Different Techniques Which led to Chroma Keying.

Abstract

In our modern world, with just a push of a button or the click of a mouse, we can remove a background or add all kinds of new scenes to a movie with the help of computers and cameras. It's easy to forget that the very first motion pictures were, themselves, essentially special effects. It has generally been forgotten how these special effects were created.

Keywords:

Chroma Key, Green Screens, Matte, Blue Screen, Williams Process, Norman Dawn.

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1. **Introduction. (61)**

The use of green screens in weather forecasts is well-known. In post-production, the weather map is added to the green background against which the forecaster is positioned. Movie productions that rely on separately filmed or animated background shootings are another common application for green screens. *Chroma keying* is a technique for changing a monochromatic background to a different one.

2. **Literature review. (78)**

The main book I used for my research is *Editing and Special/Visual Effects*,(2016) which had concise information about editing and visuals. The chapters are written in chronological order. This was helpful for me when I needed to understand the different stages of development of the green screen.

One of my main resources was YouTube: *A Brief History of Chroma Keying and Compositing* (Ryan Rakowski, 2015).

It was tremendously helpful and lead me to other sources with more information.

3. **Matte. (227)**

The background of contemporary greenscreen was the history of optical illusions. At the end of the 19th century, Georges Méliès was one of the first prolific filmmakers in history. The man who devoted his life to learning the craft of illusion. Méliès used a visual technique that is the primitive forerunner of what we now think of as greenscreen compositing in his 1898 film "*Four Heads are better than one",* in which he used mattes for multiple exposures. Parrill and William B said This was the very first *matte* which was used in moving pictures. (2011, Parrill, William B.)

Méliès would use a piece of glass with black paint on it to black out certain scenes in his movie. This is referred to as a "matte," and it was created to exclude all light from the film so that it would not be exposed to light. Then Méliès would stop the film, rewind it, and this time expose only the area of the frame that had been covered by the matte previously. The double exposure was created entirely within the camera and would combine two or more distinct photos into a single frame.

The issue with mattes was that the camera had to remain motionless at all times, and nothing could cross the matte line, the boundary between the real-time action and the matte painting.

4. **Williams Process** (**Travelling Matte). (162)**

Black matting, a technique that Frank Williams first invented in 1918, was used to shoot the couple against a blank background and then create a travelling matte to composite them against a

transforming background in the movie "S*unrise", 1927*. The film would then be duplicated to highly contrasted negatives until a silhouette in black and white was visible.

The Williams Process, often known as the black back matte effect, was utilised in 1933 for the movie "*The Invisible Man".* In order to capture the scenes in which the invisible man was stripping off his clothes, the actor had to be photographed while wearing a full black suit and posing in front of a black surface this is also known as "self-matte". Even after more efficient procedures were introduced, this effect continued to be used because it was so memorable.

The problem with the Williams Process was that the shadows of the subject would disappear in the matte.

5. **Dunning process. (75)**

Around 1925, C. Dodge Dunning created a novel alternative that employed two colours, lighting a backdrop screen with blue and the foreground subject with yellow. The Dunning Pomeroy process would support the blue and yellow light to produce a travelling matte by applying coloured filters and dyes. The Dunning process was first used in *"King Kong"* (1933) in the scenes where King Kong comes through the big village gates. (Mitchell, Mitch 2004)

6. Blue Screen. (133)

As the years went by, many effects artists adopted the concept of utilising a blue screen to isolate an element photographically to produce colour composites and colour film became available. “One of the early examples of the process was developed by Lawrence Butler for Alexander Korda's “*The Thief of Baghdad”* in 1940. The colour blue was used because there is very little blue in skin tones and had the smallest amount of grains”. (Mark 2011) With the help of an Optical Printer, Butler would combine multiple film strips into one. He would remove the blue background from the foreground, then using the negative of the travelling matte, removes the foreground from the background and at last, combs both of them together. Hollywood continued to experiment with other bluescreen techniques, such as the Ultra violet matte that was utilised in "*The Old Man and the Sea.*"

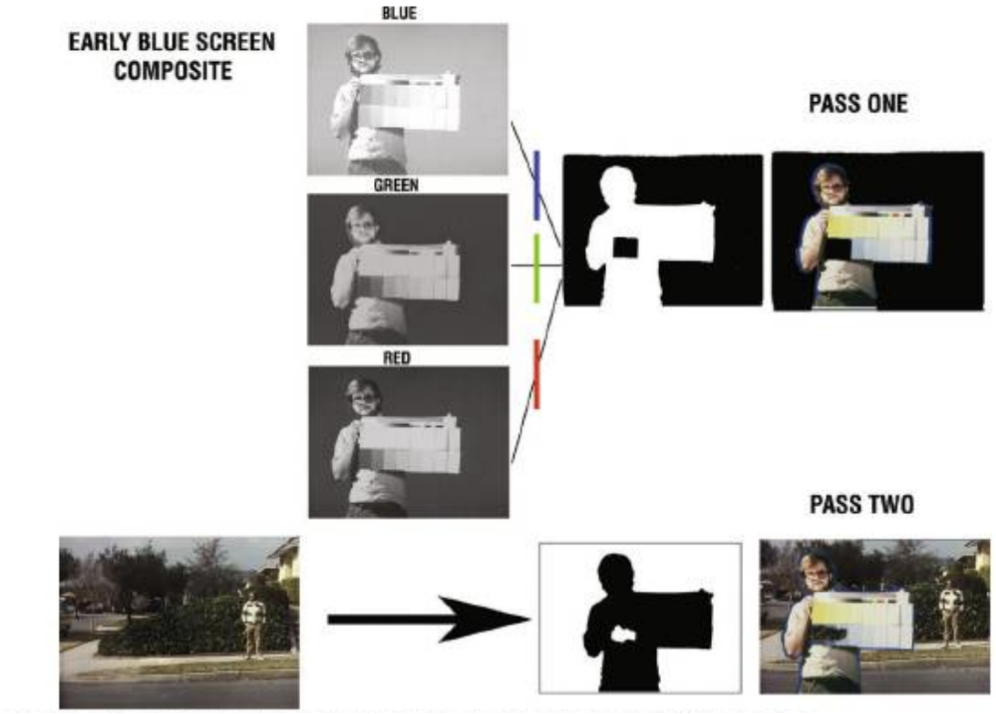

Fig. 1. Blue screen technique made by Lawrence Butler.

7. **Sodium Vapour. (327)**

The true bluescreen rival was developed in the late 1950s and is ascribed to one of the world's greatest compositors, Petro Vlahos. Vlahos created it in the middle of the 1950s, and the Walt Disney Studios made great use of it in the 1960s and 1970s.

Actors were lit with sodium vapour lights and stood in front of a white screen that was illuminated by stronger sodium vapour lights, which are the orange lights you see on old street lights. Only light with an average wavelength of 589.3 nanometers is emitted by sodium vapour. The wavelength of sodium vapour light was split off with the use of a specially coated prism and captured on a unique black and white film, automatically creating the black and white travelling matte, in an antique three-strip technicolour camera. The leftover light would be captured by standard three-strip technicolour film, which was mostly unaffected by the yellow/orange sodium vapour lights.

Disney originally employed this technique in the 1961 movies "*The Parent Trap*" and "*The Absent Minded Professor,*" both of which had some of the greatest travelling mattes of the period. "*Mary Poppins*", which won an Oscar for best special effects in 1964, demonstrated the capability of the sodium vapour method.

The only issue was that there was only one sodium vapour prism ever built. Disney owned the camera and would not allow it to be rented at an affordable price.

8. **Vlahos Separation. (187)**

In the late 1950s, when MGM was prepared to film "*Ben Hur*" with MGM Camera 65 format, they went to Petro Vlahos, for help with the bluescreen compositing. However, the sodium vapour process was ineffective because its prism was designed for only 35mm film, not 65mm. Vlahos was thus tasked with finding a way to enhance the bluescreen procedure with the 65mm.

All colours which are not purely green or blue, have an equal amount of green and blue in them. To separate the matte from the bluescreen, Vlahos employed a green cancellation separation (or positive). He passed the film through the original colour negative, then exposed both the pieces of film simultaneously under a blue light to achieve a "blue difference matte". The blue separation positive was then combined with the original negative and then exposed under red light to get a cover matte. The cover matte was put back to the original colour separations with the exception of replacing the blue separation with a composite of the green and the green difference mask, which created a synthetic blue separation. To go from the composite negative to the composite internegative, this intricate procedure needed 12 film elements, but it was impressive in how it fixed the edge and fine details of issues that hampered the blue screen on its own. In fact, the method was so effective that it was widely used for approximately 40 years.

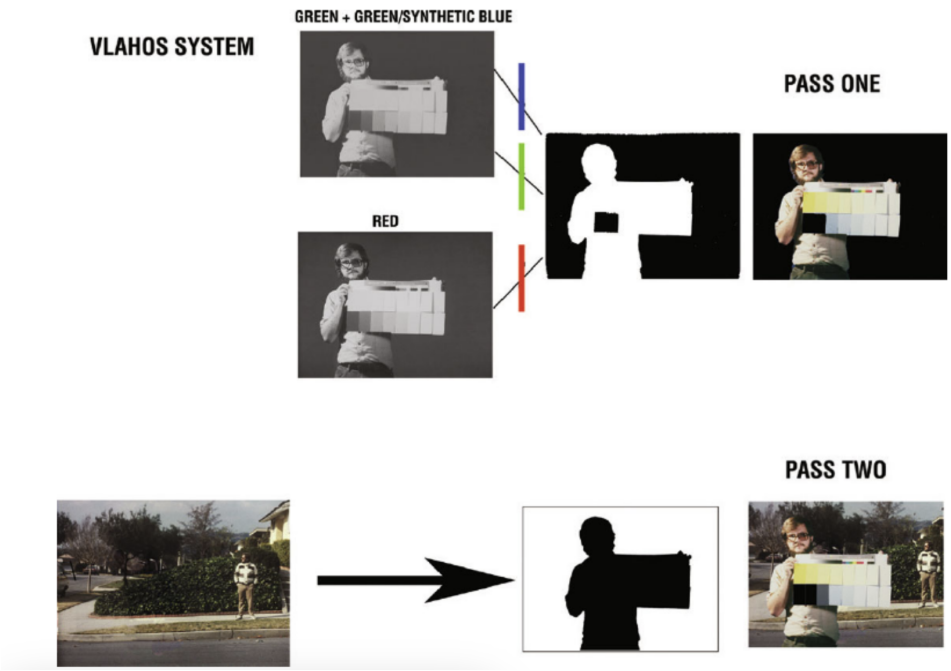

Fig. 2. Vlahos separation technique made by Petro Vlahos.

9. Chroma Key. (170)

In the past, only video systems were covered by the phrase "chroma key." That is no longer the case. A “keyer” was a mathematical procedure used in early video mixers to make a variety of colours in a video signal transparent. Of course, weather map special effects are used frequently in television newsrooms all around the world.

When movies began digital post-production in the late 1990s, green began to overtake blue as the dominant screen hue. Why green? In general, green was less expensive to light than blue, registered as brighter on electronic displays, and worked well outdoors (where the blue screen might match the sky). Additionally, since digital cameras have begun to replace film cameras, many digital sensors now employ a Bayer Pattern to collect brightness, which has twice as many

green photosites as blue photosites. Because of this, current digital cameras are significantly more sensitive to the green portion of the spectrum, making it slightly simpler to pull a matte from the greenscreen.

10. Conclusion. (131)

Depending on the requirements of the shot, additional colours can also be utilised in addition to blue. Therefore, chroma key, a phrase that today encompasses much more than its original video approach, may be utilised to insert backdrops and set expansions In ways that Georges Méliès and Norman Dawn could only imagine. This is achievable due to cutting-edge software and motion-controlled cameras.

Special effects have been used by filmmakers to advance the medium since the beginning. The only thing that matters in filmmaking, without a doubt, is what is on the screen. It ultimately comes down to opening a window into another world, from Edwin S. Porter's matting railway station window to the contemporary action spectacular. All of these effects we have are the only means to get there.

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13. List of Figures.

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Fig. 2 Sawicki, Mark. (2011) *Filming the Fantastic: A Guide to Visual Effects Cinematography*. Available at: http://ebookcentral.proquest.com/lib/ual/detail.action?docID=739038. [Accessed 16 Dec. 2022]