It is this team that mainly focuses on character, development, theme aspects, and practical factors such as mobility and rapid change. As a consequence, the creative vision of the designer and the conceptual framework of the director need to actually couple up in order to provide a coherent strategy that helps in advancing the storytelling. If the director believes that a character is representative of a particular historical period or era, costume designers are supposed to research and provide costumes that then help answer the question (Striebel, 2022) ^[42].

4.3. The Impact of Time Period, Culture, and Fashion on Costumes

This, in turn, is greatly influenced by fashion, culture, and era, which affects the concept and presentation of outfits in costume design. It is because of this that many contemporary fashion trends find their way into the theatrical costume design (Saleh Auda, 2020). This is a nod to broader aesthetic

values that ensures that viewers will perceive characters as both familiar and up-to-date. Designers have frequently incorporated cultural elements into their work by employing patterns, colors, and materials that are representative of other cultures and historical eras in order to achieve character representation. Because costume designers conduct in-depth research to accurately portray the era through clothing, the setting of the play will have a significant impact on the costume chosen. This basically means that, for instance, a play set in the Victorian era would have intricate costumes that were unique to the era, whereas a play set in the modern era would wear clothes that were in style at the time. Costume designers use these sources of inspiration to create character portrayals that are both visually arresting and contextually accurate and draw viewers further into the play's universe (Jablon, 2016) ^{28[1]}.

5. Sound Design And Its Influence On Atmosphere

From the most fundamental acoustic techniques to cutting-edge digital technologies, theater sound has come a long way. Early sound effects were made by hand with simple tools like wind generators that were turned by hand and sheets of metal that sounded like thunder. Gigantic open doors for sound quality and volume, most importantly, controls were made conceivable by the mechanical progression of theater innovation, especially with the presentation of electric enhancement in the twentieth hundred years. It is now a day's that sounds and music are well incorporated, in an act through recorded work and sound effects. Sound designing has also been greatly impacted by the Digital Revolution, as there have been new advanced innovations of the digital audio workstation, and sound reinforcement systems all that work by tearing and stacking up of a range of sound (Keinänen, 2024) ^[31]. The result is that the sound designers are now able to easily draw on highly complex soundscapes; they can seamlessly blend into live performances and much better and compelling theatrical experiences for the audience. Virtual reality and spatial audio have truly changed how sound can now convey the story, resulting in further progression in the field of digital sound design.

5.1. Role of Sound in Creating Ambience and Enhancing Drama

Sound is an integral part of a play because it determines the mood and dramatic effect of such a play. Designers of sound create a scene and a mood for an audience through the variances of musical compositions and background noise which immerses the audience in the setting or time period. The sense of place and context is communicated with the ambient sound effects. Examples of background sound effects are natural sound effects, city noises, and an office full of people working (Alekseevna, 2024) ^[1]. While music can engage the emotional responses of the viewer even more, it also defines dramatic beats and allows theme coherence. An introspective track would easily underscore the inner conflict of a character, but an eerie soundtrack would ring with more suspense and anticipation. Sound designers work to create an atmosphere for a show by developing and weaving such audio elements carefully, which capture audience engagement and retention of dramatic encounters.

5.2. Music, Audio Effects, and Their Psychological Impact

Sound effects and music are undoubtedly very potent tools

that can psychologically manipulate an audience's mind. The sound effects in a scene, like the far-off lion's roar or the creaking of the door, can invoke subconscious responses in the audience to become further engaged with the story (Ward & Leung, 2008). On the other hand, music has huge psychological effects and the power to stir specific kinds of emotions among listeners while influencing their behavior. Changes in tempo, major and minor chords, and melodic lines have the power to transport an audience to a variety of emotional states, keeping them guessing or excited to the brim. For instance, tension could be created by gradually increasing the volume of music until there is complete silence and the listener is brought to a dramatic halt that elicits a sense of eager anticipation. In order to create an audio experience that will have the greatest impact on the audience's emotional and cognitive reactions, sound designers make use of these psychological effects.

6. Role Of Special Effects And Technology In Modern Theater

Theater's true capacity has been upgraded by innovation in numerous ways. Technology is presently utilized in most theatrical creations, from set plan to the real exhibition. Technology has a certain effect, whether it assists an entertainer's voice with arriving at each individual from the crowd or assists the set fashioner with making stunning backgrounds and props. Numerous innovative components, like lighting, sound frameworks, 3D printing frameworks, and receivers, are utilized on present day stages to upgrade the survey insight. A long time before contemporary innovation, theaters were totally different. Theater is remembered to have begun in Old Greece in the 6th century B.C., when the artistic expression previously became famous there (Li, 2024). In 534 or 535 B.C., one of the earliest examples of theater and acting is known to exist. Thespis, a voyaging minstrel, jumped onto the rear of a wooden truck and began recounting verse while expecting the personas of the characters whose lines he was perusing. The main plays after Thespis highlighted a solitary entertainer who was helped with recounting to their story by an ensemble. Writers began to explore different avenues regarding adding more entertainers to the stage in the fifth hundred years. However they started at the Theater of Dionysus in Athens, these plays before long became famous all through Greece.

Despite the fact that these creations at times utilized outdated innovation, it isn't anything in that frame of mind of present day innovation. The main thing that would assist entertainers with extending their voices to the crowd instead of utilizing receivers would be the amphitheater's acoustics. Utilizing a crane to provide an entertainer with the presence of flight was one astonishing piece of innovation from the time. Other than this development, a very remarkable exhibition was passed on to the crowd's creative mind. Early theatrical creations in Greece and Rome were delivered in venues that pointed toward the east to west to build the lighting on the stage. This plan made it to such an extent that plays could be placed on in the early evening, with the daylight stirring things up around town however not those situated in the symphony area. This training would go on for quite a while, with Shakespeare's renowned Globe theater having a fractional rooftop with the middle uncovered, permitting daylight onto the stage. Modernization would change the stage by carrying masses of new technology to adjust and work on the experience of the theater for every one of those concerned.

6.1. The Impact of Technology on Theater

The impact of technology on theater has grown along with its advancements, providing audiences with an increasingly immersive experience. The theater can influence sight, hearing, and scent using innovative technology. Find out more about the ways that technology shaped theater as it exists today (Karcz-Ryndak, 2024)^[30]:



Fig 7: Impact of Technology on Theater

1. The Visual

A play or melodic's visual parts have forever been essential, and the theater has a long practice of utilizing covers, view, and props. Stunning a crowd of people with the visual has forever been the point, from the early Greeks who utilized cranes to "fly" figures onto the stage to the complicated gear frameworks of today that make a cleaned and safe appearance. Theaters may now more effectively execute a scope of obligations and work on the visual allure of their creations because of present day technology. Robotization and 3D printing make it conceivable to fabricate sets all the more rapidly, more meticulously, and at a level that submerges watchers in the scene and story. Also, mixed media exhibitions by theater organizations can now remember video and different components because of progressions for technology. Video technology offers set designers extra artistic liberty and an extra aspect to work with while making creations. This should be visible as video backgrounds that highlight a set with pictures of haze, mists, or downpour, or films that help an exclusive show by playing relevant film.

Another region where technology has changed the theater experience is lighting. For a critical piece of their reality, theaters were either worked without rooftops or depended upon possibly risky fires to light the stage. The capacity to coordinate spotlight with the utilization of focal points and reflectors altered venue design in the nineteenth hundred years. At last, electrical lighting played the job of spotlight in the twentieth hundred years and formed into the contemporary lighting frameworks we use today. A computerized light board, which is fit for controlling many lights for a creation, is as often as possible used to control lighting in present day creations. The cutting edge venue finds it a lot more straightforward to utilize specific lighting frameworks because of the progressions in Drove lighting and electrical frameworks. With a hint of a button or turn of a dial, contemporary technology permits entertainers to change the lighting's tone, example, and force as opposed to

simply lighting the stage.

2. Audio and Sound

Technology has impacted watchers' hear-able encounters in various ways. For example, creation groups can secure music and audio effects from the web and save having to make them actually. Besides, chiefs can undoubtedly layer sounds with the utilization of sound design devices, giving an exhibition more practical sounding music, impacts, and foundation clamor. One of the best advancements for the theater is microphone technology. Entertainers talk into mouthpieces that venture out from speakers situated decisively all through a theater, dispensing with the requirement for them to extend their voices. Moreover, entertainers can give great sound without the interruption of a noticeable receiver by concealing minuscule mouthpieces in their hair or wearing them as tissue hued headsets instead of handheld or ground-mounted receivers (Boland, 2024). These headways in sound technology affect something other than the watcher. In the notable play "Misery," Bruce Willis broadly utilized a headphone so he could hear his lines while performing. Entertainers' lines can be displayed on in front of an audience screens notwithstanding earpieces. Indeed, even while mouthpieces and speakers are usually utilized, numerous entertainers choose not to use these headphones and screens all through each exhibition.

3. Smell

Smell can be used to immerse spectators in a play's experience, even though it's not typically the first sense that comes to mind when thinking of theaters. An outdated illustration of this would be if a performer lit up a cigarette on stage, causing audience members to inhale tobacco smoke. The ability to create scents that an audience may detect has become more important in recent years, as technology has made it easier for theater productions to include scent in their performances (Tonkoshkura, 2022)^[44]. In late memory, the expression "aroma-turgy," or the purposeful utilization of fragrance as a part of theatrical design, has been utilized a ton. Beforehand, the fragrance of somebody cooking in front of an audience or smoking a cigarette would need to pervade the room normally and wouldn't arrive at the crowd individuals prior to being all blended with the encompassing aroma. Creations were for the most part in a tight spot in the event that they required a fragrance to contact the crowd at a specific time. The advent of dry vapor scenting technologies has allowed producers to use any scent they like to fill a theater. These vapor devices are essentially a kind of diffuser that can discharge fragrances when activated. To make sure that everyone smells the perfume at the right moment, these devices can be placed throughout a theater. With the use of this technology, theater shows may now engage audiences more deeply.

4. Technology That Has Changed Theater

The times of building open air venues with normal light spilling onto the stage have since a long time ago elapsed. Theatrical shows may now happen out of the blue of day because of electric endlessly lighting design gives acts a more profound quality. Theater lighting has changed because of computerized lighting and LED lighting (Hashim *et al.*, 2023).

4. Lights with LEDs

Theaters used to depend on obsolete lighting frameworks that consumed most of the day to set up. A lighting designer would regularly have to definitively place three hanging lights, each holding its own gel, to set up a stage light. These gels helped with changing the light to the exact variety expected for the creation. While light emitting diodes (LEDs) at first showed up, in 2007, they weren't quickly famous. The principal Drove lights were restricted to a variety plan of red, green, and blue. It took some time for light designers to sort out some way to make LED lights look alluring against skin. They were along these lines generally utilized for lighting supplemental regions and foundation surfaces (Iudova-Romanova *et al.*, 2023) ^[27].



Fig 8: LED Lights in Theater

The appearance of LEDs highlighting seven distinct colors extended the variety range accessible to designers and worked with their quest for tints that supplemented entertainers' complexions. The outcome of Driven in the theater was generally subject to this variety range. The capability of advanced lighting frameworks to change tones promptly without relying upon obsolete mechanical techniques dumbfounded lighting specialists. Theater workers adore the characteristics that LED lights bring to offer. A lot of these lights incorporate inherent dimmers that might be worked from a good ways. LED stage lights are accessible as Standard jars, strip lights, and moving head lights. To put it momentarily, chiefs and creation groups currently approach a more extensive scope of varieties in a more versatile and strong bundling thanks to LED lights.

The expression "LED lighting" describes a sort of lighting that is associated through a computerized organization to do different capabilities. Dissimilar to traditional glowing bulbs, which can't interface with computerized networks, Drove lights are fueled by a circuit board that sends power. With regards to the stage, computerized lighting comprises of Driven lights that are carefully associated and constrained by a lighting designer to improve the stage's enlightenment. Light operators can now coordinate lighting over an organization through a control station, killing the requirement for manual light control. Computerized lighting often works with the on/off and dimmer controls in a theater. These lights empower theaters to give a more customized lighting experience any place they are by being used both in front of an audience and in the entryway.

Designers have unlimited authority over the examples, tints, and powers of light projected onto the stage thanks to computerized lighting. A solitary administrator can work many lights at a computerized light board with computerized

lighting, instead of a creation group expecting to control the bright lights with conventional projector technology physically. Time is saved and new choices for the stage are made conceivable by the capacity to oversee lighting from one spot. Old performance center shows have a long history with sound, yet critical headways in sound technology that are still being used today didn't occur until the twentieth hundred years. Speaker frameworks and receivers are two regions where sound design technology has progressed essentially and changed theater.

- **Microphones**

By the 1960s, microphones had turned into a typical device in melodic theater, assisting vocalists with extending their voices over the symphony. To catch sound from both upstage and downstage without being prominent, the amplifiers were habitually situated at the front of the stage and suspended from the fly space. These mouthpieces had a downside in that they restricted the vocalist's versatility by causing them to sing decisively before them. During the 1980s, little wireless microphones were made, and they before long superior the sound nature of a wide range of sorts of exhibitions. These receivers sent a transmission to a blending work area through a FM radio transmitter that was situated on the entertainer. With the receiver implanted in the entertainer's hair or fixed on a headset with a tissue shaded mouthpiece, current remote mouthpieces offer momentous sound quality.

- **Speaker Systems**

The theater was extraordinarily influenced by the headway of loudspeakers, speaker walled in enclosures, and amplifiers. Utilizing mouthpieces, entertainers could communicate their voices by means of the speakers, empowering audio effects and music to be played couple with in front of an audience activity in theatrical productions. The capacity to play music and effects from a central place was made possible for theater plays by the advent of speaker systems. Modern performances may now fill a theater with sound at a constant volume thanks to portable loudspeakers. Speaker systems may produce even more immersive theater experiences and give contemporary stages a better sense of reality.

Theaters can now have one individual direct and clean every part of a production's sound design thanks to current speaker frameworks. A sound administrator can change an entertainer's receiver level, play audio cues when required, and deal with any music the production utilizes with a mixing console.

- **Visual**

For quite a while, directors and performers have needed to drench their audience in a more immersive encounter; thusly they have attempted to work on the visual allure of the stage. The visual conceivable outcomes of the stage have been reformed by various new advances made conceivable by present day theatrical technology. The utilization of apparatus, advanced mechanics, and 3D printing in visual stage design.

- **3D Printing**

Set designers can reduce labor by using 3D printing to create sets and paint backdrops instead of building them by hand. These days, set designers create their designs in 3D software before sending them off to be produced as plastic prototypes.

With the use of 3D technology, designers can create set pieces and props much more quickly and easily, giving them more time to experiment with new designs.

• Automation

With cable frameworks, engines, electronic control boxes, and control programming, theatrical productions can now utilize robotization to move set pieces at the ideal opportunities. All theaters, from Broadway to local area plays to secondary schools, are presently mechanized. Because of the allure of squeezing a solitary button to start exact picturesque movement for every presentation, robotization on the cutting edge stage is expected to go on for a long time (Holloway, 2014) ^[23]. The broad documentation of the stabilizer fixing framework, which traces all the way back to the 16th century, exhibits the framework's long history. These frameworks have just become seriously astounding and secure over the long run. Despite the fact that computerized stage fixing has begun to be a major effect on theater technology, the stabilizer stage fixing is still generally utilized. In hundred years, fixing frameworks have been overhauled. In computerized stage fixing, line sets are moved by electrical winches as opposed to hand hoists.

• Cues

Cues are often used in theaters to make sure that all of the activities take place at the right times. They can be anything from a predetermined movement or spoken signal to a lighting and sound effect change. With the modern technology today, theaters are able to do more with their lights, headsets, and displays, therefore giving them more options with cues. For instance, headsets may be used by the stage management to communicate with the stagehands and to ensure that everything is running smoothly during a performance (Milisavljevic, 2013) ^[35]. With the coming of technology, it is now easier to make props. Props are now able to be built more accurately and more efficiently, for example, by the use of 3D technology. This allows set designers to experiment more with different designs and use a much larger number of items. They do not need to create or search for each and every prop; it is just an app draw and print. The simplification of the process allows designers to come up with more props without compromising the high standards of the audience.

7. Conclusion

The development of theater technology can be considered among the best examples of how fundamental ideas and concepts have changed with time from simple beginnings. From the extremely rudimentary reliance on natural lighting and manual sound effect creation to the highly advanced digital technology, the development of lighting, costume design, sound, and special effects all demonstrate the dynamic exchange between technological advancements and expression. The way theatrical events are produced and carried out has completely changed as a result of recent technological advancements in automation, 3D printing, digital sound systems, and LED lighting, which enable never-before-seen levels of precision, diversity, and immersion. As lighting technology advances, sophisticated computerized systems can replace simple oil lamps, allowing for far more precise control over mood, emphasis, and symbolism. Comparably, costume design has evolved from the simpleton designs of the past to incredibly complex designs that are, for

the most part, historically accurate and significantly contribute to the complexity of the tale and character development. Because digital audio workstations and high-end speaker systems greatly improve the auditory experience, the evolution of sound design has made it possible to tell stories that are far more intricate and powerful than they have ever been. Production designers may now create an even more captivating and pleasurable experience by combining elements with projections and the release of enticing scents thanks to contemporary technology and special effects. In addition to augmenting the auditory and visual effects of theater, the most recent versions have now given the audience member a fresh stimulation.

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