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In the Presence of Photons: Portraying Light through Cinematography

Nadia Mahmud
nadia.mahmud@mmu.edu.my
Multimedia University

Abstract

Film is a medium that is impossible to exist without light. Essential to its production process is cinematography, a discipline in filmmaking that is directly responsible with visually presenting the information of a shot through a camera using the manipulation of time, lighting and framing. Frame distance describes the distance between a subject and the camera but more vital is the intent of application of frame distance as it is capable of implying meaning or eliciting a feeling in the viewer. The grammar of frame distance can be utilized to present structures, themes and styles of a film. Experimental, abstract films, although non-conformist to the rules of conventional cinema, may still be confined to the concepts and techniques in cinematography. Frame distances can help to distinguish patterns as well as emphasize details in an experimental film. The abstract, short film “Trapped Light”, explores the possibility of depicting the movement of light through transmissive and reflective materials.

Keywords Light; Abstract film; Cinematography; Frame distance

Introduction

Light is a phenomenon that is no stranger to man. Across the globe, various civilizations have portrayed some form of light, either as daylight or fire, in their mythologies and folklores. Light in these stories, existed not only as the energy but also as a representation of concepts. For example, the story of the Titan Prometheus tells of his exploits to steal fire from the Gods on Mount Olympus and his gift brought to mankind civilization and progress (Campbell, 2008). Outside these mythic stories, the study of light as a subject itself is a more familiar territory for physicists. Optics, the discipline of applied physics that deal with light, primarily defines it as an electromagnetic energy existing in little packets called photons (Hunter et al., 2012). The presence of these photons enables most humans to see as our very eyes are designed to perceive light. Human vision is basically

the ability to sense and process reflections of photons. These photons are integral even to today as it is applied in various fields from the sciences to the arts.

A medium that is very much intertwined with light is film. The very mechanics of how a film is produced and viewed deals with the manipulation of light. Although it is considered a fairly new medium compared to the other forms of art, the strides made in the development of the film makes it a very influential media (Elsaesser & Hagener, 2015). Integral to the production of film, is cinematography. The process that allows for the capture of images, still or moving, through the use of a camera. Cinematography is a discipline that branched out of the much older photography and like its predecessor, it requires an extensive knowledge of light to capture the moving image (Storaro, 2016). In the past, knowledge in film processing was vital but since the move to digital capture tools, a cinematographer is valued more for his or her expertise in conveying a film's narrative visually through a shot's composition and duration. The understanding of lighting in the photographic image now is more emphasized in the production of the film, especially those in the role of cinematographer (Costa, 2017). However, despite its importance to the field, more often than not, in the conventional film, light is employed as a means to support the narrative of the shot or scene visually. For the short abstract film, *Trapped Light*, the filmmakers attempted to address the challenge of representing light as a subject matter through cinematographic techniques.

Cinematography and its techniques can be boiled down into three basic components: the framing of the shot, the duration of the image, and the photographic image (Bordwell & Thompson, 2016). Storaro (2016) strongly suggests that a cinematographer should not be dependent on the camera's ever-changing technology but instead concentrate on their ability to compose and photograph a scene using light and colours. Filmmakers have always looked back to visual art history to guide and inspire their process. Micheal Balhaus was tasked by Martin Scorsese to study the paintings of Rembrandt to guide the lighting of the scenes in "Gangs of New York" (Bosley, 2003). Denis Villeneuve and his team, in the making of "Arrival", were inspired by a more contemporary art history, the light installations of James Turrell. Turrell's influence though is familiar to film as he has served as a lighting specialist for Stanley Kubrick's iconic "2001: Space Odyssey" (John, 2019). Storaro is also a firm proponent of such methods as he reflected in his work process for "Café Society" where he referenced the work of various artists such as Georgia O'Keefe and photographer Edward Steichen (Storaro, 2016). Storaro explains that the masterful manipulation of lighting within a frame is integral as it visually directs the style and feel of film and its shots through direction, intensity and colour. Elsaesser & Hagener (2015) suggests that a frame of film acts as a viewing window to an event, be it factual or fictional. This echoes Kracaeur (1997) who posited that films have the ability to reveal worlds to the audience.

In the language of shot framing, frame distance or shot scale describes the distance of the subject from the camera (Mascelli, 2005). A definition of a frame distance depends much on the subject photographed but they have been formalized using the Prose Storyboard Language (PSL). Long shots typically feature a full-length view of the subject, medium shots- a partial view and the close-up can be described as a “large scale portrayal of a portion” (Mascelli, 2005). More important than their basic description, however, is their intent in application. Filmmakers explicitly use frame distance to imply a meaning or elicit a feeling from the viewer. In conventional cinema, the long shot (LS) is primarily used to establish a location or a subject and in contrast, the close up (CU) is used to emphasize features or details (Bordwell & Thompson, 2016). In mastering these techniques, cinematographers become responsible in composing frames that visually communicate the concepts or themes of the film (Storaro, 2016). This supports Carroll’s proposition (as cited by Sweeney, 2011) that the audience’s attention can be directed through cinematography in order to convey a film’s intention.

This ability to implicate meaning and mood with cinematography techniques is also utilized in the avant-garde genre of filmmaking. The reasons behind the production of avant-garde or experimental films are known to be wide and varied, from a vehicle of self-expression to an exploration of filmmaking techniques (Bordwell & Thompson, 2016). Its defining characteristic is in being unconventional and non-conformist, a response to the formal narrative cinema. A number of experimental films, however, still do employ the use of cameras to capture their moving image and this would still bind the films to the grammar of framing and frame distance. A long shot can still be used to establish a scene but used to pick out geometric abstractions like in Serra’s “Railroad Turnbridge” and close-ups may be used to isolate backgrounds and emphasize texture and patterns as in Maas’ “Geography of the Body” (Bordwell & Thompson, 2016).

The application of cinematographic techniques can also be observed in the genre of film that contrasts the avant-garde; the documentary. Rooted in its *raison d’être* in presenting facts, the documentary attempts to portray the world and its many phenomenon as it is (Bordwell & Thompson, 2016). In the 1800s, scientists used films and cameras with magnified lenses to capture the movement of cellular structures. These films framed substances in long shots, in the micro-subject sense, to study their movements as well as the close up to observe their detailed characteristics (Canales, 2015). The close scrutiny of these miniscule subjects, both organic like the embryonic growth of sea urchins to the inanimate such as the Brownian motion of particles in fluid dynamics were considered fascinating to even the general public as the motion of these micro subjects suggested an illusion of life. The appeal of these micro films supports Kracauer’s suggestion that the cinematic medium is capable of revealing phenomenon usually ignored by the general viewing public. Returning to the field of optics, a process called femto-photography was developed to record the propagation of photons through a number of materials set with carrying degrees of transparency and translucency set up on a table-top

environment (Velten et al, 2013), albeit with cameras that had less mobility and user-friendliness of the conventional, commercial type. Like in the work of the micro-cinematographers, the images captured echoed the conventions of frame distance in cinematography, with the photons movement within the table-top environment echoing that of an establishing long shot and the close-up detailing of the motion through selected surface. Frankel & Whitesides (2008) understood the power of frame distance when they endeavoured to photograph textural qualities on the surfaces of materials, exhibiting details usually unseen by the general viewer.

Corra (as cited by Edmonds, 2010) explained that cinematography and its tools offered the best results in the explorative methods in abstract filmmaking. For the film *Trapped Light*, a similar approach to the micro-cinematographers and the femto-photographers was used, light was filmed in a small controlled environment through an extreme close up. The frame distance was chosen with the purpose of isolating background or environment visual qualities that could interfere with the representation of light's movement. However, unlike the documentarists, the accurate representation of the subject-matter's motion was not the focus but instead to the textural qualities that light can be subjected to. For this, the work of Lazlo Moholy-Nagy was used as a guide to the visual style of the film.

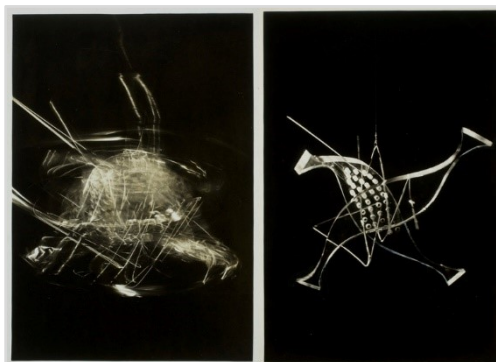


Figure 1 Moholy, N. L. (1943), *Light Modulator in Motion and Repose* [Photography], Rochester, New York: George Eastman Museum

Moholy-Nagy, a Bauhaus artist strongly influenced by the Constructivism school was famed for his exploration of technology, materials and light (Eliel, 2017). The integration of these three subjects was embodied in one of his most iconic work, the kinetic sculpture “Light Prop for an Electric Stage” (. His quest to discover the potential of light, materials and movement such as the one seen in Figure 1, served as inspiration for the play of light in transmissive substances in the making of *Trapped Light*.

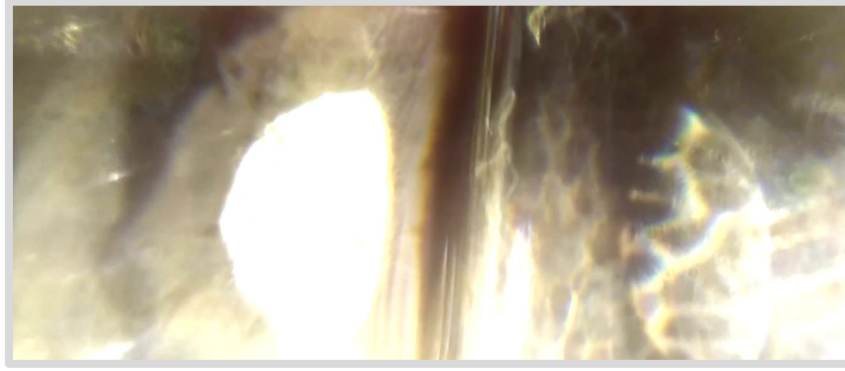


Figure 2 A Still Frame from Trapped Light Depicting Light Moving Behind Glass and Water

With the graphical and textural elements of Moholy-Nagy's *Light Modulator* work as a reference; for the film *Trapped Light*, most of the materials were selected to emphasize light's characteristics through their ability to either reflect or scatter light. In Figure 2, the image captured was created by moving a light source behind a highly-transmissive glass vessel filled with water. The extreme close-up used in the shot, served to diminish the distinguishable form of the vessel, leaving a more textural image of light through its refractions.

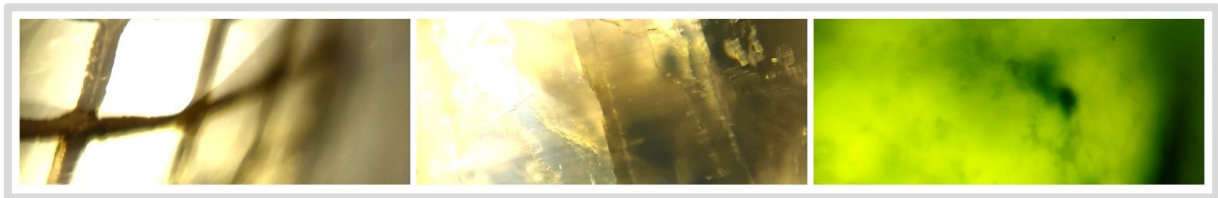


Figure 3 Three Still Frames from Trapped Light Depicting of Variations in Abstraction Level

Non-narrative abstract films often rely on the notion of theme and variations to organize its form (Bordwell & Thompson, 2016). For this film, each shot shared the element of an extreme close up and the motion of light through reflective and transmissive substances. Variation for the forms were introduced through the shifting levels of abstraction created by the light and the materials it reacted to (Figure 3) from the light reflecting off the geometric form of a metal net to the sharp contours created by a transmissive moonstone and the diffused amorphous glow scattered by jade.



Figure 4 A Frame from a Rejected Footage Filmed for Trapped Light

One of the unexpected issues encountered by the filmmakers in the making of *Trapped Light* was the problem of banding in the footage during filming as seen in Figure 4. Upon investigation, it was discovered that it was caused by the discrepancy of frequency caused by two factors, the LED light source (LED), and the frame rate of the camera. To eliminate the issue, the filmmakers switch to a different light source that agreed with the frame rate of the camera.

The “Microspace” series of short films first started in 2015 with “Microspace” where the filmmakers focused on the creation of images using mundane organic materials, captured and framed in a way that echoed outer space. “-No|Us” continued the theme by exploring the structure of hard-surface and organic materials to represent a movement from man to nature. Both films preserved the recurring theme of capturing images of materials using a magnified lens but the frame distance was not restrictive. For the third instalment, *Trapped Light*, the objective of the film was to display the visual, textural qualities that light may portray. In order to highlight the movement of these photons, the filmmakers chose to limit the frame distance to an extreme close up so that the light could be isolated from an environment that might overwhelm the textures created by it. Future instalments in the series, could perhaps explore representing other sources of light such as natural lighting or laser which would allow the filmmakers to experiment possibilities with colour temperature in light.

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