

Virtual Production in *The Lion King* (2019): Formal and Stylistics Presentation

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Abstract: Disney's *The Lion King* (2019), directed by Jon Favreau, was produced using virtual production technologies such as filming within a virtual space. While the virtual production of *The Lion King* (2019) has been described in journalistic articles, as well as in a few academic papers, there was hardly any discussion on the impact that the technology had on the film itself. Using the neoformalist film analysis, this study critically examines how the virtual production of *The Lion King* (2019) influences its formal and stylistic presentation.

Keywords: *The Lion King*, virtual production, VR, neoformalism, film analysis.

Produção virtual em *The Lion King* (2019): Apresentação formal e estilística

Resumo: O *Rei Leão* (2019), da Disney, dirigido por Jon Favreau, foi produzido usando tecnologias de produção virtual, como filmagem em um espaço virtual. Embora a produção virtual de *O Rei Leão* (2019) tenha sido descrita em artigos jornalísticos, bem como em alguns trabalhos acadêmicos, quase não houve discussão sobre o impacto que a tecnologia teve no próprio filme. Utilizando a análise cinematográfica do neoformalismo, este estudo examina criticamente como a produção virtual de *O Rei Leão* (2019) influencia sua apresentação formal e estilística.

Palavras-chave: *O Rei Leão*, produção virtual, VR, neoformalismo, análise de filmes.

La producción virtual en *El Rey León* (2019): Presentación formal y estilística

Resumen: *El Rey León* (2019) de Disney, dirigida por Jon Favreau, se produjo utilizando tecnologías de producción virtual, como filmar dentro de un espacio virtual. Si bien la producción virtual de *El Rey León* (2019) ha sido descrita en artículos periodísticos, así como en algunos trabajos académicos, apenas hubo discusión sobre el impacto que tuvo la tecnología en la película misma. Utilizando el análisis cinematográfico del neoformalismo, este estudio examina críticamente cómo la producción virtual de *El Rey León* (2019) influye en su presentación formal y estilística.

Palabras clave: *El Rey León*, producción virtual, RV, neoformalismo, análisis cinematográfico.

Virtual production is a recent development in the film industry that refers to all visual filmmaking methods aided by computers (An, 2022). It utilizes real-time 3D computer graphics, virtual camera systems, and motion capture technologies (Bennett & Carter, 2014). Despite its short history, virtual production has already achieved prominence in the Hollywood film industry. Critically acclaimed and industry-rewarded films such as *Avatar* (2009), *Life of Pi* (2012), and *Gravity* (2013) utilized virtual production by having its cinematographers relying on virtual lighting and virtual cameras to produce images that resemble traditional filmmaking practices with physical lighting and cameras (Maddock, 2021).

One of the most prominent supporters and advocates for virtual production in Hollywood is Jon Favreau, who became fascinated by it following the production of *The Jungle Book* (2016) and his frustration with the time-consuming repositioning of greenscreens (Failes, 2019). For his next project, *The Lion King* (2019), the remake of the beloved Walt Disney animated film from the 1990s, Favreau was eager to utilize the full potential of virtual production technologies. As discussed with the journalists invited to the film set, Favreau planned to create a virtual space in the Unity game engine and then shoot within it using live-action techniques, thus making it a virtual production process (Ha, 2019).

This article aims to critically examine the effect the virtual production had on the formal and stylistic presentations of *The Lion King* (2019) using neoformalist film theory (Thompson, 1988), which understands a film as a connection of devices to each other. We aimed to answer the question “how has virtual production influenced the overall presentation of *The Lion King* (2019)?” By answering it, this article will provide a context for the virtual production technology, describe the virtual production in *The Lion King* (2019), analyze its impact on formal and stylistic presentation, and discuss what the adoption of virtual production allowed the filmmakers to achieve.

Virtual Production

Labeled a “technological revolution” (Carpio & Birt, 2022), the virtual production disrupted the traditional studio modes of Hollywood production, its schedule, machinery, and required staff. There used to be three distinct phases in studio filmmaking which often overlap: preproduction (preparation, securing funding, completing the script, budgeting), production (shooting), and post-production (assembling, editing, fixing the sound, and finalizing special effects) (Bordwell et al., 2017). Traditionally, most visual effects (VFX) were completed by VFX artists in post-production, with the director overseeing the results but still being disconnected from the process. In contrast, virtual production allows filmmakers to directly work on various visual details, during any stage of production, thus supporting a more collaborative and iterative process (Kadner, 2019). Hence, the virtual production is driven by the directors in real-time, allowing them to make creative decisions regarding the film immediately on the set (Bennet & Carter, 2014; Pires et al., 2022).

During the preproduction stage, virtual production tools can be used to complete a previsualization, or previs, of the future picture. Previs allows filmmakers to creatively plan out, conceptualize, and visualize the details of the picture, including cinematography, lighting, stunt choreography, and locations, while doing so inexpensively and time-efficiently (Sawicki & Moody, 2020). Such is especially convenient for big-budget Hollywood blockbusters that consist of many computer-generated images (CGI). Previs produces a sort of digital storyboard that can easily be entered and iterated according to filmmakers’ wishes.

Such digital storyboards can be accessed via virtual reality (VR) headsets by several filmmakers at once, who can then proceed to see the space for themselves, being able to change the position of various props, test the lighting, and plan out the movement of the virtual camera (Bédard, 2022). In a way, filmmakers enter a virtual set and work within it like a traditional one. However, with all objects and actions being digital, the work can be done faster and with relative ease. VR headsets were used for such a purpose by Jon Favreau and his team during the production of *The Lion King* (2019).

Arguably, one of the films that had a strong influence on the development of virtual production was *Avatar* (2009). The film merged computer-animated motion capture images with a virtual camera system that allowed the director James Cameron to see the CGI characters while looking at the actors in their motion capture suits. Thus, live-action and virtual environments were merged in real-time, providing Cameron with enough information for directorial decisions without the need to wait for the post-production process (Sawicki & Moody, 2020). Thus, virtual production eliminated uncertainty for filmmakers, allowing them to see the images and complete the necessary changes before post-production, saving time and money (Kadner, 2019).

Recent projects, such as *The Mandalorian* (2019), which relied on virtual production, employed game engines to achieve real-time rendering of images. As Dong An (2022) describes, in virtual production, a game engine serves three functions: firstly, as the tool that achieves a millisecond-level rendering speed during all the stages of production; secondly, as an assembly tool that ensures that multiple users work simultaneously, establishing lighting, props, and so on; and thirdly, as the tool that ensures that people can immediately view the project development. As a result, game engines are central to modern virtual production, and were used during the production of *The Lion King* (2019) as well.

Virtual production has advantages, such as providing more space for iterative creative decisions during various stages of production while cutting the cost and time required to produce a motion picture. However, we should remember that although filmmakers can enter a virtual film set and practice virtual camera movements, the set itself is the product of VFX artists' work. The rise of virtual production and the dissolution of traditional film production phases increased the workload and the responsibilities of VFX artists, whose work, impact, and importance have long been undermined in Hollywood (Mihailova, 2016).

Continuously overworked, underpaid, and under intense deadline pressure, VFX artists in America work without health care and sick leave (Curtin & Vanderhoef, 2015). Film studios hire independent companies employing VFX artists on a contract basis to achieve results for a fixed price. The increasing competition and producers' desire to keep the costs down put pressure on independent contractors and their employees. These bidding wars also force VFX artists to continuously move between companies and countries to secure temporary contracts with minimal benefits (Atkinson, 2015).

Working long and often unpaid hours during crunch times, i.e., the time preceding the release of a major film had become common (Curtin & Vanderhoef, 2015). In August 2022, several VFX artists spoke against one of the major employers, Disney-owned Marvel studios, responsible for producing high-grossing superhero films. One artist talked about seven-day work weeks with an average of 64 hours of work on a good week (Lee, 2022).

Virtual production supports collaboration between film directors, actors, producers, and VFX artists. But, as Mihaela Mihailova puts it, it is collaboration without representation (2016), with artists' labor being overshadowed and deprived of its artistry, seen as a tool to realize the creative decisions of actors and directors. Overall, while the advancement of virtual production affords more interactive, affordable, and time-saving filmmaking, it is necessary to acknowledge the input of those who enable it in the first place.

Producing *The Lion King* (2019)

The Lion King (2019) was produced in two places. In London, MPC Film, a company specializing in VFX, worked on master scenes for the film and made them compatible with the Unity game engine. Jon Favreau's team was in Los Angeles, exploring virtual spaces using VR headsets and discussing the trajectory of the virtual camera and lens selection (An, 2022). When it came to actual shooting, cinematographer Caleb Deschanel (ASC) began filming on a physical representation of a real camera ballasted and affixed with markers to caption its motions, while doing so on a set that was largely empty of any set pieces but had infrared sensors lining the walls and ceiling (Bédard, 2022).

While previous examples of films made in virtual production had some actors performing their roles either in a motion capture suite or in front of a green- or blue- screen, the production of *The Lion King* (2019) was unique since the film set was empty of any performers. The actors provided only their voices without offering their facial and bodily expressions to the characters, even though some voice actors were filmed while performing their lines just to be used for an editorial discussion and as a reference for animators (Seymour, 2019). Similarly, the production team also used as reference footage of real animals and the Kenyan landscape they filmed on a trip before the shooting.

The key goal for Jon Favreau and his team was to achieve high fidelity in producing images and make the audience believe they were watching real animals in a real environment. Thus, countless hours were spent discussing the correct position of the sun and the direction and intensity of the lightning, while the animal characters were designed with no attempt at anthropomorphization. Using the virtual camera was supposed to further enrich realism by giving “the sense of a human observing and following what is happening,” as quoted by Caleb Deschanel (Goldman, 2019). It was crucial for filmmakers, and especially for the virtual production supervisor Ben Grossman, of the company Magnopus, to establish a familiar environment for Caleb Deschanel and allow him to manipulate the camera as he used to on a traditional film set, instead of standing nearby the animators and telling them what to do and how (Goldman, 2019).

Mike Seymour (2019) provides a detailed examination of the amount of work that was put in by MPC films and their animators from designing and providing locations, animating the scenes, reviewing what was filmed by the crew, to rendering the final images. Animators had to create a realistic-looking film, closed in style to nature documentaries, completely from scratch, designing and animating the environment, simulating water, dirt, and fire, as well as animating dozens of different animal species.

Despite their work, upon its release, *The Lion King* (2019) was marketed as a live-action film, instead of an animated film, which it technically was. The sophisticated virtual production technologies were used to secure the film's identity as a live-action picture since it follows the visual style of live-action cinema with its photorealistic aesthetic, distortions, and features of lens-based media (Holliday, 2020). The denial was so strong that Disney, the studio behind the remake, refused to submit *The Lion King* (2019) for consideration for the Academy Award for Best Animated Feature.

In the case of *The Lion King* (2019), virtual production was used as a marketing ploy to present the film as an innovative picture that resembles a live-action film. However, utilizing such technology does more than present the film as a unique production case, it also affects the creative decisions completed during the filmmaking process. Considering that *The Lion King* (2019) is also a remake of the well-known and beloved animated film, it might be beneficial to analyze how virtual production influenced the eventual look and presentation of the film. To do so this study turns to neoformalist film analysis.

Neoformalist Film Analysis

Various film theories provide conceptual lenses for decoding film meanings, for example, Marxist, semiotics, or feminist film theories. Neoformalism stands separately because it does not present evaluation and interpretation as a default aim of an inquiry (Rushton & Bettinson, 2010), however, it presents a universal approach to analysis that can be applied to any film. At the same time, neoformalism views audiences as active participants in the construction of meanings, encouraging them to engage with a film and to form their understanding (Glotov & Kotilainen, 2021).

Neoformalism is rooted in Russian Formalism and adopts some of its terminology, such as defamiliarization, meaning the mental process that allows us to see everything in film differently from reality, because of being put in a new context (Thompson, 1988). For example, a tree in a film can be more than a tree, it can serve as a metaphor for the character's growth or strength. A film can also present a dialogue between two people in a way that we could never experience in real life.

A thing can be integrated into a film and defamiliarized via formal and stylistic practices. Film form refers to a film's narrative, i.e., the story, the plot (the way the story is told in the film), and the characters, while film style refers to its audio-visual elements that can be perceived via our senses. An artist presents the familiar in a new light, and hence assigns it a new function by placing it within a new formal and stylistic context (Rushton & Bettinson, 2010). To complete a neoformalist analysis is to look at how each device is presented formally and stylistically, and how it exists in relation to other devices.

"The word "device," explains Kristin Thompson (1988), "indicates any single element or structure that plays a role in the artwork— a camera movement, a frame story, a repeated word, a costume, a theme, and so on" (p.15). Each device has its function within a film, for example, a costume can give us information about a character's lifestyle, social class, cultural background, and personality. Moreover, each device also has its motivation that explains its inclusion in a film. Thompson (1988) defines four basic types of motivation: compositional (inclusion is necessary for the narrative), realistic (inclusion appeals to the real world), transtextual (inclusion appeals to conventions of other artwork), and artistic (inclusion for an artistic reason).

The use of any device is motivated by historical and cultural contexts, especially within the film industry, which relies on technological tools that continuously evolve throughout time, thus, some devices that are available to contemporary filmmakers, were absent for filmmakers of yesteryear. Also, the cultural context influences the availability and the use of some devices, as well as their function and motivation. For example, in Sergei Eisenstein's black-and-white classic *Battleship Potemkin* (1925) the flag flying over the ship at the finale was hand-painted red on celluloid. The use of color in the black-and-white film made it stand out and have a stronger effect on the audience, while the color itself was an obvious reference to the Soviet communist party.

Overall, neoformalist film analysis consists of an examination of film devices, their functions, and motivations, from formal and stylistic perspectives within specific historical and cultural contexts. The following part provides a neoformalist film analysis of *The Lion King* (2019).

Analyzing *The Lion King* (2019)

Before diving into the analysis, it is necessary to establish the context of the production. *The Lion King* (2019) is a remake of the well-known animated film *The Lion King* (1994), and it is hard not to draw comparisons between the two. This remake exists within two larger contexts: firstly, the wave of nostalgia films that nods to the past decades (Pallister, 2019); and, secondly, the wave of Disney's live-action remakes with films such as *Alice in Wonderland* (2010), *Maleficent* (2014), *Cinderella* (2015), and *The Jungle Book* (2016) to name but a few. All these films and others that followed had real human actors playing their parts, hence being called live-action films. As established, *The Lion King* (2019) is a fully animated film, however, it mimics live-action films via virtual production tools.

The use of virtual production for *The Lion King* (2019) first and foremost enables the film to be contextualized as a part of the larger waves of nostalgia-based live-action remakes. Within it, the virtual production is transtextually and artistically motivated, meaning it references another work of art, *The Lion King* (1994), but does it in its unique artistic way that also references other live-actions remakes released by Disney. Moreover, when presenting the Kenyan landscape and the animals living there, the film makes a clear reference to nature documentaries.

Transtextuality affects the way the landscape and the animals are defamiliarized in the film. On the one hand, they look authentic and realistic, on the other hand, they remind us of the characters in the original film. For example, Mufasa, Simba, and Scar are not just lions, they are also characters, whose personality is reflected in their design. At the same time, all male lions miss their testicles, thus making them feel more real, instead of appearing real. Virtual production and the attention paid to the design of space and animals enable the development of that feeling of authenticity even though it references fictional characters and existing artwork.

However, the strive for authenticity affects the expressions of its characters. For example, in the original film, during the Circle of Life scene, when bowing to Mufasa, Zazu expresses his admiration for the king through his posture and look, while Rafiki comes and happily hugs Mufasa, indicating the strong bond between the two. Contrastingly, in the remake, Zazu's eyes are barely seen when it bows, and Mufasa-Rafiki's hug is completely absent since real animals do not hug this way. In the following scene in the original, when Zazu interrupts Scar, we can see Scar rolling his eyes because he is annoyed by the bird. This expression is not present in the remake, once again because the artistic motivation for authenticity limits the expressions of its characters.

This affects the formal aspect of the remake since it significantly reduces the information about the characters' relationship we receive as viewers. While the original quickly communicates characters' feelings for each other via human emotions (hugging, rolling eyes), the remake cannot afford such. Instead, the filmmakers either rely on viewers' prior knowledge of the original film and its characters or communicate the necessary information via film score, which is often indicative of what emotion to feel and when.

The virtual camera is another element of the virtual production of *The Lion King* (2019) that supports viewers' immersiveness by replicating nuanced capturing which comes when operating an actual camera by hand (Bédard, 2022). In the remake, the liberated and hand-manipulated virtual camera has two purposes. Firstly, it connects the remake with the original, occasionally duplicating the familiar shots, thus further establishing a transtextual connection and evoking a sense of nostalgia. Secondly, it enables us to distinguish the remake from the original by producing new scenes, some of which are done in a nature documentary style.

To illustrate this dual purpose, we can look at the first minutes of *The Lion King* (2019). Similar to the original, it opens up with an almost shot-by-shot reimagining of the Circle of Life scene. It employs similar iconography to connect itself with the original and invoke strong feelings of nostalgia from the start. However, the next scene focuses on a mouse being captured by Scar. The remake expands on a similar scene from the original by displaying the journey of the mouse through the grass fields. In a manner reminiscent of nature documentaries, we voyeuristically follow the mouse's movements for a while before it finds itself captured by Scar. Thus, in the first few minutes, the remake connects itself with the original, while also differentiating itself from it and establishing its style for the viewers.

The original film was very colorful, employing it not only for artistic but also compositional purposes. For example, when Simba bursts into the I Just Can't Wait to Be King song, he jumps and upon landing changes the color palette of the jungle. Apart from highlighting Simba's enthusiasm to be a king, the color change also creates borders for the musical showstopper, since when the song ends, the color goes back to normal. *The Lion King* (2019) cannot afford such stylistic liberties and consistently follows its chosen path of authentic, nature-documentary style. Since filmmakers do not use color as a device, they resort to lighting, which is done through virtual production tools.

The lighting in *The Lion King* (2019) does more than illuminate the space and characters. For example, when Mufasa comes to speak with Scar, he emerges from the light, showcasing him as an almost divine figure. In the same scene, Scar is continuously positioned in the shadows, marking him as a suspicious and dangerous character, who opposes Mufasa. Shadows were also creatively used in the original film, such as during the Stampede scene in *The Lion King* (1994) when Simba realizes that a stampede is approaching him and the camera does a dramatic zoom on his face, which is darkened by a shadow. Similarly, when Scar is about to drop Mufasa from the cliff, his shadow covers Mufasa's face highlighting his terrified eyes. In both cases, the shadow indicates the horror the characters feel when confronted with a dangerous realization. However, Jon Favreau and his team decided not to reference these moments in their film.

In some scenes in *The Lion King* (1994), the lighting is motivated by the genre conventions of musical films, for example, in the Hakuna Matata number, when an

artificial light source appears in the jungle and shines a spotlight on each singing character. The original film is an integrated musical, meaning that sing-and-dance numbers are compositionally motivated and serve as expressive ways for the characters (Langford, 2022). *The Lion King* (1994) has musical showstoppers: it uses its lighting conventions, creates imaginary spaces just for the numbers (e.g., the Be Prepared scene), and references some other musical films (Busby Berkeley's work in the I Just Can't Wait to Be King number). However, *The Lion King* (2019) limits itself creatively by its nature-documentary style and rarely follows any musical genre conventions, despite having a new musical number specifically composed for the film.

That is when Jon Favreau's creative choices clash with the cultural context of the Hollywood film industry. The remake does not exploit the possibilities the genre provides and does not reference creative decisions within the genre present in the original, because it significantly restrained itself with the strive for authenticity. Even though the singing animals are not authentic whatsoever, the team was hesitant in exploiting musical conventions. It is unfortunate, considering that virtual production and the liberated virtual camera could potentially allow fascinating and elaborative visuals.

Conclusion

Overall, virtual production allowed *The Lion King* (2019) to achieve the desired look of authentic realism in the style of nature documentaries. The virtual camera explores the realistic landscape delivering us that voyeuristic feeling of observing the animals in their natural environment. Additionally, the virtual camera occasionally references the camera movements from the original film, especially in crucial scenes, such as the Circle of Life, evoking a sense of nostalgia for the viewers. Thus, via virtual production, filmmakers were able to establish the transtextual link, while providing a unique perspective on a familiar story and differentiating the remake from the original. At the same time, the use of virtual production enabled Disney to advertise the film as a live-action picture and include it in the larger context of its live-action remakes.

However, the authentic design of animals significantly reduced their expressions, especially when compared with the original. In *The Lion King* (1994), when Mufasa dies, Simba is seen crying tears, which is a very human emotion that allows people to relate to the character. In the remake, Simba stares at his father emotionless, thus, as compensation, the film relies on the accompanying score to indicate his feelings. Finally, the strive for authenticity limited the creativity of the remake, preventing it from relying on musical conventions, using color as a film device, and playing with artificial lighting.

While virtual production can potentially support the creation of intricate and immersive spaces with realistically looking characters that viewers can relate to, the virtual production of *The Lion King* (2019) was mostly limited to establishing and securing the nature documentary style by presenting realistic landscapes, animals, and authentic camera movements. With such a focus on stylistic presentation, the formal structure of the remake suffered with characters losing their expressions and bonds with each other. Nevertheless, virtual production is a revolutionizing approach that can produce incredible results, and it would be interesting to see how it will be employed in the upcoming prequel *Mufasa: The Lion King*, which will be directed by Barry Jenkins and not Jon Favreau.

References

- An, D. (2022). Produção virtual orientada para a tecnologia: As vantagens e as novas aplicações dos motores de jogo na indústria cinematográfica. *Revista FAMECOS*, 29(1), e43370. <https://doi.org/10.15448/1980-3729.2022.1.43370>
- Atkinson, S. (2015). Interactive 'making-of' machines: The performance and materiality of the processes, spaces and labor of VFX production. *Spectator: The University of Southern California Journal of Film and Television*, 35(1), 36-46.

- Bédard, P. (2022). Virtual Production and the Transformation of Cameras Mechanical, Virtual, and Actual. *Animation*, 17(2), 226-243. <https://doi.org/10.1177/17468477221102498>
- Bennett, J. & Carter, C. (2014). Adopting virtual production for animated filmmaking. In *Proceedings of the 7th Annual International Conference on Computer Games, Multimedia and Allied Technology* (pp. 81-86). https://doi.org/10.5176/2251-1679_CGAT14.21
- Bordwell, D., Thompson, K. & Smith, J. (2017). *Film art: An introduction (Vol. 11)*. McGraw-Hill.
- Carpio, R. & Birt, J. (2022). The role of the Embodiment Director in virtual reality film production. *Creative Industries Journal*, 15(2), 189–198. <https://doi.org/10.1080/17510694.2021.2017634>
- Curtin, M. & Vanderhoef, J. (2015). A vanishing piece of the Pi: The globalization of visual effects labor. *Television & New Media*, 16(3), 219–239. <https://doi.org/10.1177/1527476414524285>
- Glotov, S. & Kotilainen, S. (2021). Teaching Intercultural Film Literacy. *Media Education Research Journal*, 10(1&2). <https://doi.org/10.5281/zenodo.5763781>
- Goldman, M. (2019). To Be King: Making The Lion King. *American Cinematographer*. <https://bit.ly/3wQUmpP>
- Ha, A. (2019). How the new ‘Lion King’ came to life. Behind the scenes of a ‘virtual’ movie production. *TechCrunch*. <https://tcrn.ch/3Rvt1mo>
- Holliday, C. (2020, February 3). “You Are Not Responsible for Their Choices, Elsa”: The Lion King (2019), Frozen II (2019) and the Theatre of Photorealist Achievement. *animationstudies 2.0*. <https://bit.ly/3kTCO9J>
- Kadner, N. (2019). *The Virtual Production Field Guide. Volume 1. Epic Games*. <https://bit.ly/3l3N5jY>
- Langford, B. (2022). *Film Genre*. Edinburgh University Press.
- Lee, C. (2022, July 26). I’m a VFX Artist, and I’m Tired of Getting ‘Pixel-F-ked’ by Marvel. *Vulture*. <https://bit.ly/3DzTXM4>
- Maddock, D. (2021). What Is Cinematography in the Age of Virtual Film Production? Posing a New Definition for the Practice of Cinematography. *Journal of Film and Video*, 73(4), 44–58. <https://doi.org/10.5406/jfilmvideo.73.4.0044>
- Mihailova, M. (2016). Collaboration without representation: labor issues in motion and performance capture. *Animation*, 11(1), 40–58. <https://doi.org/10.1177/1746847715623691>
- Pallister, K. (Ed.) (2019). *Netflix nostalgia. Streaming the past on demand*. Lexington Books.
- Pires, F., Silva, R. & Raposo, R. (2022). A Survey on Virtual Production and the Future of Compositing Technologies. *AVANCA | CINEMA*, 692-699 .
- Rushton, R. & Bettinson, G. (2010). *What is film theory?* McGraw-Hill Education.
- Sawicki, M. & Moody, J. (2020). *Filming the fantastic with virtual technology: filmmaking on the digital backlot*. Routledge.
- Seymour, M. (2019). How Virtual Production Worked On-set of the Lion King. *FXGuide*. <https://bit.ly/3l6YO1b>
- Thompson, K. (1988). *Breaking the glass armor: Neoformalist film analysis*. Princeton University Press.