ACADEMY OF PERFORMING ARTS IN PRAGUE

FILM FACULTY

MASTER'S THESIS

Prague, 2017   Guilherme Burgos Barbosa da Silva

ACADEMY OF PERFORMING ARTS IN PRAGUE

FILM FACULTY

2 Years FAMU Master's Program

Cinematography

MASTER'S THESIS

BLACK AND WHITE CINEMATOGRAPHY IN THE DIGITAL ERA.

Aspects of monochrome cinema in the contemporaneity.

Guilherme Burgos Barbosa da Silva

Thesis advisor: Prof. Mga. Klaus Fuxjager

Examiner: Prof. Mgr. Josef Pecák

Date of thesis defense: June 7. 2017

Academic title granted: Master's degree

Prague, 2017

D e c l a r a t i o n

I declare that I have prepared my Bachelor's Thesis/Master's Thesis, Dissertation independently on the following topic:

BLACK AND WHITE CINEMATOGRAHY IN THE DIGITAL ERA.

under the expert guidance of my thesis advisor and with the use of the cited literature and sources.

Prague, May 2017

_____

Guilherme Burgos Barbosa da Silva

Warning

User's Log

By signing below, the user attests that he/she has used this thesis solely for study purposes, and he/she declares that he/she will always cite the thesis appropriately among the sources used.

Name	Institution	Date	Signature

ABSTRACT

The primary objective of this thesis is to approach the contemporaneous production of black and white filmmaking through technological developments in digital cinema and its achievements in monochrome cinematography. From the birth of cinema to modern indie filmmaking productions, lies a debate on whether to use color or black and white as an aesthetic; as that has always occurred, I intend to shed light on how monochrome images are being created and to what extent this is being realistically practiced nowadays.

ABSTRAKT

Hlavním účelem této tése je sanalyzovat současnost výroby černého a bílého filmování technologickým vývojem v digitálním kině a její úspěchy v monochromatické kinematrografii. Od narození kina do moderních inďických filmových produkcí leží debata jestli se má používat černá a bílá barva jako estetika; tak jak se to vždycky stávalo, snažím se objasnit zbůsob jak jsou monochromatické obrazy tvořeny a do jaké miry je to realisticky praktikováno v dnešní době.

Content

Introduction

The technological developments that make conceivable the usage of color in cinema have traced the history of filmmaking aesthetics, in regards to its chromaticity, even when the only two colors displayed on screen are black and white. In the sense that while color film were being developed all the transitions in between color, black and white aesthetics, the discussion this theme, film, and all that we investigated in the historical foundation chapter, happened. Whether the film is in color or in black and white, there is a discussion that has developed through the years and it has been there since the beginning of cinema. Technology has been, for a long while, a frontier cinematographers had to deal with always trying to overcome it; and with every achievement came a celebration, just as the KODAK 5248 - a color negative film – was celebrated when it won an award at the 25th edition of the Oscars, in the class I – Scientific or technical award. The winning of the Oscar as a huge public acclamation to a technological development archived. This thesis, nevertheless, is not about the history of color film but it is quite impossible to examine black and white cinema without mentioning the overcome of color aesthetics. Technology is looking more like a bridge then a frontier nowadays, spreading possibilities to the moving image industry and thus affecting the way black and white images are being produced. The objective of this thesis is to deliberate on the production of contemporary black and white filmmaking, its concept, crafts and technologies.

I intend to divide this project into three main blocks of interest: Historical foundation, Crafts & Technology and, Black and White Cinematography within the Creative Process and Production in the Digital Era. To transition on these three areas, might help to shed a light on the current status of producing black and white cinema.

The chapter on historical foundation is intended to explain the change of black and white to color as the core aesthetic used in the film industry and, furthermore, to elucidate the key aspects that kept black and white productions alive. In addition, it aims to elucidate how black and white was and is used, to

meet the various demands of films and filmmakers when referring to their storytelling needs, aiming to also produce films in black and white only, upon the necessities of productions and to interpret the usage of black and white through history.

In Crafts and Technology, the digital process of color reproduction is briefly explained as to establish basis to a camera test analysis, that follows in the same chapter. Currently, is possible to achieve black and white image from a color sensor or from a monochrome sensor and the objective of the test is to fathom the possibilities of workflow and develop conclusions about the final images, comparing the results of the different processes regarding grayscale reproduction of the colors.

The chapter on Cinematography within the Creative Process and Production, the workflow of the films *Gook* (2017)[1], *Butterfly Kisses* (2017)[2] and *Ida* (2013)[3] is aimed to expose the decisiveness of filmmakers who shot black and white what led them to choose the technology they did. In addition, a research regarding award nominations and prize winnings by black and white films in festivals such as Cannes, Berlin, Sundance and The Oscars will be examined.

---

[1] Justin Chon, diretor and screenwriter (to be released on August, 2017)
[2] Rafael Kapelinski, director. Nick Cooke, Cinematographer. (Feb/2017)
[3] Pawel Pawlikowski, director. Ryszard Lenczewski, Cinematographer (2013).

Historical Foundation

The usage of colors in the Arts - painting, architecture, photography and consequently in cinematography - is an area of study that is followed (or follows) developments in different areas of Science as psychology, physiology, physics and chemistry. Artists have always tried to resemble the world as it is and to affect subjectively the interlocutor. In the book *The Art of Color*[4] it is defined that color might be approached in three directions: Impression (or how colors affect visually), expression (its emotional impact) and construction (the symbolical use of colors). To talk about the use of black and white aesthetics in the digital era and how the shades of gray are currently being used in cinema, I found important to briefly show the footprints that run toward color reproduction throughout history. To analyze what is happening with black and white filmmaking is important to understand what made monochrome never fade away. The historical knowledge of the usage of black and white in the early years of cinema, the development of color reproduction at same period, the development of the usage of color language in the cinema, the main technologies involved and the transition to color as a main form of production, will lead us to a better understanding about the gap black and white aesthetics had in the cinematography art form mainly since the 60's and, furthermore, its usage within filmmakers from 2012 onwards.

> Having spoken of three different points of view for purposes of studying color - constructional, expressional and impressional - I would not omit to say this: Symbolism without visual accuracy and without emotional force would be mere anemic formalism; visually impressive effect without symbolic verity and emotional power would be banal imitative naturalism; emotional effect without constructive symbolic content or visual strength would be limited to the plane of sentimental expression. Of course every artist will work according to his temperament, and must emphasize one or another of these aspects." (ITTEN 1973:17)

Until the 60's and a bit beyond, the standards for producing cinema were developed to a considered high level: Hollywood was working at a fast pace to compete with television, Europe on the other side was making reference movies for the so called art-house cinema, all the main geniuses from the history of cinema were active and shooting, and on the visual side the aesthetics used in the majority

---

[4] Johannes Itten (1973)

of these productions were black and white. Although there were productions of full length films in color - as we are going to discuss a little further on this chapter - the transition from black and white to color happened at a not so fast pace, due to the development of technology that was yet to achieve a cheaper and more effective manner to reproduce color in the moving image realm. The way color images were used and could be used artistically in film – or what directors and cinematographers meant by using colors in their films and what they would have to do in the future with color, elucidates the transition. Film language itself had a lot to develop together with the audience, who would see the films to face that which producing houses would soon have as reality: Cinema would become a color art at least in the main stream.

It does not mean that color appeared late in the history of cinema and also does not mean that black and white was the main form of production because it was the only possible way to make cinema. Films in color appeared further back in history, from the last decade of the 19th century. Through processes named tinting and toning where the film emulsion was dyed mechanically with color or the silver halides in the film emulsion were converted to other metal, giving a different color to the whole image. Colored moods were added to the black and white films and some kind of chromatic nuances and full colors would be added on the highlights or shadows with tinting and toning. Another technique used in the "born" of color cinema was hand painting as in *Le Royaume des Fees/The Kingdom of the Fairies*[5], where the frames were painted one by one in a work of several dozen employees.

> Interestingly, the purpose of the earliest use of colour in film, through processes such as hand colouring, tinting, and toning, was less to enhance the film's realism than to serve as an aesthetic or symbolic device for strengthening the narrative (EVERETT 2007:18)

---

[5] George Melies (1903)

Figure 1
Tinted film

Figure 2
Toned film cooper

Figure 3
Hand painted –
The kingdom of the Fairies

The scientific pursuit to achieve reliable and efficient ways to produce color images for cinema was already at full stream in the first decade of the 20th century. In the year of 1908, in Europe, the first projection of the Kinemacolor[9] process took place, it was a two color additive system that used a mechanical apparatus (a modified camera) where a rotating disk with red and green filters placed in front of the camera would "select" the wavelength to be registered in the material – for the projection, to use a similar spinning disc containing the color filters would make possible the reproduction of the colors onto the screen. It was believed that only without the blue wavelength the image achieved would be good, or verisimilar, or real and natural enough. The process didn't go far "though briefly successful, Kinemacolor – like many other early color processes – was dogged by color registration problems and failed to last beyond the 1910's" (MISEK 2010:121).

This thesis is not proposing to discuss in deep parameters all the ways scientists together with filmmakers and producing houses were trying to achieve a possible manner to produce color films in great scale. The examples cited bellow are important to show how early the discussion about using colors in cinema began. The film industry – and here I refer film as film material, from its production to its development – didn't stop working on the subject of making color natural, or real, from 1915 to 1932, Technicolor Inc. worked in three types of cameras and different process to arrive at its best Technicolor IV a three stripe color process that promoted to have achieved the reproduction of colors as never before.

---

[6] http://www.brianpritchard.com/rose%20tint.jpg
[7] http://www.brianpritchard.com/Copper_Tone_1916.jpg
[8] https://www.pinterest.se/pin/187110559490293132/
[9] The Kinemacolor Process – Moving Pictures With the Natural Color Reproduced Photographically
https://www.scientificamerican.com/article/the-kinemacolor-process/

Technicolor Number IV (1932) was a three-color process, in which three negatives were exposed through three color filters (red, green, blue), allow- ing the full spectrum of color frequencies to be reproduced. In terms of inscribing color onto a negative, Technicolor was thus an additive process. In terms of projecting color onto a screen, only Technicolor Number I (1915) was additive. In Technicolor Number I, color was added to black- and-white prints in cinemas, by means of special projectors that included red-orange and blue-green filters. The complexity of the projectors required an operator who, in the oft-repeated words of Herbert Kalmus, "was a cross between a college professor and an acrobat" (1967: 52). So Kalmus's researchers subsequently developed processes in which films' colors existed on the print itself, allowing Technicolor films to be screened using conventional white light projectors. Technicolor Number III and Number IV, for example, utilized a subtractive dye-transfer process: prints of each of the two or three negatives of an image had color dyes applied to them and became printing plates. The dye on each of these plates was then transferred onto a final print, which ended up with two or three layers of color dye added to it. (MISEK 26:2010)

Technicolor was the best possibility that the industry found in the early 1930's and it was the way color was made more appealing to cinema. The achievement of reproducing the so called natural colors and the possibility to spread these films to cinemas with normal bw projectors put the spot on the technology but also on the question "why should we use colors?". In the article *Technology and Aesthetics, Technicolor Cinematography and Design in the late 1930s,* Scott Higgins describes how slow the new possibility was going to be accepted by the industry as a reliable technology and desired aesthetics "Having accomplished this, Technicolor entered a new phase of development. Between 1936 and 1939 the company sought to establish a place for its new process in regular, studio feature production." (HIGGINS 1999:55). From 1936 through 1938 there were twenty-four full color films produced by Technicolor, in the year of 1938 thirteen films were produced in the same way. The author develops that in spite of being technically and monetarily accepted, as for color film it would have yet to put itself in conformity with "established cinematographic aesthetics, norms of production and conventions relating style to the tasks of narration" (HIGGINS 1999:56).

This period is perhaps best viewed as one of cautious experimentation. On one hand, Technicolor lobbied for the industry to cast aside associations of colour with pure novelty. If the new process was to last, it would have to prove its potential for enhancing drama and story, thus overcoming a short-lived attraction as a gimmick. (HIGGINS 1999:56)

Taking a closer look at the American Cinematographer Magazine, which is published by the American Society of Cinematographers[10], on the year of 1936 edition, is clear how Technicolor and Color filmmaking are on the agenda in two different ways – technical and conceptual. Technically speaking is possible to see the development of manners to work around the new three stripes Technicolor process. In the edition of August of 1936 there is an article entitled "Make-up for the new Technicolor process" where the author discusses about the difference to make-up to black and white, old Technicolor processes and the new one "Now that Technicolor's three-color process is enabling us to bring our pictures to the screen in color, a new conception of make-up becomes necessary" This Article highlighted how the transition from a system that was able to reproduce a wider range of colors would affect the industry as a whole. The article goes further to explain how to mixture new kinds of make-up foundation and so on to achieve a real natural look that would be needed to the new way of filmmaking. In the subsequent edition of the same magazine there is an article entitled "Shooting Technicolor on the Sea Bottom" by Floyd Crosby, A.S.C. "Natural Color cinematography is always interesting; so is underwater filming. And when you combine the two you get problems – and results – that are distinct departure from the beaten path of a routine camerawork." (CROSBY 1936). It's is clear by these two articles that the craftsmanship was getting its tools ready to develop color cinema as never done before, however, there are two other articles published in the same two editions of the magazine that make history even more interesting. A part of the development of color technic left many people from the industry skeptical towards the new aesthetics.

In the August edition of 1936 of the American Cinematographer Magazine, while there was the discussion about how to make-up to color films there was also an article with entitled "*Why all this Hubbub Regarding Color*?" (American Cinematographer August 1936). As no specific author signs the article, I considered it as an Editorial of the magazine itself. The Magazine discussed about the low points on the color technology on the time regarding reproduction and the bad effect caused by color on the visual appreciation of the audience "Inclusion of

---

[10] The ASC – The American Society of Cinematographers (authors for artlicles unknown)
https://www.theasc.com/ac_magazine/April2017/current.php

colors stifles the greatest of audience reactions; it does not stimulate imagination."
(American Cinematographer Magazine; September 1963). Furthermore, the
magazine declares its bet about the future of the main aesthetics that will be in
vogue: color.

> There is unearthed no cause for alarm that current
> cinematographers of the light-and-shadow school will be reduced
> either 10 the status of mendicants or recorders of established color
> scales. Black-and-white photography is, and every indication shows
> it will continue to be, the industry's one staple com-modity.
> (American Cinematographer Magazine; September 1963)

In the following edition of the same magazine there is an article entitled
"Is All This Color Ballyhoo Justifying Itself?" (American Cinematographer;
September 1936) as the article of the previous edition, it was not signed. For this
one, the author clearly says that there are questions about color cinema that were
not yet possible to be answered "Is the picture as good in color as it would have
been in black and white?" or about profit and box-office "Did color alone bring in
sufficient dollars to the added cost of putting it in the picture?" The author yet
sums up the data of the amount of films produced that year and how many of
them were in color – a very small amount. In my point of view, it was a really hard
moment to be living within the industry. The new technology which was lead by
Technicolor Inc. had in its way of production a full team of technicians that were
going on set with the camera to control the accuracy of the filming and the
precision, in order to achieve the right colors. In the end of the article it's concluded
that "nowhere is there admissible evidence indicating that cinematography has
becoming a lost art" whereas or not cinematography in the case is indicating the
work of the cinematographer, it defines the approach to be given by the sentence
"Cinematographers had at work to pay off the family mortgages not necessarily
take the color propaganda too seriously." (American Cinematographer; September
1963).

These different approaches found in the two editions of the magazine
addressing practical experiences of working with colors and the press' point of view
of a new way of making pictures that it has been established. Scott Higgins in its
article *Technology and Aesthetics* draws in a very precise way what was the
Technicolor real possibility toward cinema and in between all the fuss of its

technology.

> These are by far the most outspoken arguments against colour in the professional press and cannot claim to represent the ASC's dominant attitude. Yet this criticism is valuable for so clearly enunciating the objections which Technicolor sought to over-come. During the late 1930s the company labored to demonstrate that colour need not mean the aban-donment of long-standing ideals of well-crafted cinematography. From a technological standpoint, Technicolor faced the problem of proving that its system could complement rather than dominate standard production practices. (HIGGINS 1999:57)

I will not try to discuss here the ways color aesthetics had to go in order to become the main norm of film industry. These articles showed and briefly analyzed a way to display an inflection point in the history of film that emphasizes both technical and theoretical developments of the art, once the discussion itself about a new way, was already considered as a new one. By living the reality of today, we can perceive that the majority of the films released in the cinema are in colors, therefore understanding the transition from black and white exemplifies the use of colors in the storytelling as an active tool, not just as allegory. In the book *Chromatic Cinema* (W&B; 2010) the author demonstrates that color filmmaking had several problems to be established as cinema's aesthetic default. Among these reasons, two of them are directly related to the theme of this thesis: Verisimilitude or how colored films would be perceived as real life colors; Ideology, or how the audience would give meaning to the color on the screen. To understand some obstacles faced by color films before becoming the main form of production is important because it relates to the audience point of view and to the creative part of the process at the same time. Making color on cinema accepted by the industry and audience was not just a matter of having the right technology of color reproduction - that would make the colors seen as real and not as supernatural - but rather on how color was experienced as an aesthetic.

> More important than the question of whether or not color was verisimilar was the question of whether or not it was perceived as verisimilar. As seen, black-and-white had for a long time been associated with reality, and color with spectacle. (MISEK 2010:46)

Although there were full length color films been produced, the way color was being aesthetically mixed with black and white is a point of analysis that becomes more important for the development of my work as it might give a

perception about the use of the tool for specific storytelling needs – in the future or further in history we are going to see that black and white started to have a similar role, but on the other way round. One way colors started being used in major film productions, as a tool, was on the film *The Wizard of Oz*[11]; Apart from the critical process of working in Technicolor with its big size camera and the need to archive the correct exposure in different film strips, which demanded a large amount of light that increased the temperature on set, leading to a complex and particular method of developing, the film represents a mark in film history by its achievement in color reproduction as well as representing an important way color was entering the black and white realm, concerning film language. The film was not colored through the full length of it. The color was used to demonstrate a fantastic world while black and white scenes showed little Dorothy's real world. There was in the productions of color film mixed with black and white a direct relation that would work the different aesthetics to represent opposition. This could happen in many different ways: opposition in between waking and dreaming, sanity and insanity, life and art, heaven and earth and on that it might directly influence the modern productions in black and white, the opposition between past and present, which for films in the digital era, presents black and white aesthetics as a way to enforce the historical characteristics of the film, as on *IDA* (2013)[12]; a case that we will deal with, next chapter.

> *The Wizard of Oz* marked a key development in the evolving opposition between black-and-white and color. It was not the first film in classical Hollywood to make black-and-white and color signify opposition, but it was the most prominent. By the late 1920s, chromatic mixture had given way to separation; by the late 1930s, separation had become opposition. Virtually all hybrid films made between the late 1930s and the late 1950s – within Hollywood and beyond – used transitions between black-and-white and color in order to signal moves between opposed physical spaces or perpetual states. (MISEK 2010:32)

Going forward thirty years up until the year of 1967, we arrive at a moment that might be crucial to the timeline history of black and white cinematography, when the usage of color film won its crown, to never let it go. It was the first year that the Academy of Motion Pictures Arts and Sciences[13] awarded an Oscar just for

---

[11] Fleming, Cukor, Leroy (1939)
[12] Pawel Pawlikowski, director. Ryszard Lenczewski, Cinematographer (2013)
[13] http://www.oscars.org/ founded by Douglas Fairbanks (1927)

"Best Cinematography", prior to that moment the Academy had been giving two awards, one for "Black and White Cinematography" and another for "Color Cinematography" – the Oscar that was rewarded as best cinematography in color motion pictures was counted as an special achievement while the best cinematography for black and white film was the "real award". From when *Gone with the Wind*[14] won the award for Best Cinematography in Color until 1966 when *Cleopatra*[15] won the same award, thirty-two years went by and just eleven films won the award for best picture in black and white. Furthermore, it is important to say that from 1960 until 2017 only three black and white films won the best picture award from the Academy: *The Apartment*[16], *Schindler's List*[17] and *The Artist*[18]. These facts provoke the following questions: What happened to black and white filmmaking? Why did color take over so badly? How did black and white aesthetics kept on being used by filmmakers?

The moment that Misek calls "The transition to post modern age" (2010:85) justifying culturally how people were more likely to watch color films then black and white films, is a moment that represents a big transformation in society and it might be represented by the advent of the color television which by mid-70's were present in more then 50% of the houses with a TV set. Color television represented a competition to cinema as television has always done since its advent, making cinema workaround a way to drag people to theaters.

> Under the threat of television, the studios turned to technology co compete. Color, which had been used in barely one out of 10 films, eventually dominated production as television slowly converted to color. The government provided a much-needed boost in 1950 by forcing the Techni-color Corporation to surrender its patent for color cinematography, sparking the growth of competitive systems and wider use of color. On another anti-television front, studios invested in widescreen systems such as Cinemascope and Vista Vision, and theaters installed stereophonic sound. Giving up the losing struggle against television, studios began selling films for broadcast and supplying original programming which eventually revitalized studios that were near collapse. (Douglas K. Daniel – 1998:405)

---

[14] Gone with the Wind – Directed by Victor Fleming, George Cukor and Sam Wood (1939)
[15] Cleopatra – Directed by Joseph L. Mankiewicz (1963)
[16] Directed by Billy Wilder (1960)
[17] Directed by Steven Spielberg (1993)
[18] Directed by Michel Hazanavicius (2011)

Apart from competition, cinema and television found a manner to live together. Furthermore, the possibility of watching news and everything else in color enhanced the way people perceived the reproduction of reality, which was not in black and white anymore, it was in color. If until the 60's black and white was the core to represent reality and color was a way to represent different states of mind of the characters or change in space – as it's been mentioned above - the further years would become the role black and white material mixed in the color as to represent a change in the time and space of a film. Black and white aesthetics started to represent detachment, present historical documents or historic resemblance and flashbacks. To mention a film made until 2011, as example, there is *Memento*[19].

> Black-and-white has continued to appear throughout color cinema
> since the late 1960s in the form of old footage, both genuine and
> simulated. It has also found a niche for itself within dominant cinema
> in the codified form of the flashback (MISEK 2010:97)

If the Oscars were indicating where the industry was leading its investments and attention to, by its awards, the main critics were considering black and white filmmaking as museum pieces; however, filmmakers themselves didn't. Although taking the Oscar's ceremonies as base of study to draw a timeline in the sense of finding the major ways of production in each era of cinema, it's also important to note and understand that not only from festivals do filmmaking makes its living. From the 70's many consecrated directors as Tarkovisky, Tim Burton, Martin Scorsese, Steven Spielberg, Coppola, Win Wenders, Bela Tar, among others, have done black and white films regardless of the main stream aesthetic. Even knowing that the main public wasn't mainly interested in monochrome, the directors and cinematographers used black and white as a deliberated choice, not because it was or it was not a representation of reality or a disconnected time and space, not because the industry wanted them to do so, but because it was the way they saw their stories or, additionally, how they could financially found their films - until mid 90's black and white stocks and processing were cheaper then color. After the subtractive color film, the persistence of directors to shoot in black and white clearly showed the importance of this kind of aesthetics for storytelling. Even if it would not be the most profitable way, once there was not much interest from

---

[19] Directed by Christopher Nolan (2000)

production houses and audience, these films kept on being made and making their way into the history of cinema. Black and white production lived a dichotomy in between money – for investment, producing and for distributing such films - and creativity. In an interview published in 1999[20], Christopher Nolan stated that his first feature film *Following*[21] was only made possible because it was decided that it was going to be produced in with black and white.

> When you have no money, it can be shrewd to find subject matter that lends itself to that sort of black and white, noirish type approach, because you can do harder lighting. You can do quicker lighting set ups. You're not worrying about color balance from the tungsten lamps and things light that. I think at the end of the day, hard shadows and that sort of lighting looks a lot better in black and white than it does in color. If you have no money, it's quite often that you're better off shooting like a documentary, and shooting what's really there. You try to use the available light. The sort of light from windows that you can get in London has a gloomy, cold feel to it. In black and white, you can make that look stylish in the way that you want. If you start trying to create an artificial world, you start needing a lot more resources. (NOLAN 1999)

The film was shot in the year 1998 and color was not missed in the development of the story. It is interesting how Nolan was capable to make plot twists without the need of using any visual artifact, the drama of the film in the spectator point of view, is based on a history that is present in different timelines of present and future that meet in the end, a story that's told in a non linear and yet less conventional way. Somehow, *Following (1998)* proves that the screenplay can sustain itself in a black and white story even in an age that we, spectators, are already used to see different film tools showing us where to drag our attention to.

Technically, lighting for black and white film stock is less problematic and cheaper. As Nolan stated is possible to drive to a more stylized way, aesthetically, in order to take more out of what the location has to give in its raw stage. It's understandable that it would be less distractive to have a wall that gives certain shade of grey that is darker or lighter then the optima, then to have a red wall that cannot be painted because there is not enough money for that. Talking about the same subject but more towards light design, the way experienced cinematographers face the size of an production might be represented by the kind

---

[20] Website IndieWire – Interview with
[21] (1998)

of material that are going to be used, an interesting example can be seen in the film of the British director Lindsay Anderson's *If…*[22], which had the Czech cinematographer Miroslav Ondriček as director of photography. This film was partially made in black and white firstly because of budget but choices of the cinematographer made this film fly through its screenplay. The use of black and white on this film is widely discussed and represents a very important cooperation in between cinematographer and director. Ondriček said to Anderson that for having consistency in the Chapel scenes, he would have to have certain kinds of lights and the Production said that it was not affordable.

> Ondrícek informed Anderson that he "couldn't guarantee color consistency in the chapel scenes." So they were shot in black and white. Anderson liked the way they looked so much that he told the DP, "I'll just shoot a few other scenes in black and white when I feel like it." And thus *If....* goes from black and white to color and back again without any apparent reason—the result underscoring the fact that we're watching a movie, not life, and giving the movie the resonance of a half-remembered dream. (EHRENSTEIN – 2011/2017)

About the choices of how the other scenes would be shot in black and white, Miroslav Ondriček said that it was completely emotional, as it was decided on set by the director. In that way the audience loses the feeling of being an unseen spectator and Anderson reached his goal of showing to the public that the film has a specific way of communicate itself and not only something to observe in a cold manner. Moreover, monochrome aesthetics adds into the film what is called Brechtian effect or Alienation effect.

> Alienation estranges an incident or character simply by taking from the incident or character what is self evident, familiar, obvious in order to produce wonder and curiosity. […] at playing in such a way that the audience was hindered from simply identifying itself with the characters in the play. Acceptance or rejection of their actions and utterances was meant to take place on a conscious plane, instead of, as hitherto, in the audience's subconscious. (BRECHT and WILLETT 1964).

On the other hand, *Raging Bull*[23], for example, was shot in black and white by artistic choice; however, there was a historic element that influenced the concept of the film. In an interview with the cinematographer of the film, Michael

---

[22] (1968)
[23] Scorsese, Martin (1980)

Chapman justifies the black and white aesthetics by how boxing it was transmitted on television and how that made an imaginary aspect of the reality of the sport "boxing was definitely thought in our memories…totally in our associations boxing was a black and white sport, so it seemed perfectly reasonable to shoot it in black and white. Also the cinematographer believes that "black and white is one step removed for reality anyway" regarding that people see in color so the monochrome would be more liberating for art once it is "more abstract then color". These statements of the cinematographer raise an interesting debate on why the audience want to see a film in the way they perceive reality on a daily basis. Of course that on the color era many tools were developed as in VFX[24] to create different spaces, travel in time, other dimensions, galaxies, worlds that would not be real but somehow the colored skin gives a realistic effect that allows the spectator to relate to a more possible world, then a world in black and white.

Regardless of the reasons black and white stayed alive and rolling, the producing issues and loads of creativity gave enough reasons to the aesthetic of monochrome cinema to remain on the minds of filmmakers. It is striking how black and white filmmaking, an art form associated with representation of reality until the 60's has become directly related to stylization – either related with film genre as Film Noir[25] or, as discussed before, to represent past, detachment and so on, held its place in the moving image art. So if in one hand the absence of colors empower the story and acting, it is still a way of stylization once it takes the audience out of its own "real" perspective of the world, which is colored. On further chapters of this work, the analysis of the films produced in black and white in the digital era shall light up this theme again discussing the motivations for the usage of the black and white as an aesthetic.

> If black-and-white cannot escape its ties from this receding past, does it have a future? Does it even have a present? In the final chapter, I suggest that it does. With the rise of digital color, a new chromatic orientation has developed, which renders old black-and-white/past and color/present oppositions irrelevant. (MISEK 2010:116)

Technology has developed standards that were never imagined before. Color reproduction becomes day by day more accurate inside the thousands of bits

---

[24] In filmmaking, 'visual effects'.
[25] A style of film, usually about crime, that presents the world as being unpleasant, strange, or cruel
http://dictionary.cambridge.org/dictionary/english/film-noir

and amazing resolution of the new monitors and projectors, vfx effects, sensors, cameras. In an era when films start to copy Instagram filters that copy old color dye processes, the clarity of the black and white surpasses all by its aesthetic power and it remains alive. On the next chapters, I will discuss how this aesthetic is meeting the contemporary way of producing films.

Crafts and Technology
The production of black and white moving image in the digital era

There are several different methods to achieve a black and white final image when regarding moving image in the present film industry. It is possible to shoot in color or black and white film material or shoot with digital cameras that have either color or monochrome sensors. Independent of the media which the images are going to be recorded at, if it is in film material or in a digital sensor, these methods will involve a digital intermediary and always a certain degree of postproduction aiming at digital distribution. Images captured in film material or in digital camera sensors have very similar postproduction process in order to culminate into a digital file that can be screened on theatres, broadcasted on television or distributed on the internet. Film material has to be scanned to become a digital file and then is edited and post produced. I believe that is also important to say that the usage of film material is alive and the study about the process of transcoding the captured image in film material to digital data give us a basic information that clarifies the structure of the digital image, mainly the RGB[26] nature of them, as Hunt explains in his book:

> In scanners using a spot of light, the beam, after passing through the input material, is usually split into its red, green, and blue components by means of beam-splitters. In scanners using a line or area of light, various methods are used. In three-pass scanners, the material is scanned three times in succession, using, for each scan, either one light source with three different filters, or three different light sources, the first two page-scans being stored. In one-pass line scanners, either three linear CCD arrays, covered with red, green, and blue filters, are used in close succession, the first two line-scans being stored; or beam-splitters are used to reflect the light simultaneously on to three linear CCD arrays. One-pass area scanners use a CCD area array covered with a mosaic of red, green, and blue filters. (HUNT 1995:565)

The way modern color cameras absorb light to transform it to a final image

---

[26] Tech term; Red Green Blue.

is very similar then the scanning process described by Hunt. The sensor of the color camera is composed by a squared grid of photo sites that is covered by a mosaic of color filters (Color Filter Array) commonly known as *Bayer Mask* due to the most used arrangement of the colored sites that was proposed in 1976 by B.E Bayer from Kodak Eastman Company. The photo sites of the photographic sensor are responsible for capturing the light as electrical signals that will be read by the camera as images; the Bayer Mask filters light into monochromatic signals of red, green and blue to make possible to the sensors to read the colors of light and objects.

> Most consumer digital cameras implement a more cost effective solution that involves bonding a colour filter array (CFA) directly onto the sensor chip above the photodiode array. In this arrangement, each pixel is covered by a single colour filter, such as a red, green or blue filter. As light passes through the filter to the photodiode, only light with wavelengths corresponding to the colour of the filter pass through. Other wavelengths will be absorbed. The resulting image, after filtering by a CFA, resembles a mosaic of red, green and blue since each pixel records the light intensity for only one colour. (LANGFORD 2008:113)

The image created in the sensor will be different from the final image, which will be processed by the camera apparatus. It is possible to consider the image created by the sensor as a code containing the necessary information to archive a final image that resembles reality or, comparing to film material, the red, green and blue filters that resemble the color dyes of the film strip which need to be developed in a laboratory in order to get to the final result. The mosaic of pixels created by the CFA (Color Filter Array) has to be decoded through a process where each photo site reads the information of its neighbors to form the final pixel color information. Respecting the trichromatic formation of the human eye, the reproduction of colors in the additive process composes each final color by summing up the information of red, green and blue from different pixels in order to form a color that matches a specific wavelength, in the case of digital image the wavelength of the color of each pixel.

This phenomenon of trichromatic matching is easily explained in

terms of a trihrocmatic theory of colour vision. For, if all colours are analysed by the retina into only three different types of response, ρ, γ and β (proportional, presumably to absorptions in three different photo- sensitive pigments), the eye will be able to detect no difference between two stimuli that give rise to the same ρ-, the same γ-, and the same β-signal, no matter how different the two stimuli may be in spectral composition. (HUNT 1995:70)
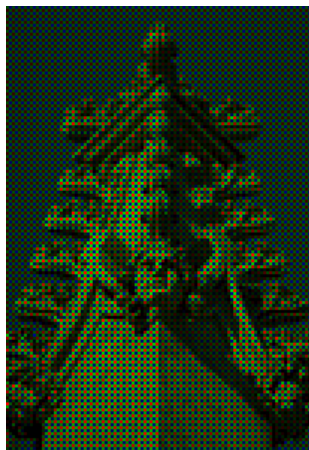
Figure 4 image before debayering

Figure 5 image after debayering

In the digital realm – and here I mean a production workflow that does not include film material - until few years ago, the black and white image could only be achieved by post producing the color image obtained by the process explained above – the final color image would have to be desaturated in a color grading software. Therefore, in the year of 2012 the company RED released a camera called EPIC-M, which has a monochrome sensor; in 2014 it was time for ARRI to release its monochrome camera the ALEXA XT B+W. As a first impression these releases represent an interesting movement when black and white aesthetics is concerned, these releases theoretically show that camera producers understand that there is demand of filmmakers shooting black and white which is worth the investment of creating sensors that would make possible for a full black and white workflow for professional digital cinema. Apart from what might concern a market insight by the companies, it is worthy the analysis of what could be the differences and similarities of the color and monochrome sensors. The digital workflow from the photographed object to the final image which uses the color filter array and demosaicing process explained above, its technology and structure to absorb light,

---

[27] http://www.cambridgeincolour.com/tutorials/camera-sensors.htm
[28] http://www.cambridgeincolour.com/tutorials/camera-sensors.htm

is already a first clarification to understand the monochrome sensor specificities and how its release by the camera manufactures might change, or not, the black and white image making. The color camera does not have a color sensor, it has a luminance sensor, which is covered with a colored layer, if someone brave enough removes the mask from the sensor they would automatically produce a strict monochrome camera.

For the monochrome sensors recently developed, there are three main aspects to be considered: sensitivity or latitude, grey scale distinction and resolution. The sensor which contains the Bayer mask absorbs light depending on the color of the filter which covers the photo sites, each photo site just absorbs luminance information of red, green or blue and not of the full luminance of each point of the object. In this way the sensitivity of the sensor is limited once the debayering, or demosaicing process recomposes the color of the image but it does not increase its final brightness – it does not lose luminance back to the picture. The black and white sensor, for not having a CFA, allows the photo sites to read the object in its full luminance. The minimum detail that can be fixed by the sensor will have the information of luminance of the respective part of the object – the full spectrum of colors will be read only as luminance. As a practical example within the last releases mentioned in the beginning of this chapter, the camera ARRI Alexa has as native ISO EI800 in its color version and EI2000 for the black and white version just because of the absence of the color filter array.
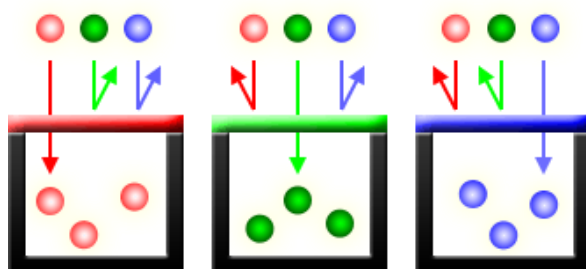
Figure 6 Example of image formation with CFA

[29] http://www.cambridgeincolour.com/tutorials/camera-sensors.htm
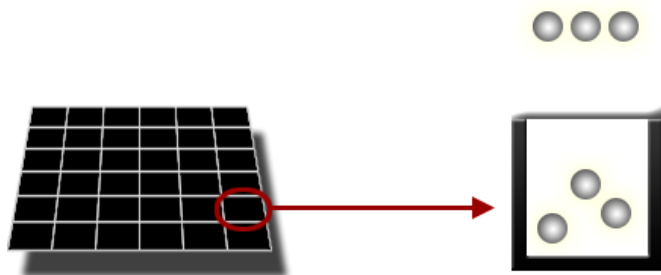
Figure 7 Example of image formation without CFA

The study of the technical and mechanical behavior of the digital platform is an important start to critically observe the development of the cameras and new possibilities for cinematographic work. Clearly, as physics explains, the process of light absorption of the camera sensors make a great difference in how light is transcoded to image by the different kinds of sensors. The native ISO of the cameras shows that the monochrome and color sensors have a difference in sensitivity of more than one stop as this can be used in the field by the taste of the photographers and their necessities. In a situation of low incident light, the higher sensitivity of the monochrome sensors would favor the cinematographer since lesser amount of light would be needed to work the scene out as oppose to shooting with the color sensor. This information might be of interest of new filmmakers that want to shoot in a high-end camera but does not have enough budget to afford big set-up of light.

On the other hand, in bright sunlight for example, the native ISO of EI2000 would be a hassle to work with low aperture values without the need of heavy ND filters, therefore, there is nothing that forces the photographer to use the native ISO of the camera once it's not the minimum ISO possible to achieve – furthermore, for the tests I've developed for this work, which will be shown latter on this chapter, I used the native ISO because I assumed it would be the one which the camera would have its higher performance, but in the case it turned out be noisier then the color camera . Certainly, as in any photographic activity, priorities ought be considered in order to make decisions based on the technical knowledge of his crafts and personal experience, as part of the cinematographer's work. It is not possible to say whether this or that system is better for being more or less sensitive, fundamentally we to understand how each camera works to make

the right choice to each specific situation.

Aside from the topic of how the mentioned sensors absorb light with or without Bayer mask, it's important to understand if there is any substantial difference in the final black and white image obtained on the process. Through the process of planning this thesis, a question that was essential to help choosing the theme, which I would explore, was: Is there any difference in the reproduction of colors tones in the shades of grey if the image is captured by a color camera and post produced to black and white or if the image is already captured in black and white by a monochrome sensor? My main interest was to understand if any of the two technologies would be able to give a better looking image or if the images would be different at all.

The perception of color is not an objective experience because of the difference of physiological and psychological behavior of each person and these two characteristics make a person perceive a reproduction as acceptable or not – the red I see is not the same red you see. In the book *The Reproduction of Colour* by R.W.G. Hunt, the author, explains this issue regarding the observer of certain reproduction:

> Colours in a reproduction are not generally appraised by comparing them either with the original objects, nor even with some mental recollection of them. By what means are they then judged? There seems no alternative to the idea that the basis of judgement is usually a comparison between the colour perceptions aroused by the reproduction, and a mental recollection of the colour perceptions previously experienced when looking at objects similar to the ones being appraised (BARTLESON, 1959 and 1960).

For the reproduction that has as an objective the resemblance of the original constitution of the object, the analysis of how good the reproduction is as subjective matter, should not be different for black and white images. In the book *The Art of Colour* by Johannes Itten, the author highlights the interest of the artist in the work with colours:

> The artist, finally, is interested in color effects from their aesthetic aspect, and needs both physiological and psychological information. Discovery the relationships, mediated by the eye and brain,

between color agents and color effects in man, is a major concern of the artist." (Itten, 1973:16-17).

In the black and white photography, the artists' aesthetical and personal choices rule how they want to represent reality, how they expect to reproduce reality to the audience once this same audience will not have the possibility to make a comparison to the original.

I decided to test two cameras of the same brand, one that has a color sensor and the other one with a black and white sensor. The cameras chosen was the ARRI ALEXA and the ARRI ALEXA B+W. The tests I composed at the school's studios, was a situation where many different colors were placed and the scene was shot with the same lenses and respecting the native ISO of each camera, balancing the exposure with Neutral Density Filters. The intention of the test is to discover how much the representation of the original colors varies from one camera to the other when shades of gray are concerned. The pictures from the colored camera were post produced without any kind of digital filters, the image was desaturated on the color-grading platform. The picture is composed of basic elements with well-known colors such as apples, oranges, leafs. Also there is a dark skin and a light skin model, color charts and grey charts. The pictures will be placed bellow with the respective specifications used to light up and shoot the scene. Following the images, the chrominance values in RGB, parts of the picture such as faces, pure red, pure green, pure blue, leaves, and middle grey, will be highlighted. This data will be shown in order to analyze objectively the pictures, its similarities and differences.

The images were shot using logarithmic color space (Log C) of Arri Alexa on PRORESS 4:4:4:4 format. In the color grading suit a small adjustment of brightness was made to match the middle grey luminance in both color and monochrome cameras, once a slightly difference in between the middle grey density, was noted – the adjustments didn't exceed ½ stop of exposure and the images from monochrome sensor were always slightly brighter. This part of the work was done at UPP, post production house located in Prague, Czech Republic, using *Base Light* software. Frames of the test were exported in uncompressed TIFF format, in order to be placed on this paper work.

[30]Figure 8

Image a) Color image captured with color ALEXA. To use as reference to the BW images.

[31]Figure 9 Image b) Color image converted to black and white.

---

[30] ISO 800, F4, WB 3200, MIDLE GREY 6.2EV, LIGHT TEMP. 3200K

[31] ISO 800, F4, WB 3200, MIDLE GREY 6.2EV, LIGHT TEMP. 3200K.

³²Figure 10 Image c) Image captured with the monochrome sensor.

TABLE 1 – RGB DATA FOR SPECIF POINT IN THE IMAGES

|	IMAGE B	IMAGE C
18% GREY	R:99 G:99 B:99	R:99 G:99 B:99
LIGHT SKIN BRIGHT SIDE	R:120 G:120 B:120	R:120 G:120 B:120
LIGHT SKIN DARK SIDE	R:90 G:90 B:90	R:88 G:88 B:88
DARK SKIN LIGHT SIDE	R:109 G:109 B:109	R:109 G:109 B:109
DARK SKIN DARK SIDE	R:74 G:74 B:74	R:74 G:74 B:74
RED SHIRT	R:73 G:73 B:73	R:87 G:87 B:87
GREEN SHIRT	R:80 G:80 B:80	R:84 G:84 B:84
LEMON BRIGHT SIDE	R:140 B:140 G:140	R:140 G:140 B:140
ORANGE BRIGHT SIDE	R:120 G:120 B:120	R:128 G:128 B:128
RED APPLE	R:64 G:64 B:64	R:74 G:74 B:74
RED ON COLOUR CHART	R:89 G:89 B:89	R:98 G:98 B:98
GREEN ON COLOUR CHART	R:105 G:105 B:105	R:105 G:105 B:105
BLUE ON COLOUR CHART	R:80 B:80 G:80	R:83 G:83 B:83
YELLOW ON CHART	R:129 G:129 B:129	R:120 G:120 B:130
MAGENTA ON CHART	R:106 G:106 B:106	R:109 G:109 B:109
CYAN ON CHART	R:104 G:104 B:104	R:106 G:106 B:106

Figure 11

Next, follows a test of the different cameras shooting only the color chart and grey chart, to be considered. These shots were taken with a light work that would reduce the contrast to a minimum, as to be more precise in the evaluation of the behavior of the two cameras. Both images presented an R:93 G:93 B:93 value for 18% grey.
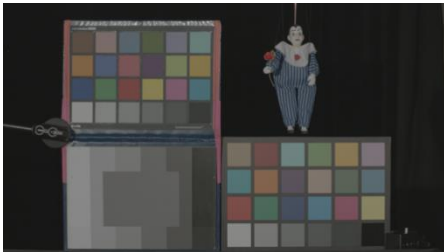
Figure 12 Chart – color image
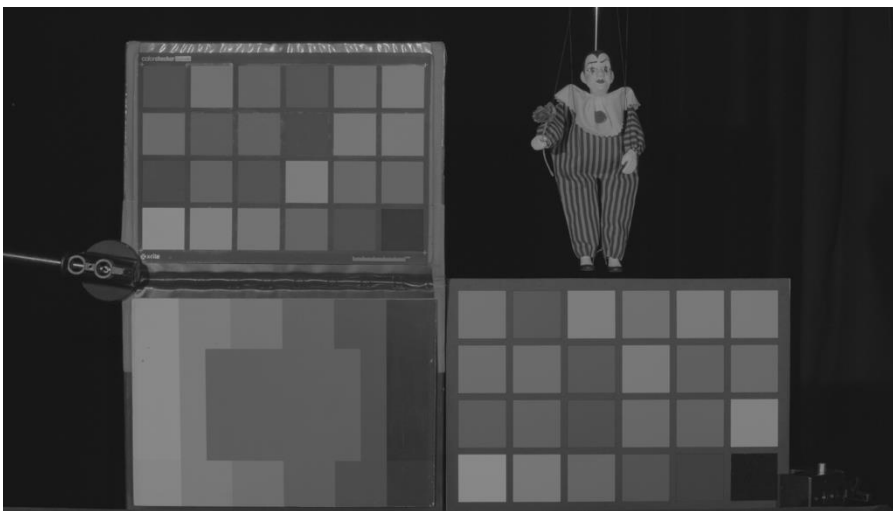
Figure 13 Chart b – Black and white from color
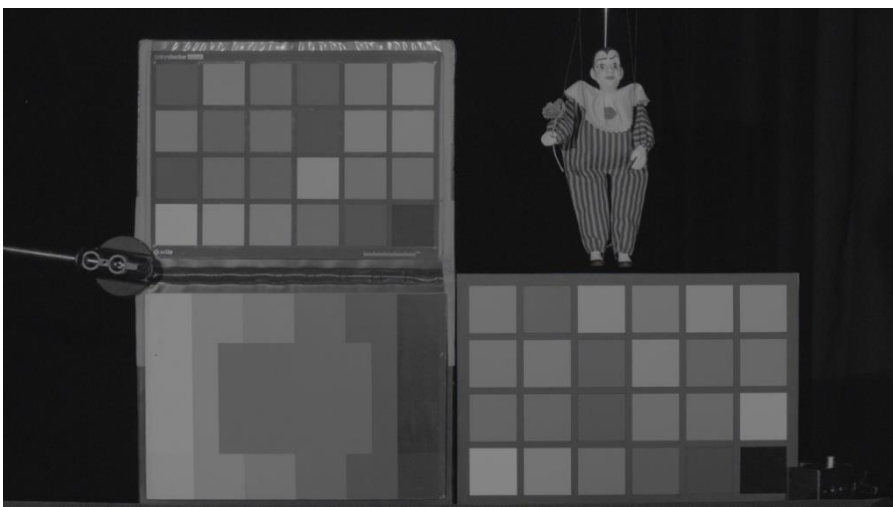
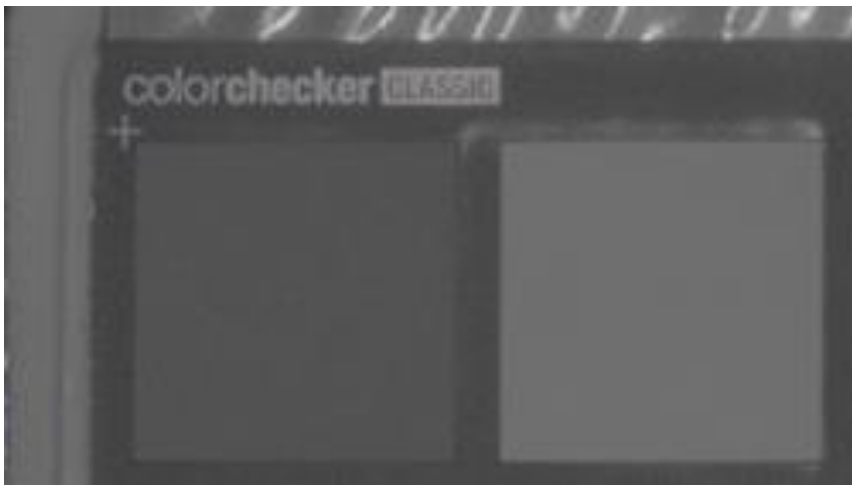**Figure 14** Chart c – Monochrome sensor

TABLE 2 - DATA FROM THE TEST

	Chart B	Chart C
RED	82:82:82	92:92:92
GREEN	96:96:96	98:98:98
BLUE	73:73:73	78:78:78

*values displayed in RGB

It is interesting to note that a major difference appears just on the rendering of the red color and the color palette close to it as in the orange, apple, red shirt. The monochrome camera also appears to represent colors in slightly brighter shades of grey then the desaturated image from the color camera. Therefore, skin tone seems to keep its luminance whatever the camera that was used. Green and red have a smaller difference in luminance between themselves when observed in the image generated by the monochrome camera, then in the color camera. Image C, the one generated by the monochrome camera, is of less contrast then image B. This parameter (contrast) might affect the choice of technology by a director of photography, therefore, is of common knowledge that computer technology represents a great part of the image making industry. To operate the color channels of a color image to manipulate the final black and white result is a quite simple operation – below there is an example, Image D, created in Photoshop to match image C.

Other difference perceived in the tests concerns resolution, as explained in the begging of this chapter the absence of Bayer Mask gives a better resolving power to the monochrome sensor.

Figure 15 Chart D – from color sensor

Figure 16 Chart E – from monchrome sensor

Figure 17 Image D Image from color sensor manipulated to match image from monochrome sensor


Figure 18 Image C Image captured with the monochrome sensor

Into the black and white image making, the usage of glass filters has been a way cinematographers found to create different looks of monochrome images based on the different wavelengths, which the glass filter placed in front of the lenses would absorb, reflect or let pass to be registered on the film material. In the digital monochrome cameras, the same technique can be used to achieve similar results. Trying to understand if the color-grading of the images from the color camera could achieve similar results, I shot monochrome images using the filters "T RED 28" and "T 13 GREEN" and tried to match them with the images from the color camera. The procedure used on the grading suit was to manipulate the image in a way that just the channel related to the specific color filter would be used, i.e. for the image to be compared to the monochrome image which was shot with red filter, only the red channel of the software was used, green and blue channels were reduced to zero.

Figure 19
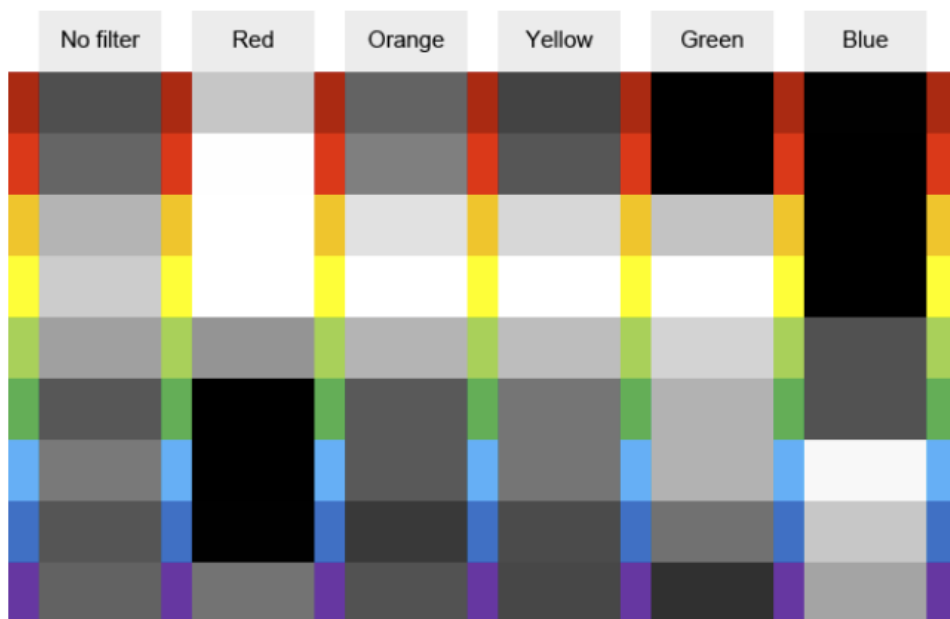
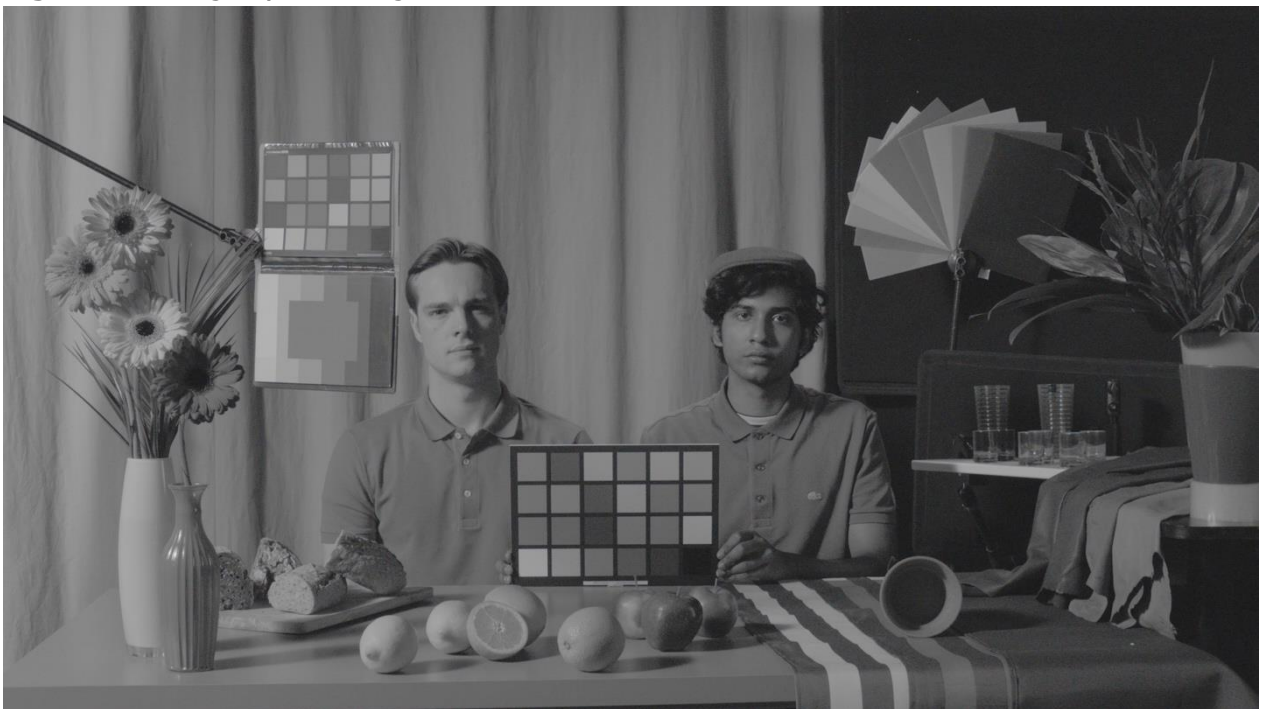*Different coloured filters (top line) affect your scene's greys in different ways.* [33]

---

[33] - Example of how different filters interfere on the shades of grey; colors will be represented in black and white
http://www.photographymad.com

Figure 20 - Image E) Color image to be used as a reference.

34

Figure 21 Image F) BW image from monochrome camera without filters.

---

[34] ISO 800, F5.6 ½, MID GREY 8E.V.

Figure 22 Image G) Image from monochrome camera

35

Figure 23 Image H) Image from color camera post produced to black and white using red channel only

36

TABLE 3 - RGB DATA FOR ESPECIFIC POINT IN THE IMAGES

	T RED 28	RED CHANEL	MONOCHROME
RED	139:139:139	127:127:127	104:104:103
GREEN	50:50:54	54:54:54	99:97:99
BLUE	40:40:44	48:48:48	62:64:64
LIGHT SKIN	158:158:158	158:158:158	144:144:144
LIGHT SKIN - SHADE	75:79:79	69:69:69	61:61:62
DARK SKIN	144:144:144	139:139:139	127:126:127
DARK SKIN - SHADE	65:66:66	60:60"60	55:56:57
DARK SIDE APPLE	61:61:64	56:56:56	41:41:39
APPLE	112:115:115	99:99:99	70:70:70

The usage of filters in front of the camera lens is a way to modify the way the camera sees light; the filter removes unwanted spectral bands from the light spectrum. In the case of a red filter, as shown in the pictures above, the filter will allow the red part of the spectrum to pass while absorbing the blue and green parts of the spectrum – not all of it but the stronger the filter, stronger the absorption/reflectance of unwanted light stimuli, will be. This filter is used by photographers that wish to acquire darker skies in sunshine days, as to manipulate red and green colors in a more precise way, i.e. The color filter might be used to differentiate in an image two colors which have similar luminance, as showed in the pictures of the test, the shirts of the models look alike in the monochrome image without filtration and are very different in the image achieved using the red filter.

> An optical filter can be either a passive absorption type or an interference type. Their role is that of frequency filtering to remove unwanted spectral bands or lines otherwise transmitted by the optical system. Colour depends on the transmitted wavelengths and for absorption types is independent of orientation and angle of incidence. Filters are characterized by their spectral transmission properties, presented in various ways. (ALLEN and TRIANTAPHILLIDOU 2009)

Based on the pictures that were shown and on the data retrieved from it, it's clear to see how strong the interference of the color filtration is in the process of black and white image making. Reds and red-oranges became much lighter then the original picture while greens and green-blue became much darker. Out of visual appreciation the image from the monochrome camera seems brighter then the image from the color camera, although the middle grey shows to have the same RGB value 127:127:127 for both images. Shades in the monochrome sensor are brighter which raises the perception of clarity. When we objectively compare the values from the table above, the image from the color camera appears to be of higher contrast then the image from the monochrome sensor – when compared, i.e., the ratio in the faces of the models. Therefore, there is a contrast factor that influences the images which is color. The difference in between the luminance of red and green – that is higher in the image from the monochrome sensor - increases what would be a color contrast represented in shades of grey and is possible to perceive that the image presents more contrast then the other, showing that the way colors are reproduced in each camera affect the perception of the observer of contrast.

> Using filters for contrast control can be a matter of artistic preference, or of necessity. It is possible for two disparate colors, say a certain orange and blue, to record as the identical tone, eliminating any visible difference be-tween them. Filters will lighten objects of their own color and darken those of their complement. (TIFFEN 1993)

Next, follows a test using the T 13 GREEN filter to analyze the behavior of the technologies under one more creative possibility. In this case, the differences in between the images appear less dramatic than in the images manipulated around red color. Although the image from the color camera is brighter and of more contrast, the lower difference in between the colors makes the perception almost even.

Figure 24 Image I) Image from monochrome care

37

Figure 25 Image J) Image from color camera post produced to black and white using green channel only.


---

[37] using T13 green filter. F4, ND3 ISO 800

From the test with filters, it is possible to compare the manipulation of the image from color sensor to become similar to the monochrome image. It becomes more interesting then comparing the image without any strong parameter that has to be matched – as in the beginning of this chapter where I've shown that is possible to match the images in a relatively easy way. If it was to compare the tables that was shown so far in this work is possible to see that in table 3, which shows the values for working with red filter and red channel, the values in between the images are further apart then in table 1, which compares the first test displayed. When trying to go further in the color correction attempting to match RED and GREEN luminance in the two last images with the red filter and red channel, the process is not as simple as said before. To manipulate the image from the color sensor, even when it is already transformed to a monochrome image, the colorist still needs to manipulate the information of red, green and blue which is contained in the image. Moreover, a channel or a color, in the reproduction of colors, is not capable to interfere in only one color. Physics explains that when an object reflects a certain color – the red of a tomato – it is not reflecting only red light from the spectrum, it is reflecting different colors of the spectrum, which form that final color. The sensor receives the information like that, not only one color but different colors which form a final image. In addition, when trying to manipulate a certain color of an image several other colors of the image will be altered –in our case, even in the desaturated image from the color sensor. A simple example of that can be found in the book *The Reproduction of Color* written by R.W.G. Hunt*.*

In Fig. 1.1(b) the amount of light reflected at each wavelength by a particular red surface is plotted as a percentage of the amount of light falling on the surface at each wavelength. The curve thus obtained is called the spectral reflectance curve of the sample, and provides a detailed description of the colour properties of the surface. In the case of this red colour it is clear that about 65 per cent of the red light is reflected, 55 per cent of the orange, 30 per cent of the yellow, 15 per cent of the yellow-green, 10 per cent of the green, 10 per cent of the blue- green, 5 per cent of the blue, and 5 per cent of the violet. And these reflectances result in the particular red colour of this surface, actually that of a red tomato. (HUNT. 1995:4)
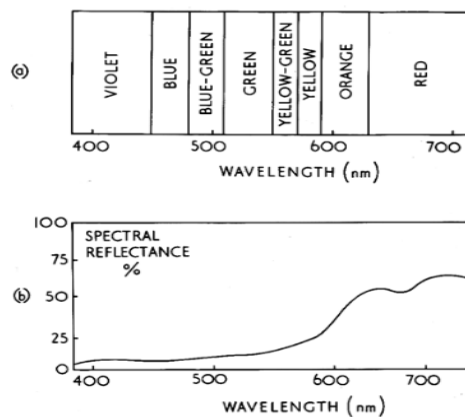
Fig. 1.1. (a) The distribution of colours in the spectrum. (b) The spectral reflectance curve of a red colour.

For the grading of the black and white images from the technologies mentioned above, this is a question of main importance. The captured image with the color sensor has many more parameters that influences the final image then the captured image with the monochrome camera, fact that might indicate that it won't always be better to have more space to work the image on post production. If a cinematographer desires to achieve a specific look by the luminance of certain color represented in the grey scale, it might be more effective to work with color filters and "bake" its image on the sensor then to have to achieve that on post production. Nevertheless, the test around LUTs that can be applied on the camera on set might give the wanted result. In this case, the decision involves the preferred workflow of each professional understanding that this objective values become subjected to the visual appreciation.

Going deeper on the tests, one parameter that should be better in the monochrome camera is the formation of interpolation artifacts (aliasing or moiré). The presence of the *Bayer Mask,* and how it makes interpolation of colors, theoretically increases the unwanted effect of moiré. However, the test shows that the image captured with the monochrome sensor performs worse in this aspect – and even worst when the red filter was applied. Also is possible to perceive that the image from the monochrome sensor has more noise then the image from the color sensor. These two parameters ought to be carefully considered and restlessly tested before making a choice about which technology one will use.
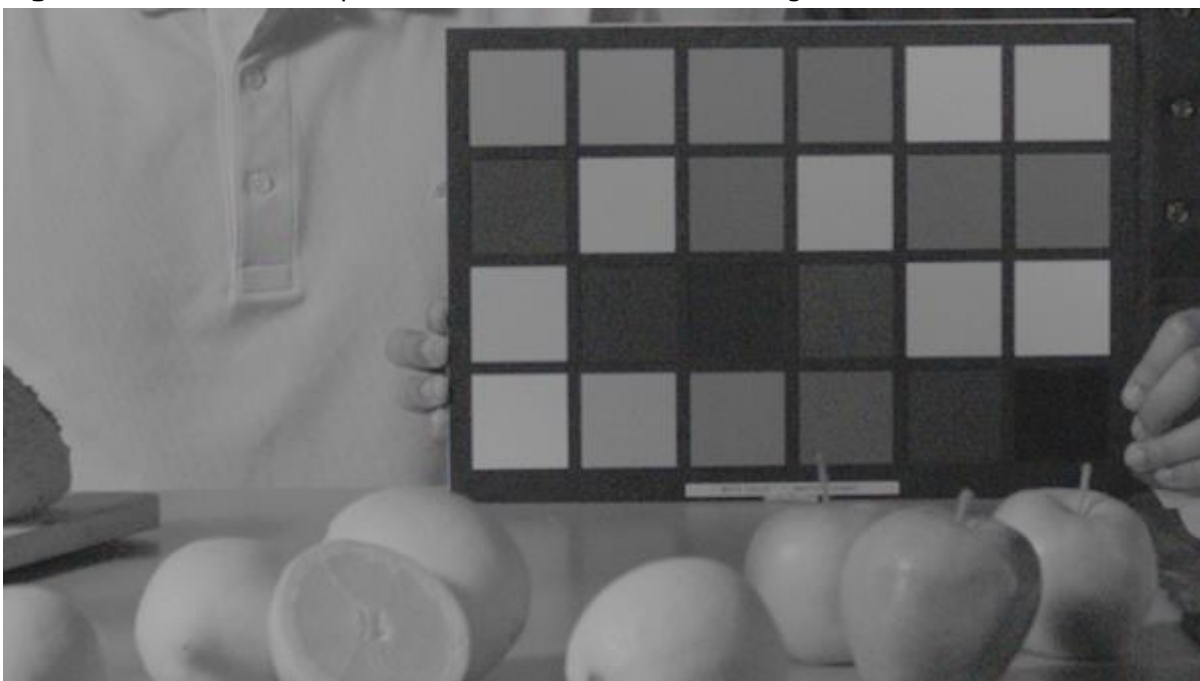
Figure 26 - Chart F – Crop from color camera
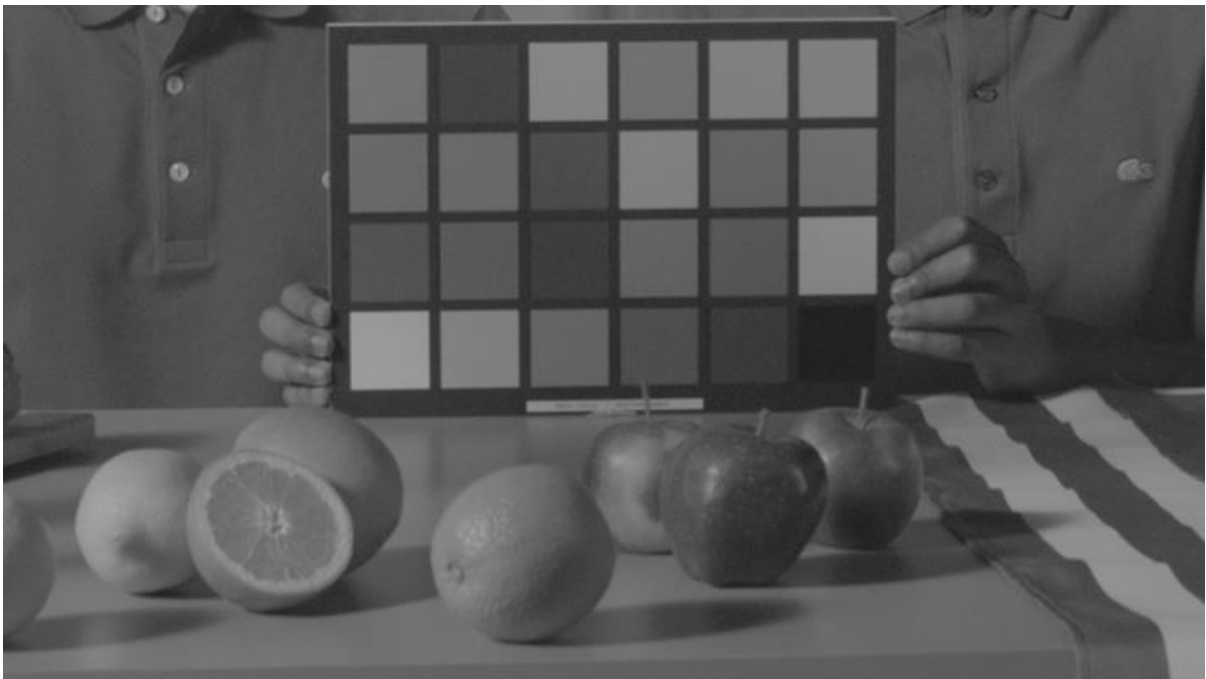
Figure 27 Chart G – Crop from monochrome camera
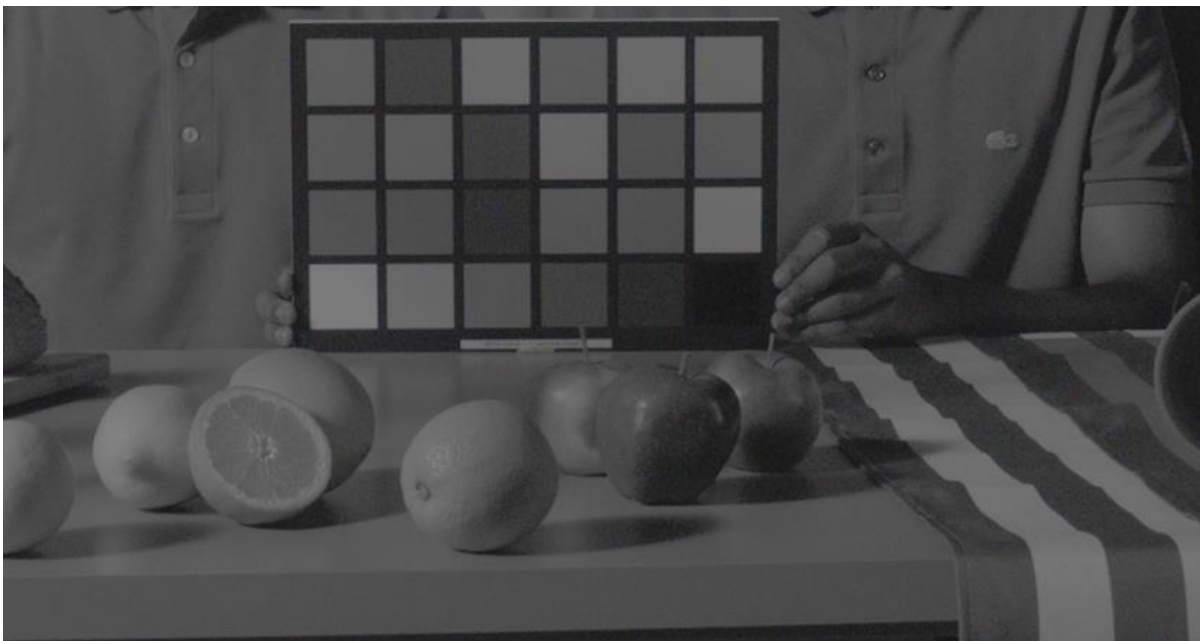
Figure 28 Chart H – Crop from monochrome camera using T Red28 filter.

Last, but not least, I'd to speak about a feature that is presented by the monochrome camera, which is the possibility to capture infrared light for the making of black and white images. Infrared photography dates back to the beginning of the 20th century, as it has been used for color photography and black and white photography. By the usage of a special IR filter (and special film material when this technology is used) the camera becomes capable of capturing only wavelengths from 800 to 12000 nanometers – at the core, digital cameras come with a filter that does not allow the IR light to penetrate the system, once it would drastically change the reproduction of colors if it was added to the visible spectrum of light. Contemporaneously, many different tools and tricks have been used in digital DSLR cameras in order to capture the near infrared spectrum of light, therefore, the majority of the systems include the transformation of the camera sensor by removing the IR-cut filter and its need to use IR glass filter, which allows only IR light to pass to the sensor. ARRI Alexa B+W and RED Monochrome cameras come with the facility of not having a fixed filter on the camera, rather removable filters. The filters can be easily replaced and do not require any special capacity to do so. In the website of ARRI we can find a detailed description of the camera ARRI Alexa B+W capacities, it is the camera that was used for the tests demonstrated in this chapter. The ALEXA XT B+W sensor assembly has no Bayer mask, optical low-pass filter (OLPF) or IR block filter allowing each photo site to capture the full spectrum of visible light increasing spatial resolution and contrast. In this mode, the camera's look is very much like a 35 mm camera loaded with panchromatic film – the classic black-and-white look. As well as this, the camera can also operate in an infrared mode in which the camera only 'sees' the reflected infrared non-visible light. These images appear dramatically different producing white foliage, blemish-free skin, black eye pupils, and moody dark skies. The camera is also more sensitive than a regular ALEXA XT Plus, with a native sensitivity of around EI 2000. Through the usage of two new ALEXA In-Camera Filter (IFM) system compatible filters, the ALEXA XT B+W can be easily configured with either a BG39 filter to shoot stunning B+W images, or a BG87C infrared pass, visible light block filter for infrared capture.

Unfortunately, the day I could have the camera to test it was cloudy as we
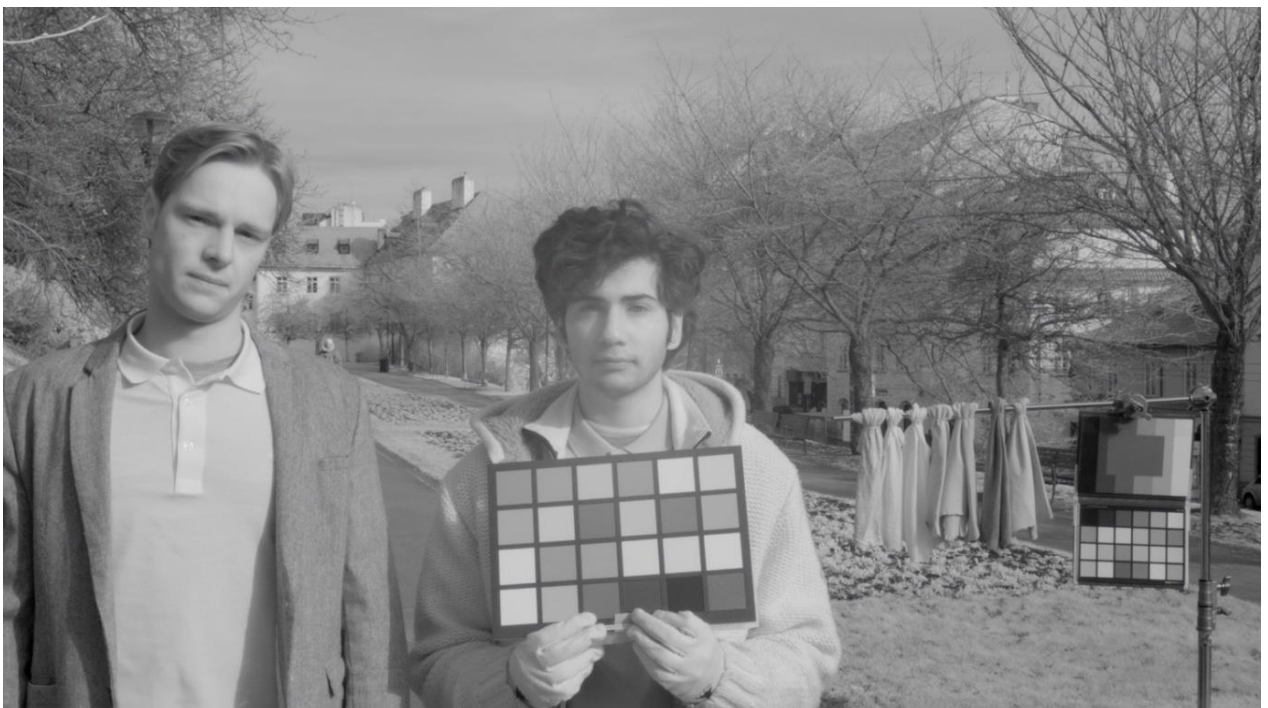
were in the end of the Czech winter, not making possible to demonstrate with accuracy the behavior of the camera, when outdoors. However, in the studio shot we can observe how drastically the foliage becomes white, blacks become deeper and eyes become black.

Figure 29 Image K – Infrared image in studio

Figure 30 Image L – Infrared image outdoors

Each different technology will have different workflow and the choice of how to work is not as objective as mathematics and involves many subjective elements as experience and taste. As a result, understanding the basic behavior of different technologies, as shown in the tests above, is important to develop a criteria of selection of equipment that might be chosen for a certain project. The data from the color sensor is more "elastic", it can be transferred to monochrome in several manners by changing the luminance of desired colors as to achieve the aesthetics that is desired, an LUT (look up table) can be pre-designed and added to the camera so crew can roughly see the images, prior to how they will look in the end. The data obtained by the usage of the monochrome sensor does not carry color information because of the lack of Bayer Mask, as this makes the camera more sensitive and sharper, but it does not give the freedom to work in post production, as the color camera does. The image from the film material – which is important to mention - is the one that carries more the final information with it once the emulsion plays its role giving to the final image the characteristic of the company which manufactured it. The original monochrome options might seem, at first sight, worst then the one, which would give more possibilities, but I do not see it like that. As we saw before, the infinitude of possibilities, at times, can transform the final step of making a movie a nightmare. Also experienced cinematographers might prefer the option of monochrome sensor to bake their aesthetics in the image, before it gets out of the set. In addition, the production site of the history, the time on the grading suit can be very expensive and to have the image as close as possible to the final product would save money and time but, as everything is a matter of priorities, producers would have less control over the final image.

Additionally, I want to highlight how I personally would choose the technology to use in a project with a final image in black and white. I would not have only one answer that could cover any type of project. I believe that the work between cinematographer, director and producer, varies from project to project and is smart to have different possibilities to choose from, for each demand we have, but I will try to discuss on how I would make a choice.

The choice for the color camera gives the possibility to work the color channels and color mixture in color-grading to achieve the look which is more suitable to the film. Through some camera tests is possible to design a first LUT (Look Up Table) to use on the camera on set, as to see the images in black and white to make a fluid workflow. As the tests demonstrated that it's possible to achieve a similar look of the monochrome image desaturating the image from the color sensor and simulate colored glass filters effects to manipulate the luminance of certain colors, it's important to repeat that in images used for this work that were post-produced in the simplest of the processes in order to not influence the final image. Using a color sensor, I believe that as long as tests are made beforehand a wider range of colors can be used in costumes and set design as to be more precise in the desired contrast to the storytelling. With this same aspect of post-production, lies down the budged issue: time on grading suit, equals money and the usage of different colors on set, including different colors of light, will make the post production process lengthier when trying to filter the colors by its luminance all over the film and, for each manipulated color in post production, other colors will be affected (if money is not a problem, there will be no problems).

Choosing the monochrome camera means that what happens on set is as closer as it can be of what you get on screen, apart from luminance contrast of shadows and highlights. I like the most the idea that I can decide how the final image would be without much interference of the grading process. For differentiate colors, for example green and red as seen in the tests, its needed to use colored glass filters which gives a specific luminance for these colors in a way that it cannot be proportionally reduced or enhanced in color grading. Thinking as a purist, I could say that this is the best option once my image would be almost untouched after shooting, but I understand that reality is not always the way we imagine, and having room to develop the images can be seen as a lifeguard when the final result is concerned, so I see this as a lower point to monochrome cameras knowing that this effects can be manipulated within certain precision with images from a color sensor. However, decisions made on pre-production stage of a film and the development of the black and white aesthetics on set, save time on shooting and

on the finalizing the film as it keeps the final look as close to the concept of the film as possible. I see the work directly on the monochrome sensor more simple and straight to the point, capable of achieving great results in contrast when certain aspects of the colors used on set can be resolved beforehand. When black and white images are concerned, I like deep blacks and sharp details, as given from the monochrome camera, and I know that is possible to lower resolution with the use of filters and also with some post-production, while is not possible to make the softer image from the color camera sharper – considering this aspect of resolution it would make me go for native monochrome. The higher native ISO of the monochrome camera is also something that makes me lean more towards this side. Having a native 2000 ISO makes possible to lit some scenes with a smaller amount of light sources, allowing the cinematographer to create atmospheres that would be more laborious and more expensive then what it would be needed, with a 800 ISO camera – to get the camera and go outdoors to shoot night scenes can also be more effective with the monochrome camera in an lower budget situation and, if the outdoor scene is at day light, the ISO can be lowered and ND filters can be used. It is possible to have a preferable technology but is impossible, in my way of understanding cinematography, to use this same technology for every project simply because each project have a different artistic demand and different production requirements. Many variables have to be observed before choosing a camera to shoot a movie and I understand that the development of the monochrome sensor is something that opens up the gamma of possibilities filmmakers can work to accomplish their ideas.

Interview

The present moment we are living is also part of history. The productions, which are happening in this very moment, are already, somehow, developing a meaning for the history of cinema. The understanding of history allows us to follow the art forms through time, the understanding of technology spreads our possibilities to make art and to study it in a deeper sense and not just enquiring "Why was it made?" or "What was it made for?" but instead, "How was it made?". To acknowledge how a film was made, which technology was used, leads us closer to the reality the artist was immersed in when developing his piece of art and gives us more fundament to try to understand a mindset that he could have been working under. Furthermore, the technological developments in art are of no meaning if we don't see it applied into art works. To talk about techniques for achieving black and white images in cinema is meaningless if we do not talk about films made in black and white, regardless the technology that was used.

During the time, I have been producing this thesis I have been researching on black and white films that have won, somehow, a prominent place in the media in regards to cinema. Actually, was when watching a black and white film, *Ida* (2013)[38], that it came to mind the idea to understand in a better way what is currently happening with monochrome filmmaking – in the year of 2013 the film won the Golden Frog at Camerimage festival[39] and, in 2015 won the prize for Best Foreign Film at the Oscars. I did not found a way to raise data for all the black and white films produced lately and a wider research frame, as that would've been almost impossible to analyze it. However, I have developed a research frame to guide me inside the huge amount of films that are produced every year. I have researched through some important film festivals – Sundace, Canne, Berlinale, Oscars – to find out which black and white films have been nominated or that have won any important prizes at these festivals. After researching, I could reach out to some cinematographers who shot films in black and white and that were awarded for them.On one side, making an objective numeric research might raise understanding about the volume of black and white films that's gotten into the

---

[38] Directeb by Pawel Pawlikowski; Cinematopraphy by Ryszard Lenczewski
[39] International film festival - http://www.camerimage.pl/en/Camerimage-Chosen-As-A-Student-Oscar-R-Qualifying-Festival.html

mainstream media, it is, nonetheless, impossible to analyze how black and white aesthetics are being used more often by indie filmmakers today but, looking deeper on the reasons that cinematographers and directors choose to use monochrome aesthetics allow us to comprehend certain priorities that were taken and choices that were made which might be useful for any kind of filmmakers, from the wealthiest to the poorest.

I think it is important to explain how I will develop this chapter from this point forward. First, I will explore the interviews with the cinematographers explaining the film that was made, which prizes the film has won, the used technology and how it was decided by the filmmakers to shoot black and white. Following, in the conclusion of the chapter, I will briefly discuss on the interviews and then I will write about the proportions of black and white nominated films and how they have been awarded throughout the festivals.

I will start with the polish film *Ida* (2013) directed by Pawel Pawlikowski, with cinematography by Ryzszard Lenczewki and Lukasz Zal – Mr. Ryszsard did the preparation for the film but could not shoot it due to health issues, so Mr. Zal took over the shooting. Out of the films, which will be highlighted here, *Ida* might be the one that has most visibility worldwide. It has won an Oscar for best foreign film and a Golden Frog at Cameraimage festival, as mentioned above. The film was shot in Arri Alexa Plus 4:3, using Zeiss Compact Primes lenses. The original format used ArriRAW in color, post produced to black and white. The film received stunning reviews by almost all the media, including the British newspaper *The Guardian* "An eerily beautiful road movie", The New Yorker "A film Masterpiece", and the Hollywood reporter "*This rigorous beautiful black-and-white drama of early-'60s Poland is an art film in the best sense".* I have interviewed Mr. Ryzszard Lenczewki, for about an hour, on skype and he has clarified his choices about technologies and workflow and also about the reasoning behind why the film was made in black and white.

The first thing he's motioned to me in the interview was how he manage to capture images in location and that it was done using a small point and shoot still camera, that had a black and white mode that he lowered down the contrast

of the little camera and went about to locations – even knowing that he was going to shoot with a different and much more capable camera, he did his desired approximation out of visual appreciation, without caring much about resolution or post production. This would come afterwards in the more specific camera test. This part of the interview is important to me because the cinematographer was not putting technology in front of his concept, he was developing a visual style that would be refined with technology, and he would try to find, with the camera used to shoot the film, the visual style that he developed with the small point and shoot camera.

> I would like to show you one photograph, which is a good example of what I'm thinking about, for sure you know this photograph from my website, by the way just to make this conversation a little you know wider, you know... Can you see it? (LENCZEWKI 2017)
>
> Yes, yes. I can see the reference of the window. The light of the window falling in between the doors. (BURGOS 2017)
>
> Yes and you know that maybe now...this higher contrast when I look at the picture, but then anyway...the photograph was done with beauty, it was such ray of light...you know, it was a soft sound light, a little bit by additional cloud, anyway I love this photograph and if you remember of the scenes on *IDA*, it's almost the same…But all the time the preparation begins when we came on the location and started using photographs and every day in the evening we meet, we met and you know we looked at the photographs, and we developed staging of the scenes, we developed the title of the movie, you know that's why this camera is so important for me. (LENCZEWKI 2017)

Mr. Lenczewki was not trusting the developing laboratories entirely back in Poland and because of that he felt afraid to shoot in film material, still he likes the possibility that digital gives the cinematographer to create atmosphere by changing camera setups and also working in post production.

> Because you know so many times during the prep time, I prepared this digital photograph that we watched on the screen. It was so easy for me make a collection to show him how I can easily change up the atmosphere on digital so I didn't have to convince him to shoot digital". (LENCZEWKI 2017)

Regarding the producing of the film in black and white he underlined two reasons: the first one was an understanding that in black and white it could cause a necessary distance from audience to characters, second one and as I believe, the more important for him, was to shoot a film that airs in the 60's in the same way that films from that era were shot.

But you know, one of the reasons to shoot this movie in black and white, because the story takes part in the 60s in Poland, in this time in the 60s in Poland, almost all the movies, and it was let's say Polish school from the 60s in Europe this school, I think it was known by the first movie, etc., etc. So, for us to shoot movies that takes part in the 60s was very simple ok, we said let's shoot this in black and white, ok she came with this idea, black and white the same way we shot movies in the 60s in Poland. (LENCZEWKI 2017)

Other data that I could retrieve in the interview is about set and costume design. Mr. Lenczewki says that everything was produced in shades of grey, from set design to wardrobe. The only way they would intentionally use colors on the film was when wanting to find texture on very dark shadows, so they would use navy blue instead of black.

In the year of 2017 the movie *Butterfly Kisses*[40] won the Crystal Bear in the Berlinale Festival and the director was nominated for the Best Firs Feature Award. The film was shot with a RED monochrome camera in Redcode RAW format. What caught my attention, apart from a black and white film been awarded, is that this film was the only one shot directly in a monochrome sensor out of the black and white films that I've been researching on. Talking with Nick Cooke, the cinematographer of the film, he explained that the reason for shooting on the monochrome sensor was the aesthetics (they did tests to decide in between Sony FS7 or Red Monochrome) but not only for that – when they could find budget to produce the film in black and white and were thinking about the technology to be used, the producers suggested that if they were to shoot in a color camera, why not to have a color version of the film.

"Was it a big challenge to found the film because the idea was to be black and white or everything was already set and it was not a problem at all?" (BURGOS 2017)

It took a bit of convincing, it was a bit of another journey, we were originally gonna shoot, sony F55 in color but, we'd want black and white on the set but we'd have a color...like a color negative that we reduced to the blue channels, to gray and black and white, because if you have more blue, more red, more green you change the quality of the black and white, like the tone of range of that black and white image so...we're kind of doing almost like a technical at three strip, kind of grading process but with black and white being our final theme. But what our investors discovered was

---

[40] Directed by Rafael Kapelinski

like, wow, if there's a color version we should shoot both, we should have a black and white release, maybe on demand...on color, or could there be a country that wants a color version...so we were like, well, we don't want to shoot a black and white, and also have to shoot color at the same time, that would just be confusing...although it's possible, but by that point, Raff was convinced, and I was convinced, that it was a black and white film so we chose to go red on monochrome, 'cause there was no way back...(COOKE 2017)

About the choice to shoot the film in black and white, the cinematographer discussed about the possibility to go further from reality and to develop a dream like quality of the light with monochrome. Further, in the interview, Cooke talked about the usage of glass filters with the monochrome camera as been and advantage of the technology.

"How was the experience of shooting with a monochrome digital camera?" (BURGOS 2017)

It was good, I liked it, I guess what's special about a monochrome is that it sees it's interpreting only black and white, it's not a color camera that's made black and white, that essentially sees in black and white, so you get this lovely, lot's of details on the skin, details on the eyes...which is great, one thing that I found that was bit of challenge with it was that the red camera and I don't know if this is just because of the red sensor, it favors red over, even though it's black and white, it favors the color, red colors...far more than green, and far more than blue, so for example, what that means is by favoring red, generally in a black and white image, the more black you have, contrast, the more contrast you have, the deeper the shadows are, so we kind had to...we balanced it out a bit and I went Tiffen, a London filter company, and we got some blue filters...(COOKE 2017)

"For black and white cameras?" (BURGOS 2017)

Yeah. Which, generally they are used for like a...film stocks, so don't...I don't think you typically use that on digital black and white because you can...you don't have the proper white balance or any color like you would maybe on Epic or something like that. We found...a bit more blue into the image just then...we lowered...more tonal range, particularly on faces or portraits and stuff like that... (COOKE)

"Do you have any thoughts, or any kind of thinking, comprehension about this subject, like, let's say, black and white filmmaking in the digital era. How do you see it?" (BURGOS 2017)

I think if you can justify it and shoot the film without people thinking throughout 'this is a black and white film' then there's no reason why you shouldn't. I think it's definitely a choice now, because the lack of film stocks, the lack of people shooting film stocks, it's

definitely, you have to make a conscious decision, we are gonna do something to this image, unless you go monochrome but, I think that's good in a way, it's given you the power to tell your story in certain ways. I think it's a good thing that people are still shooting in digital in black and white, and it gets you away from digital because people forget it's a digital film in black and white, if it's done right. So, it's quite the opportunity, the budget is getting smaller, directors are getting more freedom, 'cause it's quite small budget, you have the freedom to shoot black and white, if we had a big budget I think they would have said no. (COOKE 2017)

At the Sundance Festival of 2017, a black and white film won the Audience Award for Best film, *Gook*, directed by Justin Chon and with the cinematography of Ante Cheng. The main reason the film was shot black and white regards the possibility of the cinematographer to keep the continuity of the light of the film. The story happens in a day sequence of 24 hours and was shot in 24 days. Cinematographer and Director understood that with the budget, they had and with the not so extensive experience of the cinematographer, shooting black and white would be a way to not allow colors to be distractive and as so to lead the audience closer to the story.

I think for this film because it was going to be shot it, I think that black and white it's more pure, because the film visually and story wise is going to be very, very busy and I think black and white, you could see thru all the...one less distraction of color to worry about, so you can just focus on the story...also for filming, because the story takes place in 24 hours – we shot it in 24 days – if we shot in color it would spend quite a bit of time to match up the consistency of color, and that's something we could not afford without production budget and it's one less thing to worry about and focus on the story. (CHENG 2017)

Well I, you know, there was a few sort of factors that played into that, you know, one being budget, so you know, I'm doing a period piece from 1992 and I just knew that being in independent film I wasn't gonna have the proper budget to get street closures, period, specific cars, also color pallet wise, you know, it would cost way more for production design and the art set deck in all that stuff so, making it black and white essentially all I have to really worry about was more about like, texture, color tones, contrast...I wouldn't have to worry about color much, it was more about contrast, lighting, and texture.

So, that was one of the main reasons, the other reason is I just didn't want the audience to worry about the fact that...I didn't want them analyzing the film or critiquing the film, for the first fifteen minutes, just kind of like picking apart it was period perfect. So you know, if it's black and white you allow them to relax right away and

they can just automatically believe that we are going back in time. So, those were the two main reasons to go black and white.

Also, you know, these days are digital, we searched a few different cameras but, I just felt that if we were gonna go digital, black and white, we can really tell a great story and then there's also you know, the color space, we didn't have to worry about color as much, it was more about lighting and digitally I just felt like the original idea. (CHON 2017)

The director also talked about his challenge to find founding for the film due to its black and white aesthetics and found barriers as investors thought black and white is less marketable. In addition, he gives a good explanation regarding the different audience for the so-called indie films, that is if you are screening a movie in the big multiplex cinema chains and if the movie is focused in an audience that is more into art films or lower-budget b films.

I did a research on the films that were nominated for awards in film festivals such as Cannes – Palm d'or, Caméra d'or –, Berlin – Golden Bear for best film, Silver Bear for Outstanding Artistic Contribution, Best Fist Feature Film-, Oscars – Best Film, Best Cinematography, Best documentary - and Sundance – Grand Jury Prize Documentary, Grand Jury Prize Dramatic – the full spread sheet will be attached in the end of this thesis. The results are startling. Out of 1258 films only 24 were made purely in black and white, 74 were made using both black and white and color aesthetics. From the year 1997 forward – my research frame for award winners – just one black and white film in Cannes, *The White Ribbon* (2009)[41], won an award, the Palm d'or. In Berlin 5 films have won awards, in 20 years, out of 3 categories. At the Oscars, out of three categories, 13 films have won prizes but is interesting to note here that ten were in the category of best documentary and none of them being exclusively made in black and white, just two films won the award for best film, *The Artist* (2011)[42] and *Chicago* (2013) which is a color film with parts in black and white. Additionally, theses festivals have been regarding black and white films in categories that are not their main awards – as in the case of the films, which were mentioned in the beginning of this chapter – but for the main awards, color aesthetics still is the core and the participation of black and white films lack representation even in between the nominees. Even though at the Oscars, from 2010 onwards, at least one film in

---

[41] Directed by Michel Haneke
[42] Directed by Michel Hazanavicius

black and white was nominated for the categories "Best Picture" and/or "Best cinematography", and I don't see that as a strong indicator of black and white films achieving a place of higher relevance in the industry.

Conclusion

It would be naive of me to try to develop a conclusion predicting the future of black and white filmmaking or, to pretend to define in final means how black and white cinema is happening in the contemporary era. It would be necessary to develop researches where every film produced worldwide could be accounted for. Therefore, out of the historical material that I have researched on, which includes theory and praxis regarding monochrome aesthetics through history; considering the new technological possibilities available for those who want to make monochrome images in the moving image art; reading interviews and listening to professionals who have made black and white films to reach relevant positions on the main film festivals of the world lately; I shall be able to rise here the discussion on how I perceive the digital era as a sequence of film history, an era that opens doors for those who want to use black and white aesthetics in their films.

History shows that cinema was only made in black and white because of the lack of technical means to achieve rigorous fidelity to color reproduction and due to impossibility to adapt the early color processes to an industrial producing workflow - from capturing the image to projecting it – that could be reliable. During the development of color cinema, already in the stages that started to be considered good enough to be used by the main producing houses, black and white aesthetics was used as the main form to represent reality and cinema was solely still a monochrome art.

After the overcome of color with the release of higher ISO color stocks, black and white became mainly a specific aesthetic tool or an economic solution. Artistically, monochrome images started to appear in some color films assuming function in the role color images were being used when it was yet fighting to become the industry's aesthetic norm: representing detachment from reality or change of time, as in Cristopher Nolan's Memento (2000) or Martin Campbell's Casino Royale (2006). Therefore, even from the 60's when black and white films were about to be vanished, they were still being produced, "despite the resistance offered by studios and consumers, there is one group within which an interest in black-and-white still thrives – filmmakers themselves"[43] and the examples of films

---

[43] (Misek 96:2010)

in the filmography of important directors are of significant meaning as exemplified with more the detail in the historical chapter of this work. Nowadays these filmmakers who want to make black and white films are still finding their way and some films are reaching the audience internationally, as in the case of Ida (2013), Nebraska (2013), Embrace of the Serpent (2016), Gook (2017), Butterfly Kisses (2017), just to mention some examples.

> Now, by contrast, black-and-white is a means of satisfying the aesthetic craving. It is no coincidence that so many of the most style-driven directors of recent decades have used black-and-white. [...]It is inconceivable that these directors' chromatic choices were not at least partially motivated by the desire to make their films beautiful. In a diary entry, written just before he started shooting *She's Gotta Have It*, Spike Lee gives the game away, writing: "We will shoot this film in beautiful black and white". The continued existence of black-and-white moving imagery owes much to its beauty.[44]

The access to the production of black and white films within the digital technology also gives current filmmakers another good reason to believe in their monochrome ideas. When taking in consideration financial issues related to producing a color film, the theory and praxis of the past keep on ruling, although the color control tools have developed throughout time but also the price using them in a production. The possibility to use digital cameras to shoot black and white films – which goes from the humblest DSLR cameras to the higher end industry cameras - and, still, used techniques to pre produce tests with fast response and to post produce the color images to black and white, plus the newer options to shoot direct in monochrome, have spread the aesthetical possibilities of the final images regarding its depth and latitude and might attract the attention of producers to look at monochrome aesthetics not as a lack of potential but, moreover, as a distinct choice regarding the needs of storytelling. Black and white become a stylized modern language which is backed up by the main camera developers who show the world, with their new releases that they believe in monochrome.

Out of the interviews made on this thesis I understand that at moment of history some filmmakers are starting to question themselves in a deeper and more

---

[44] (Misek 2010-105)

complex way then "how to use color". The question about "is color needed" regarding the scripts to be produced, starts to have more acceptance. As demonstrated in the chapter of Historical Foundation with the usage of black and white material in the film "*If…*"[45], and in the interview with the cinematographer of "Gook"[46] the usage of black and white was what made the shooting of the film possible; even by them being apart by almost fifty years, the reason is the same: Budget. To use black and white as a tool to make a script to get out of the paper might gain more adepts.

To shoot a film in color involves more than just an aesthetic choice, it influences all its producing and makes the workflow more complex with the need of color fidelity, accuracy with color temperature of lights, and the awareness to not use distractive colors in the *mise en scène*. It's not always that colors are used as a key tool for storytelling so its absence should not influence the story of a film negatively. To say that this statement of mine is a prediction that black and white will appear more in contemporary productions would be rather presumptuous. But I believe that certain happenings might develop other actions of the same kind. If there are more black and white films wining festivals, if there are more technical developments regarding the producing of monochrome images, there will be more courage and reasons to go forward with a black and white project and more ways to pitch the idea of a black and white film for a producer or investor. Time is needed to see how all this is going to happen in the next years regarding monochrome images, but surely the digital era is transforming the monochrome way of production by giving to the professionals in the many different levels of the moving image industry wider possibilities and excuses to make their movies in black and white; even if black and white might be only a tool for stylization.

---

[45] Cinematographer Miroslav Ondříček (1968)
[46] Cinematographer Ante Chag (2017)

Bibliography

Itten, Johannes – *The Art of Color - The Subjective Experience and Objective Rationale of Color* (1973:16-17).

Everett, Wendy – *Questions of Colour in Cinema – From Paintbrush to Pixel* (2007:18).

Misek, Richard – *Chromatic Cinema* – (2010:32,46,60,85,97,116,121).

Higgins, Scott - *Aesthetics, Technicolor Cinematography and Design in the late 1930s,* Film History (Volume 11, 1999:55-56-57).

Crosby, Floyd – *Shooting Technicolor on the Sea* Bottom **-** The American Society of Cinematographers (1936).

K. Daniel, Douglas – History of Mass Media in the United States: An Encyclopedia – Edit by Margaret A. Blanchard (1998:405).

Nolan, Christopher – Interwiew for IndieWire website – (1999)
http://www.indiewire.com/1999/04/following-britains-neo-noirist-christopher-nolan-82323/

Ehresntein, David – *If…: School Days*. The Criterion Collection (30 Aug. 2011. Web. 01 May 2017).

Brecht, Bertolt – *Brecht on Theatre: The Development of an Aesthetic*. New York: (HILL and WANG, 1964).

Hunt, R.W.G - *The Reproduction of Colour* - (1995:4,70,565).

Langford, Michel & Bilissi, Efthimia – *Advanced Photography* – (2008:113).

Allen, Elizabeth & Triantaphillidou, Sophie – *The Manual of Photography* (2009:194).

Tiffen, Iara - *American Cinematographer Manual* - (1993:216).

Lenczewski, Ryszard – Interview conceeded to Mr. Guilherme Burgos, via Skype (2017).

Cooke, Nick – Interview conceeded to Mr. Guilherme Burgos, via Skype (2017).

Cheng, Ante – Interview conceeded to Mr. Guilherme Burgos, via Skype (2017).

Chon, Justin – Interview conceeded to Mr. Guilherme Burgos, via Skype (2017).