“Argiaren Ibilbidea Zineman” zinema-argazki zuzendariaren ibilbideari buruzko kronika laburra da film baten filmaketan. Lehenik eta behin, nor den eta bere funtzioa zein den galdetuz, geroago bere jardueraren, ezagutzen eta zinemaren espezialisten kolektiboarekin dituen harremanen eremu delikatuan sakontzeko. Artikuluak, halaber, industria analogikotik sistema digitalera igarotzeak argazki zuzendariaren mentalitatean eta garatu beharreko teknikan izan duen eraginari buruzko informazioa ematen du.

Giltza-Hitzak: Argazki zuzendaria. Zinema industria. Filmaketa. Argiaren erabilera zineman.

“Estela de la Luz en el Cine” es una breve crónica sobre el recorrido del director de fotografía en el rodaje de una película. Primero, preguntándonos quién es y cuál es su función para adentrarnos más tarde en el delicado terreno de su actividad, sus conocimientos y sus relaciones con el colectivo de especialistas en la realización cinematográfica. El artículo informa también del paso sustancial que se ha dado en la industria con la implantación del sistema digital sobre el sistema analógico y su influencia en la mentalidad y la técnica a desarrollar por el director de fotografía.

Palabras Clave: Director de fotografía. Industria cinematográfica. Rodaje de películas. Luz en el cine.

«Dans le sillage de la lumière au cinéma» est une brève chronique du parcours du directeur de la photographie dans la réalisation d'un film. Tout d'abord, nous nous demandons qui il est et quelle est sa fonction, puis nous entrons sur le terrain délicat de son activité, de ses connaissances et de ses relations avec le groupe de spécialistes de la réalisation de films. L'article rend également compte de l'étape importante franchie dans l'industrie avec l'introduction du système numérique par rapport au système analogique et de son influence sur la mentalité et la technique à développer par le directeur de la photographie.

Mots-Clés : Directeur de la photographie. Industrie cinématographique. Prise de vue. Lumière dans le film.

The wake of the light in the cinema

Aguirresarobe, Javier
Jakiunde - Zientzia, Arte eta Letren Akademia. Prim 7, 20006 Donostia
javieraguirresarobe@yahoo.es

http://doi.org/10.61879/riev692zkia202407
Reccep.: 2024-05-31
Acept.: 2024-07-02
BIBLID [eISSN 2952-4180 (2024), 69: 2]

How can we define the role, the craft, or the art of the cinematographer?

It is said that the cinematographers are the creators of the light and the framing that shape a moving image. They use a technology that includes the camera, which captures the scene's image, lighting equipment, and various mechanical elements arranged for the mobility of the camera. A good definition, indeed. Although I will not resign myself to describing their work and personality solely in terms of the tools they use.

The cinematographer's work as an image creator also involves other types of skills. Being imaginative and having a sweet touch of madness in their creativity is important. Passion, sensitivity, ambition, and the ability to visualize their surroundings in a different and original way, plus a few more qualities that are seldom mentioned in photography books, are some of their essential features.

Their value as a professional becomes visible through the results of their work, through their prominence as the author of what we see on a cinema screen. Audiences feel and remember emotional and unforgettable images, but hardly ever ask ourselves how and who created them. Audiencies are usually unaware of the process behind their creation, the author's journey through the mist of technical and human intricacies used to build the image of a film. It is a long and committed process, where technique and art blend together. Intuition and experience. Without forgetting the dose of humanity required for the collaboration with other departments.

The cinematographer practices a profession that depends on many variables. Achieving an outstanding work is almost a miracle. Good cinematography requires an extraordinary script, in the first place, in addition to the suitability for connecting with the ambition and demands of a renowned director and, last but not least, having access to the proper production resources. Many films that we watch in theaters or on television, show an impeccable cinematography. Images that meet the expectations, justify the budgets, and concur with the circumstances of the production. However, at other times, we come across with works that are not more than merely correct or uninspired. There are many projects that do not aspire to authorship in cinematic works. Their level of ambition is low or non-existent. Some producers and directors are happy with an image that is simply "see-able". Nothing more. Don't talk to them about textures, contrasts, dominant colors, etc. Despite this, I will be optimistic and try to analyze the work of cinematographers from a different perspective. Cinematography is a profession that requires emotional and vital stimuli. Technique alone is not the determining factor in their work. I rather mean excitement, self-confidence, persistence, and overcoming failures and disappointments. Not all films will be good, though. It is a profession of sacrifice, and, of course, great satisfactions. Staying in it over the years is a remarkable achievement. There is nothing like feeling master of the light and follow its wake [1].

The connection with the film's director

The making of a film is carried out as a team work. The director assumes the role of captain and makes the main decisions. To do this, they rely on the criteria of their key collaborators, who are, in turn, heads

1 "Master of the light." That's what I thought one day on the set of "The Sea Inside" by Alejandro Amenábar (2004). I was the first to arrive at the studio. The darkness in that vast space was total. The plan for the day required shooting a sunrise scene. I turned on a projector, and there was the light. The fake sun light entered through the window of Javier Bardem's room. It was a warm sun, not too intense. A Galician sun that tried to evoke the presence of the sea.

of teams of more people. For the cinematographer, having good communication with the director is essential. Sometimes, the director has a specific visual idea and insists on applying it. Other times, they encourage the cinematographer to decide how the image of the film will look like. In either case, it is necessary to reach a shared visual idea, a point of connection. A point which is not easy to envisage before the filming begins, for it is not easy to convey what each one imagines or dreams of how an image will look like. Almost always, references are mandatory [2], at least to rule out what doesn't make sense, or is far from what each one has in mind. In the end, it is during the filming, in the day-to-day work, that the visual layout of the film is confirmed.

Communication with the director, despite those initial hesitations, almost always works. There is one simple reason for it, i.e.: it is usually the director who chooses the cinematographer out of several candidates. They do this by speaking with them all. These are interviews where the film or the project doesn't necessarily have to be the theme of the conversation. Both director and cinematographer need to get along; after all they will be working intensely side by side for several weeks.

However, there are other variables that are ought to be considered when hiring a cinematographer. It's not just their ability, creativity, or likeability that matters, but also their affinity with the type of project. Cinema has its genres, such as comedy, action films, horror, musicals, etc. As a result, often the selected one is the one that has a recognized track of titles in their filmography matching the genre of the film to be shot. Being a specialist can be an advantage for getting hired, although it risks being labeled and losing opportunities to get involved in other projects. Furthermore, specialization can constraint creative freedom. Someone specialized in comedies, for example, tends to stick to the dominant "visual look" rules of that genre which are difficult to break. If they specialize in children's films, they cannot be at variance with a bright image pattern, with saturated colors and never dark lighting environments [3]. On the other hand, there are directors whose films invariably reflect a characteristic visual style. This happens with the films of Almodóvar, for example [4]. In this whirlwind of situations, the ideal is to have the prestige of being a professional who adapts to all styles and, can deal with all kinds of projects. And, in the best case, to find oneself with a recognized and up-and-coming director with whom one can maintain a professional relationship across different productions.

---

2 Sometimes it's complicated to get a good reference image. I remember my first meeting with Alejandro Amenábar for the filming of "The Others." Amenábar showed me as a reference a classic scary film that I didn't like. I think his choice was motivated by certain framings and movements, not the lighting. I offered to provide him with something different. And I couldn't find it. I could only come up with a magazine page—a photo of a model with extraordinary color and contrast. At least, it could serve as a reference for the image of Nicole Kidman, who was to be the protagonist. When I showed him the photo, Amenábar nodded, surprised. Afterward, the film wrote its own gothic visual image.

3 I had the opportunity to shoot a couple of films specifically for children. The last one, "Lyle, Lyle, Crocodile," directed by Josh Gordon and Will Speck (2022). The first photographic instruction they gave me was to forget about dark scenes. The word "darkness" was not in the dictionary of that production.

4 It was a great opportunity for me to participate in the filming of "Talk to Her" by Pedro Almodóvar (2002). Its script was extraordinary. I remember fighting from day one to differentiate myself from the visual tone of his films. I negotiated with him the scenes that I felt required more shadows. I eliminated some of the color saturation. I proposed a more selective light. I didn't dislike the result, although the "Almodovarian" style persisted, perhaps with less intensity than in his other films. Almodóvar's style imbues every frame of his films with his personality.

The first observation Woody Allen made to me when he called me to shoot "Vicky Cristina Barcelona" (2007) was: "I want the movie to be warm." He repeated over the phone again and again: "Warm, warm..." in his first conversation with me from NYC. And so it had to be.

Collective Work

Besides getting along well with the director, it's essential to maintain the same positive spirit when collaborating with other department heads. The production designer, or set decorator, is one of the first professionals to join for the pre-production stage of a film. Together with the director, they supervise the initial location scouting. They also design sets and establish a tentative visual style for the film with the colors they propose—the color palette—and the chosen spaces. The director of photography, the cinematographer, comes on board later. Consequently, they find that some of the decisions about the film's visual style have already been made. This marks the beginning of a process that demands shared decision-making.

The (harmonious) relationship with the decorator will significantly influence much of the film's final visual personality, namely, its specific look and colors' mood and tones, the selected locations, the arrangement of windows at these locations. Even more, the landscape of the outdoor spaces and their orientation relative to the sun, the decoration style — all are elements to consider, and can either facilitate or hinder the filming process, with a corresponding impact on the image's quality. At this point is worth noting how essential it is to secure a smooth communication with the set decorator. For they need to understand the issues related with "light contrast" in a scene, and be able to adjust accordingly the set's ornamentation density. They must see and feel the set's space with the same eyes as you do.

The costume designer also enters the tight circle of important collaborators. The proposed color palette for the film dictates the costume tones— whether through similarity or contrast. Additionally, the density of the tones, whether dark or light, relates to daytime or nighttime scenes. The characters' costumes or outfits ought to balance the scenes in relation to the other characters with texture and colors. Costume design is always important, not only in period films. In science fiction, even in fantasy productions, costumes, makeup, and hairstyling contribute significantly to the overall visual impact of the image [5].

Set design, costumes, makeup, and hairstyling are essential departments that influence the image. However, other specialties' importance may vary depending on the film genre. Today, it is common for films to include scenes with digital effects (DFX). Sometimes these are images that, after being filmed, are manipulated with the help of a computer software. Sometimes, they are computer generated images (CGI) from scratch. The use of visual effects is no longer exclusive to great science fiction or Marvel universe productions. For several years now, it's been common to have a visual effects producer (VFX supervisor) on the filming set, a necessary collaborator in the photographic work [6].

---

5 I want to highlight the visual work in "Poor Things" by Yorgos Lanthimos (2023), with Robbie Ryan as the director of photography. This film had about 30 specialists in makeup, hairstyling, and prosthetics for several of the protagonists. It featured sophisticated, original costumes and a set design involving DFX and VFX technicians to create fascinating baroque settings. It's a film with a dazzling visual aesthetic, an example of high-level collective collaboration.

6 I had the opportunity to work on a Marvel production titled "Thor Ragnarok", directed by Taika Waititi (2017). When I was hired, they told me that almost 100% of the shots would be filmed with chroma screens. And that's how it was. Chromas are green or blue screens, with a specific shine and texture, used to separate the characters, who are in the foreground, from non-existent backgrounds or sets, which are typically created by computer. My lighting work focused on the main actors placed in a space surrounded by chromas that, in the final image, turned into large cities, endless hallways, vast areas where aircraft were parked, etc. During filming, however, the real elements in front of the camera were minimal. A couple of columns, a piece of the floor, a throne... The rest was virtual. While shooting, I always wondered what the image hidden behind the chroma would look like. I needed a reference. The production designer's team provided me with wonderful descriptive drawings to give me an idea. Based on these, I

Since the dawn of cinema, the work and collaboration of special-effects technicians have been vital. They are the inventors of the practical effects that are filmed live. Some specialize in complex action scenes. Others in explosions. There are countless inventions applied by these highly imaginative specialists during the filming. They also organize artificial rain and create the smoke that in the outdoor scenes simulate fog, and in the indoor ones produces a lighting atmosphere that influences the scene's color and contrast. Finally, there's the world of stunt performers, who replace the main actors in dangerous scenes. Their coordinator is someone with whom a dialogue must also be established in many sequences where they are involved.

On the filming set

The cinematographer organizes the day's work on the filming set, assisted by a team of professionals. These are the camera operators, the electricians, whose chief is called the "gaffer", and the grips, who follow the instructions of their own chief, the "key grip", and are responsible of rigging cameras, building dollies and tracks, operating cranes, and managing pullers to capture footage just as the cinematographer envisions it. The camera team is led by the first assistant, who looks after the team's job, and is habitually assisted by the video assistant. Digital cinema has given rise to other specialists, such as lighting programmers and the DIT (Digital Imaging Technician). The electricians are divided into two groups: those who work on the set during the filming, and the "rigging technicians", who prepare the lighting for the following days, outside of filming hours. Collaboration between all these individuals and the cinematographer is crucial. Smooth communication and rapport with each collaborator on the filming set help ensure good work is done and the organized daily-schedule is met [7].

On the set, the dialogue with operators focuses on decisions to be made about where the cameras should be placed and the planning of their movements. With the grips, it's about how to carry out these movements. With the gaffer, it's about positioning the light sources and selecting the type of projectors.

---

was encouraged to design the lighting and contrast in the space where the actors were, trusting that the visual effects supervisor would maintain the continuity of my lighting in the space created behind the chromas.

7 Sticking to the schedule is sometimes an obsessive concern for the cinematographer. During filming, the responsibility to meet that schedule falls more heavily on their shoulders than on others in the crew. This relates to the high demands of building the light and camera movements concerning the sequence's complexity. Other variables also play a role. For instance, the number of actors and extras involved, makeup, hairstyling, and costumes. Developing a viable plan requires a commitment from all department heads. Actors must be ready at a specific time, as must the lighting and cameras, according to a variable and complex shooting schedule. Decisions to create the plan are made during pre-production and usually undergo numerous changes throughout filming days.

When the schedule involves shooting outdoors, meeting the schedule is always highly uncertain. Outside the studio, the team works at the mercy of weather conditions. The sun, clouds, wind, and rain affect the continuity of a sequence's image, sometimes forcing the team to wait with crossed arms for the ideal moments to shoot. I remember filming "Fright Night" with Craig Gillespie (2011) in New Mexico. The skies in that place, with clouds in different colors, were extraordinarily beautiful, but I couldn't photograph them because of the presence of electrical storms that forced the crew to seek shelter and pack away the equipment.

Luck is a factor to consider. A very windy day can ruin a day's work. Another memorable outdoor filming experience I had was during "The Enchanted Forest" by Jose Luis Cuerda (1987), which was set mainly in a Galician forest during what locals said was the sunniest July of the century. That forest at 4 pm. inspired nothing. Five hours later, it was wonderful. The solution to achieve its mysterious air was thanks to J. L. Cuerda's generosity, whose schedule allowed us to start, when the sun was at its peak, with close-up shots, then move to medium shots, and finally shoot the wide shots when the sun was disappearing on the horizon.

With the first assistant, the film's focus puller, the discussion involves determining the T-stop, i.e.: the precise aperture of the diaphragm so that the amount of light transmitted through the camera's lens and reaching the sensor, is the right one in accordance to the sensitivity of the film, or of the camera itself if it is digital. Whenever computer generated visual effects are in order, it's about positioning and lighting the chromas according to the instructions of the visual effect supervisor (VFX).

The number of camera operators, assistants, electricians, grips, etc., varies depending on the production. In a big-budget Hollywood studio film, there are days when there might be three or four camera operators, six to eight assistants, twelve or more electricians, and eight to ten grips— a team of over forty people.

Analog Cinematography

Until recently, cinematographic photography had no option other than to relying photochemical processes. Scenes were captured using cameras loaded with film, which typically ran at a speed of 24 frames per second. The captured image would be impressed latently onto the sensitive emulsion until it was developed in the laboratory. This photographic impression was achieved frame by frame, thanks to a shutter that opened synchronized with the film reel. In addition, the lenses enabled the capture of the scene and its fixation onto the photographic emulsion. It was a fully analog system in line with the invention of the Lumière brothers, which evolved over the years with the use of more precise, lightweighter, and progressively better soundproofed cameras. From the Hollywood's golden ages, we remember images of film shoots with large cameras, insulated to reduce their own noise. Elsewhere, smaller but noisier cameras were ordinarily used until the late 1970s, a system that made it impossible to shoot with direct sound. Actors had to re-perform their roles in dubbing studios. (As an anecdote, when soundproofed cameras were introduced, a rumor spread that some actors missed the noise of the camera, arguing that it helped them to focus on their performance). It was in the mid-1970s that new filmmakers prioritized shooting with direct sound, even though it required the use of bulky, shielded cameras [8]. Finally, lighter and soundproofed cameras arrived on the market, changing the way films were made everywhere.

Earlier, before mentioning the direct sound practice, I mentioned that in the photochemical process, images remain latent until their development makes them visible in the form of negatives. As such, these images needed to be re-exposed by contact onto a positive sensitive material in order to be projected. This technical process was shrouded in a certain mystery and high expectations. No one dared to predict the results of a shoot until, after a few hours or days, the positive material could be viewed on a screen. The screening of the MOS, literally "mit-out sound", also known as a workprint (a working copy without sound), was either a bitter or sweet moment for the cinematographer. It was the moment when the cinematographer's work was scrutinized for the quality of the light and the exposure of the projected image. Others, like heads of departments, actors, and even the director, also felt judged, but less severely.

8 At the beginning of my career, in the mid-1970s, I shot several short films with young filmmakers, almost all of them colleagues from the Film School. One of the priorities on those shoots was direct sound. If we were shooting in 16mm, we could use lighter cameras. The problem was enlarging the film to 35mm, which was a real luxury at the time. If the shoot was in 35mm, we had no choice but to use noisy cameras. To silence them and use them for direct sound, we covered them with a large blimp, tripling their exterior size. With the blimp, they became incredibly heavy and difficult to control. The other option was to use cameras like those in the American industry (the Mark II was one of them). These were soundproof cameras that required four people to handle them. A few years later, the industry welcomed the arrival of direct sound cameras that became widely adopted for their lightness and ease of handling (the so-called Arri BL cameras). These cameras changed the way movies were shot accross the world.

Once the lights came back on, the only discussion was about how beautiful, or dreadful, the lighting was, the photogenic quality of the actors, etc. Silence was not a good sign [9].

This mystery in capturing images with analog cameras was partially mitigated when it became possible to transmit a video signal that displayed exactly what the operator was seeing while filming the scene. From that point on, the director could get a precise idea of the composition, framing, movement in the scene, and the actors' performance. For the cinematographer, it was a huge relief. If the video signal transmitted visual parameters similar to those of the film, it could even allow to form an impression about how shadows and scene contrast manifested.

In the photochemical process, the cinematographer was the primary decision-maker towards selecting the type of sensitive emulsion to be used. Several factors influenced this decision, such as the type of story being told, the prevalence of either daytime or nighttime scenes, filming locations, the actors' skin tones, and the cinematographer's experience with the performance and results of different types of film stock. Emulsions differed primarily in their of light sensitivity, contrast, texture, and color. For many years, Fuji Corporation and Eastman Kodak Company were the main suppliers of negative stock. Fuji was slightly more affordable than Kodak, and its emulsions offered different color tones, with a predominance of cyan hues. Kodak provided a standard quality that was more neutral, with skin tones tailored to the preferences of the American film industry [10].

With the arrival of digital cameras in the film industry, there was a sharp decline in sales of negative film stocks. Fuji stopped production, and Kodak continued until it filed for bankruptcy in 2010. Kodak suffered massive financial losses during the early years of the digital camera boom, leading to a moment where it seemed analog film production was coming to an end. The majority of labs closed down. In response to this disruptive change in the industry, Hollywood reacted. The major studios decided to ensure Kodak's survival by committing to purchasing a certain annual amount of negative film stocks, enough to make manufacturing viable for a few months each year. As a result, every year, significant productions continue to be shot on film, either in 35mm or 65mm formats. Furthermore, there are even nowadays renowned directors who reject working with digital systems. For them, it’s not about nostalgia but about the unique

9 The screening of the workprint often turned out to be traumatic. The cinematographer depended on the lab’s work—on their accuracy in color and the density of the positive. Among the many screening stories, I recall the one of the film "The Others" by Alejandro Amenábar. The lab where the film was processed was MadridFilm, which had a good projection room. "The Others" was a co-production in which Tom Cruise was actively involved with his wife, Nicole Kidman, as the lead actress. The lab opted to shield the building during the projection hours. Only essential personnel could enter. Tom Cruise always arrived the last, just when the lights were going down, and used to sit alone in the back rows. During the projection, you couldn’t hear a fly. When it ended, we used to glance at each other, communicating with slight gestures. But this day, no one dared to say anything. The next day, on the set, the producer told us what Cruise thought about what he had seen. We all felt fearful during that shoot. The possibility of being fired terrified us. We took it for granted that one mistake would end our careers. Nonetheless, the film proceeded without any such incidents.

In Barcelona, years later, during the screening of “Vicky Cristina Barcelona”, the unusual anecdote was that Woody Allen requested a blindfold be put on the projectionist. He didn’t want any intruders or outside eyes, other than those of his usual collaborators. Seeing is believing.

10 Odd as it may seem, I always doubted the quality of the rolls of negative material imported by the Spanish delegation of Kodak. I was convinced that the film used in American productions was superior. Photographic emulsion is an organic material that doesn’t necessarily meet impeccable standards all the time. For that reason, I would always test the emulsions available for my shoots. And indeed, I found noticeable quality differences on several occasions. These tests irritated my commercial friends at the American company.

qualities of film that differ from digital cameras [11]. According to them, the photochemical image is warmer, has more depth, and a human connection that digital film lacks. There are additional arguments. The storage and preservation of photochemical negatives are far more durable than digital archives. The working routine on the filming set also differs between film and digital systems. All in all, films shot on film stock—especially large-format ones, like 65mm—enjoy greater prestige within the industry. In 2020, among the ten films nominated for the Oscars, five had been shot on photographic film. Those predicting the death of photochemical film will have to wait a few more years. Some professionals even claim eternal life for the photochemical film. Currently, productions often combine digital and analog systems, mixing various formats and alternating between black-and-white and color sequences. There are even scenes shot in Super-8 or 16mm mixed with conventional digital footage. The cinematographic language today is bolder than ever, and in many cases, it still requires the contribution of the photochemical system.

In an analog shoot, the cinematographer is not only responsible for designing the lighting atmosphere in a scene but also for applying the right technique to ensure this creation is properly recorded on the sensitive emulsion. To do this, they rely on a light meter that measures both highlights and shadows and decides the T-stop, i.e.: the lens aperture, depending on the sensitivity and latitude (the extent to which the film can be either over- or under-exposed and yet yield a satisfactory result) of the chosen film emulsion. After development, proper light exposure results in a negative with color and density values that can be manipulated. The copy can be made darker or lighter, with warmer or cooler tones. However, until recently, it was difficult to alter the contrast between intense lights and shadows in a scene, which was a key factor in the personality of the photographic image. The photochemical process didn't allow for much experimentation. Attempts of altering color, creating intense shadows, or overexposed highlights had to be recorded in the negative during filming, as the development and printing parameters were virtually unchangeable [12].

The arrival of the so-called Digital Intermediate (DI), at the beginning of the 21st century marked a significant significant leap forward in the manipulation of the photographic values embedded in the negative. This new system, which came alongside technical advancements in telecine technology, which enables a motion picture, originally recorded on photographic film, to be viewed on a standard video equipment, opened the door to greater freedom for adjusting color, contrast, and texture in film copies. It became a key tool in the post-production of films. Additionally, the DI has led to the rise of a new specialist, the colorist, who requires a high level of technical and creative expertise. Today, there are highly sought-

11 Hoyte van Hoytema, Oscar winner for his cinematography in "Oppenheimer", is absolutely in favor of continuing to shoot with analog cameras and in 65mm format. He comments: "The depth, detail, and color quality captured with an IMAX camera have yet to be surpassed. Part of my job is overcoming the difficulties of shooting in this format today and pushing camera and lens rental companies to continue developing new technology that will make this format even better."

Bennett Miller, director of films like "Foxcatcher", "Capote", and "Moneyball", mentions that when you compare film and digital side by side, the image on film moves you immediately. The digital image gives off a clearer, more precise, and dry feeling that doesn't reach the dimension of photochemical film. In my opinion, I don't think there's a huge difference between both systems. However, I must say that a proposal to shoot in traditional photochemical film means working with a director who sees the image as one of the vital elements in telling a story. As an anecdote, I mention that my last film shot with an analog camera was "Blue Jasmine" by Woody Allen (2013).

12 All cinematographers have been tempted to break the rigid parameters of the photochemical process. I ventured to do so on "Beltenebros" by Pilar Miró (1992). It was a unique opportunity because the circumstances were just right for achieving a good result. I skipped one of the development baths, the bleach bath, to get a more contrasty negative with very little color. By printing onto a low-contrast positive film, I obtained an extraordinary copy with cold tones and almost black-and-white quality. When the low-contrast positive emulsion disappeared from the market, so did the opportunity to repeat my experiment.

after, prestigious colorists in the film industry. They strive to extract the maximum potential from the negative in harmony with the cinematographer's vision for the image [13]. Nowadays, the DI system remains as relevant as ever, thanks to technological advancements that improve the reading of both photochemical and digital files.

The Digital Cinematography

Digital cameras capture images in a way similar to how the human eye's retina does. Just as nerve impulses reach the brain and are then precessed to generate "vision", in digital cameras, electrical signals are processed to form the digital "image". It's a complex technology based on sensors containing millions of receptors, called photo-diodes, capable of converting light energy into electrical charge in accordance to the light intensity they receive. For capturing colors, the photo-diodes are equipped with red, green, and blue filters. The electrical signals are transmitted from these photo-diodes to a processor that deals with the intensity, color and brightness values of each of the pixels that make up the digital image. The size of the camera sensor is one of the determining factors of the quality of the obtained image. If two sensors have the same total number of pixels but one is physically larger than the other, each photo-diode in the larger one captures more photons with relatively less noise. It gathers more information, which at the end results in a better image. It's very useful to be aware the characteristics of a digital camera and its internal design in order to select the most suitable one for any given specific project. Key considerations refer to understanding the relationship between the sensor's size and the maximum number of photo-diodes, the number of pixels it contains, and the distance between them, the dynamic range, which informs us of the exposure latitude in terms of F-stop (how much light it is allowed to reach the sensor), the formats in which it records, and the number of pixels contained horizontally in each format, which gives an idea of the image resolution.

A few years ago, Netflix requested certain technical conditions for the digital cameras employed to record its productions. One of them was that the resolution had to be at least 4K. This requirement by the powerful streaming platform, led to the construction of new cameras with larger sensors and the use of lenses with greater coverage power. Nowadays, there are digital cameras that reach 8K resolution, designed for projects that may be displayed on televisions capable to hold such high level of definition. It is important to remember that commercial cinema projectors are designed for the projection of digital cinema packages (DCP) with a 2K resolution.

Shooting with these professional cameras is easier than with negative film cameras. For example, the color temperature of the camera can be changed simply by pressing a button. With an analog camera, color filters or different emulsions were needed according to the color temperature of the scene. The sensitivity of digital cameras ranges from 120 (ISO) to over 4000 (ISO). The film loaded in an analog camera has a specific sensitivity, and if you need to shoot in low light, you need to load the camera with a more sensitive film. Digital cameras, in night shoots, can "see" more than the human eye. No photochemical negative matches the capacity of digital sensors in low-light environments. All this makes the use of digital cameras to appear more advantageous than traditional ones. It is more convenient,

13 My first major experience with the DI process was working with colorist Mike Hatzer, who collaborated with me on the final print of "The Road" by John Hillcoat (2009). Even though the negative was already special, Mike encouraged me to push it to the limit to achieve a positive with desaturated color, almost black and white, cold, eliminating any hint of green in the fields and accentuating the apocalyptic tone of the story.

flexible, and economical. It requires less light in the scene. It can record continuously for a long time. Finally, due to its optimized design and shape, the camera's body is smaller, weights less, and therefore, is easier to handle. The use of less light in scene lighting and the cost of film, which also includes the cost of its photochemical development process, makes digital production significantly cheaper than analog production. This is why digital cameras were rapidly adopted in the industry, and I think it has been a definitive shift. In a short time, they replaced traditional cameras on film shoots, marking the start a new time in scene recording taking advantage of many technological advancements that have significantly improved image quality.

Innovations in the Digital Cinematography

In both, analog and digital shooting, the work of the Director of Photography (DP), the cinematographer, is practically the same, though the digital process renders some technical aspects easier. There is no need for light meters. There is no intermediacy of labs in the process. The images of the scene are seen at the moment of recording. Corrections can be made on the spot, either with lighting adjustments or by changing the lenses' apertures. Direct vision helps in all respects, whether to fine-tune exposure or create lighting nuances and correct colors. What used to be a mystery is now seen live on the numerous monitors distributed around the set. There is no secret to hide. The image, though not definitive, is an open window to both, the crew's critique and feedback.

The digital path has opened the door to certain innovations and changes of the DP's work routine. The new system has the necessitated collaboration with new specialists, one of them being the DIT (Digital Imaging Technician), who manages and supervises the capture, handling, and storage of images. The DIT ensures the integrity and quality of the digital images and facilitates their workflow and storage for further processing and distribution. The DIT's collaboration with the DP is essential for making adjustments and corrections in real-time during filming, and for other creative decisions, especially in color and texture. Habitually, the color space transmitted from the cameras to the monitors, the so-called LUT (Look-Up Tables), is neutral and known as Rec709. This color space interprets the scene without any manipulation. The DP, in agreement with the DIT, can replace this LUT with a more personalized one [14].

Lenses

An important topic that I don't want to overlook is related to lenses. The same lenses can be used in both analog and digital cameras. Choosing an emulsion is important for achieving a special texture. The choice of a digital camera is also crucial, due to its color and resolution characteristics. The selection of lenses is another key factor in personalizing the work of the director of photography. Each brand and series of lenses has distinctive characteristics. Some are more contrasted, others are softer. Some are warmer, while others are neutral, etc. There are spherical lenses and the so-called anamorphic lenses, which

14 The new LUT can be created by modifying the logarithmic curve that affects color response. There are pre-existing LUTs whose "usage licences" can be purchased, such as those that match the look of Eastman color photography from the 1980s or those resembling the color quality of Kodachrome Super-8 film from that era. Others can mimic the color and contrast characteristics of Fuji emulsions. As you can see, the LUT can become a highly variable color space that can be tailored in the final print to match the color concept designed for a specific story.

contain a cylindrical component to vertically compress the image. Some achieve precise outlines, while others, on the contrary, react to bright lights and scatter their light, creating the so-called “flare” effect. There are “vintage” lenses and super modern lenses. The choice of optics determines the film's look and, consequently, its final image.

Epilogue

With this brief article, I have tried to put forward the tools, the technical means, and the human relationships in the journey of a director of photography in performing their role in creating cinematographic images. I have also pointed out the radical change in their work habits with the advent of digital cinema. Although I haven't delved deeply into the technical aspects, I have commented upon the importance of technology at performing their work. Even so, I don’t believe that an exhaustive technical knowledge is essential. The function and work of the director of photography should as well be guided by their imagination and intuition, their way of seeing the world, their unique perspective on their surroundings, their curiosity in understanding artistic movements, and their ability to dream of the image of a film even before it is shot or recorded.