This essay, commissioned by Vitra Design Museum Weil am Rhein for Volume 1 of 3, On the Cultural History of Light for the 2013 Vitra exhibition, Lightopia, traces the development from natural to artificial light as a dynamic and artistic rather than merely pragmatic medium in the design and articulation of performative space in theatre, event and urban space. The text understands light to be an active agent in the creation of an overall scenography, comprised of all material and immaterial elements that make up the space of a live event. Drawing on a wide range of significant primary texts and practice examples from antiquity to contemporary positions, the author links technological developments to changes in the understanding of the hierarchy between audience and performer, text and image, space and decoration in the history of scenography.

In line with the author’s research focus on scenography, performative space and the politics of space, the positions introduced and interrogated in Modulating Space show performance lighting to occupy a central role in the constant rethinking of the relationship between the space of action (the stage) and the space of reception (the auditorium). The transgression of such conventionalized spatial demarcations toward undisciplined and disharmonious configurations (as in Antonin Artaud’s Theatre of Cruelty), toward abstraction and reflection (as in Adolphe Appia’s Hellerau stage) and toward mass manipulation and representation of power (as in Albert Speer’s Nuremberg and Paris Light Domes) are shown as examples in their historical and cultural context.
Modulating Space
Using Light in Staging and Set Design

As a support for narrative and dramatographical structures, aesthetic experience and generating atmosphere, light plays a central role in theater and public events. Light creates spaces and is able to shape space in time. The deployment and use of artificial, static and mobile light, as deployed on stages and in the opening and final ceremonies of the Olympic Games, are directly linked to technological innovation and a changing way of thinking about the hierarchy and the presentation of performers, space and text (Fig. 1). In the amphitheaters of Ancient Greece around 400 BC, performance and the plot of a drama were bound to the maximum length of the day from dawn to sunset, and the only "lighting" effect was the course of the sun. The theater during the Middle Ages, however, knew no fixed stage: liturgical plays and festivals took place in market squares or in churches and light was provided by oil lamps, candles or torches. It was only with the return to ancient building traditions and the late reception of the Roman theoretician Vitruvius’ theory of perspective De architecture libri decem (Ten Books on Architecture) that architects began to think about questions of scenography to link stage decoration, perspective and light to one another. The permanent perspective stage sets in Andrea Palladio’s Teatro Olimpico in Vicenza (built posthumously, 1586–88) and Vincenzo Scamozzi’s first freestanding Renaissance theater (+1557) in Sabbioneta, a north-Italian “ideal” town, were to be illuminated so as to emphasize perspective depth. At the same time, the actual space of action for the performers was to be lit in an even fashion using light from the sides. In his multi-volume work Piazza fine (1557) and strongly influenced by Vitruvius, the Italian architect and stage designer Sebastiano Serlio (1475–1554)

emphasized for the first time the necessity of careful stage design to enhance the three-dimensionality of the stage architecture. The Baroque stage, with its wave machines and flying machines and dramatic depictions of catastrophes, featured a complex use of light with candle devices, torches and fireworks. In 1678, the Italian architect Nicola Sabbioni published the first guidebook on stage and lighting technique, Pratica di fabbricare scene e macchine ne’ teatri, with a depiction of lighting devices that could be regulated gradually—so-called “dimmers,” two cylinders hanging over burning candles that could be lowered or raised by a mechanism. Depending on the distance of the cylinder from the candle flame, the light effect could be amplified or weakened (Fig. 2).

Swabian engineer and mathematician Joseph Furtenbach (1595–1667) advanced the development of Italian lighting technology in Germany, although he continued to use the outdated ancient model of rotating side stages (peristreben). Besides investigating complex chemical mixtures for fireworks, Furtenbach also experimented for the first time with mirrors that could be used as light reflectors and with metal reflectors that, used in the footlights, put an end to the bothersome blinding of the spectators by way of lights placed on the stage floor. The continuing development of reflectors and the fixation of lighting on rotatable scaffolding in the eighteenth century allowed for an increasingly differentiated use of light. Architecture and performers could now, in a first turn toward the interpretation of music and text using space, light and movement, be “staged” in a targeted and effective way. Changes in lighting not only marked the beginning and end of a performance, but also structured the performance in scenes and various moods.

LIGHT BODIES AND LIGHT SPACE
Gas lighting was initially used in foyers and auditoriums, and in 1817 it was used for the first time on the stage at London’s Lyceum Theatre. The advantages of gas lighting—great light intensity and easy controllability—were countered by the increased danger of fire, as seen in the dramatic rise in the number of theater fires between 1820 and 1880. Vienna’s 1881 Ring-theater fire, which resulted in the deaths of three hundred people due to a tragic chain of mistakes and misunderstandings, led to the establishment of fire code regulations specifically for theaters. The common practice of using oil lamps in the foyer and behind the stage, and gas lighting in the auditorium, was then replaced by gas lighting in the entire theater building.

The fire at Vienna’s Ringtheater on Schottenring broke out just before the start of a performance of Taus’s Hofmannsche inausserlich zu den Exzerzen des Hofmannsche durch die release of excess gas when igniting a light box backstage. The fire quickly spread to the stage decoration


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and the sold-out auditorium soon caught fire. A side door open near the stage caused a strong draft that further fed the flames, and doors that only opened inwards hindered the audience who were trying to flee. The oil lamps for the emergency lighting had not been reinstalled after having been repaired. The policeman responsible, Anton Landsteiner, announced, "All clear!" upon seeing the doors to the auditorium closed, and the firemen, who arrived late on the scene, left without doing a thing. In Arthur Schnitzler’s story “Komilföllinnen” from 1893, the young Frizzi lives though the experience over and over again, to the delight of the men listening to her. "It seemed," she continued, "as if the flames were nothing harmful, nothing that threatened me. I stared into the fire with interest, perhaps even enthu-
siasm, but certainly not with fear. Then suddenly, I felt myself being pushed, no, not pushed, lifted, and around me there was a howling, monstrous noise, as if everything were collapsing, and it blustered throughout the room like a storm, while a gray, dark smoke issued forth from the blaze. Unexpectedly, there was a violent push in a certain direction. It was suddenly dark, and I couldn’t move. Around me, there was cur-
ning and moaning. Yes, I screamed as well a few times, hardly knowing why. And suddenly, I felt fingernails around my neck, close: somebody was pulling at me. My collar was torn from me; my dress was simply pulled off my body."

As a consequence of the Ringtheater fire, an iron safety cur-
tain, which separated the audience from the stage and could be lowered against the danger of fire, became a legal requirement, and other fire code regulations also went into effect. Soon after Edison’s development of the electric light, the fans and auditoriums of the first theaters were outfitted with electrical light-
ing—First London’s Savoy Theatre (1881) and briefly afterwards Britain’s historic first to use electric lighting exclusively. Initially, lighting systems were used only to illuminate the stage. However, the development of special effects technology followed soon after. Revealing here is an article from 1881 in the Polytech-
nische Journal on the lighting effects in Gilbert & Sullivan’s opera 'Iolanthe' at the Savoy Theatre, based on a lecture by the architect Paul Jordan. In FIG. 3: "In the theater, all the fairies in the large-scale, evening-filling fairy spectacular Iolan-
the appear with their own electric light. Each of them carries a small, tiny glow lamp in their hair, as shown in FIG. 2. The electricity is provided by a plant’s sec-
ondary battery consisting of two elements that the fairies wear under their wings and their glowing hair hidden on their backs. One such secondary battery weighs 2.75 kg, to charge them an electric current of 3.3 amperes is required: their electromotive power has 5 volts and the light from the lamps c. 1.5 amperes. The small lamps are connected to the battery with thin, flexible wires, and attached to their hair using a comb. The overall effect is a very nice one."

In contrast, an anonymous theater critic from the London Figaro remarked skeptically in December 1881: “The incan-
descent lamps worn in the hair of four of the Pegs at the Savoy on the opening night did not produce the happiest effect. The light dazzled the eyes and gave rise to an uncom-
fortable suspicion of possible danger. For, although the wires are doubtless completely insulated, yet a fracture or a rub would imply instant death to the unhappy lady who wears the lamp. It is doubtful, after all, whether the game is worth the (incandescent) candle."

The invention of such individualized electric costume accessories, called bijoux électriques, can be attributed to French engineer and inventor Gustave Trouvel (1839–1903). FIG. 4. For the ballet in Camille Saint-Saëns’s opera Aïda, Trouvel developed an electric torch with a battery (Planté batteries with lead sheets) that remained charged for twelve to fifteen minutes. This and the electric swords that Trouvel had already constructed for a dual scene Charles Gounod’s opera Faust (1859), which released electric sparks upon contact, were highlighted in the press of the time as especially effective stage technical innovations. During the 1890s, the American dancer Lote Fuller (1886–1938) used the new light and projection technolo-
gies to create individualized stage lighting, utilizing the language of light artistically in a direct engagement with the dancing female body. In her construction of ephemeral body architecture, Fuller experimented with colorful move-
able light, with magic lantern projections and reflecting mirrors. She painted her costumes with phosphorescent pigments to achieve a glow-in-the-dark effect and projected abstract, pathologically altered “body cells” into the stage. Fuller worked with a team of electricians who traveled with her from performance to performance and meticulously adjusted her materials for use in each appear-
ance FIG. 5. Virtually fulfilling the Symbolist aesthetics of a dream-like interiority as described by the French poet Stéphane Mallarmé (1842–98), for whom dance repre-
sented pure poetry, in her thematic performances between 1890 and 1930 (Radiant Fire, Iridichée, Serpentine) Lote Fuller achieved an as yet unknown fusion of the immaterial-
ity of light and the materiality of her body, which was shrouded in long, billowing silk fabric. With broad, circu-
THEA BREJZEK

Using Light in Staging and Set Design

/ Raumbildend: Licht als
szenisches Gestaltungsmittel


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Light space is one of the most important aspects of stage design, as light can create an illusion of space. The properties of light can be used to simulate the appearance of space, to suggest the location of objects, and to indicate the time of day or the mood of the scene. Light can also be used to create a sense of movement or to direct the viewer's attention. In addition to these functional uses, light can also be used to create an emotional effect, such as to suggest a sense of mystery or to create a sense of tension.

Light can be used to create a sense of depth or to add a sense of dimension to a space. This can be done by using light to create shadows, by using light to simulate the appearance of three-dimensional objects, or by using light to create an illusion of distance. The properties of light can also be used to create a sense of movement, by using light to create an illusion of motion or to suggest the passage of time.

Light can also be used to create a sense of atmosphere or to suggest the mood of a scene. This can be done by using light to create a sense of emotion or by using light to create a sense of mystery. The properties of light can also be used to create a sense of tension or to suggest the presence of danger.

In conclusion, light is one of the most important aspects of stage design, and it can be used to create a sense of depth, to add a sense of dimension, to create a sense of movement, to create a sense of atmosphere, and to suggest the mood of a scene.
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