

## Demystifying Color: Gaumont Chronochrome

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Basic Issues and Training

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The study of Gaumont Chronochrome film exists as an afterthought, a frantic attempt to commend the system's technological abilities and document its place in the history of early additive color processes. Chronochrome - created by Léon Gaumont, patented on February 11<sup>th</sup>, 1911 and presented to the public in 1912 - should be recognized as a progressive solution to flicker, bleeding, and fringing during the infancy of colored moving images.<sup>1 2 3</sup> Shooting and projecting Chronochrome was cumbersome, fraught with complicated adjustments and technical hurdles. It should not be overlooked because of these inefficiencies, but recognized as a pivotal invention in capturing and projecting simultaneous images of natural color<sup>4</sup>.

An additive color system in film refers to the process of recording light values as they pass through colored filters on sensitized film stock. Although the image projected appears to be 'in color', the film stock is monochromatic and light passes through it to be registered in associated filters. In three-color systems like Chronochrome, it is necessary to record blue, green, and red components to achieve the full spectrum of visible color. An additive color system using blue, green, and red filters will produce cyan, magenta, and yellow overlaps and pure white at the convergence of the primary elements. The desired result of these early additive systems was an ability to capture natural colors and reproduce life-like images.

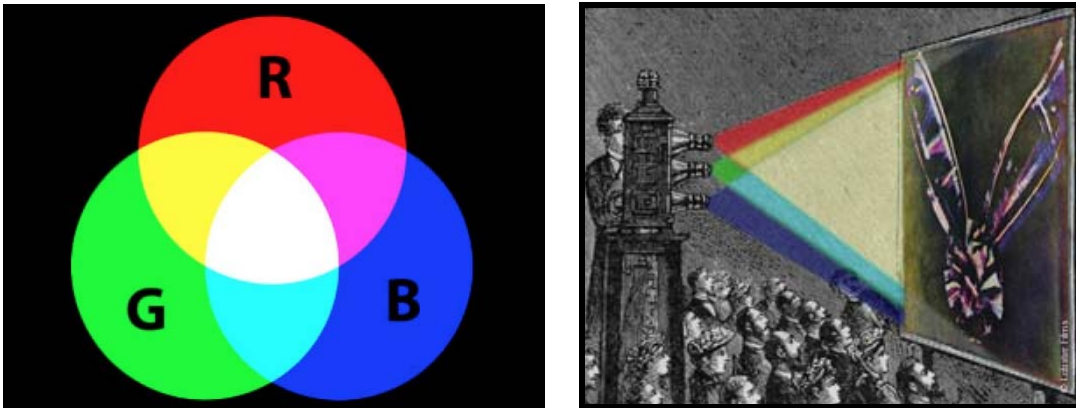
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<sup>1</sup> "Gaumont Pathé Archives: Trichromie / Chronochrome," Gaumont Pathé Archives, section goes here, <http://www.gaumontpathearchives.com/>.

<sup>2</sup> Laurent Mannoni, "Chronochrome Gaumont," in *Encyclopedia of Early Cinema*, by Richard Abel (Abingdon, Oxon, OX: Routledge, 2005), 169.

<sup>3</sup> Léon Gaumont, "Gaumont Chronochrome Process Described by the Inventor," in *A Technological History of Motion Pictures and Television; an Anthology from the Pages of the Journal of the Society of Motion Picture and Television Engineers.*, ed. Raymond Fielding (Berkeley: University of California Press, 1967), 67.

<sup>4</sup> Karine Mauduit and Delphine Warin, La Cinémathèque française, "La Couleur dans le fonds Gaumont : le Chronochrome," Last modified 2006, <http://www.bifi.fr/public/ap/article.php?id=252>.



*Results of an additive color system (left) represented by “The three-colour process by James Clerk Maxwell” (right).<sup>5</sup>*

In papers found after his death, inventor Léon Gaumont – founder of the Gaumont Film Production Company and an established figure in the field- wrote an announcement for the Chronophonograph, Elgephone, and finally Chronochrome, briefly addressed towards the end of the document as “Research in Color”.<sup>6</sup> This primary source expresses Gaumont’s intentions and the process of creating moving images in Chronochrome. In his words (translated from French), Gaumont explains:

Each image appearing on the screen in natural colors was formed by superimposition of three images, violet, green and orange. The combined radiation of these colors results in the reproduction of natural colors. The image was photographed by three [lenses] placed one above the other, each provided with a glass color filter [...] In this process the single image of ordinary motion pictures is replaced by three images simultaneously projected and superimposed.<sup>7</sup>

<sup>5</sup> "The invention of cinema in colour," europafilmtreasures.eu.

[Photo credit]

<sup>6</sup> Léon Gaumont, "Gaumont Chronochrome Process Described by the Inventor," (Berkeley: University of California Press, 1967), 67.

<sup>7</sup> Ibid.

In this text, Gaumont notes that three times the amount of film and “very rapid movement” would be necessary for Chronochrome’s success as a system without adjustments.<sup>8</sup> To combat these technical difficulties, the size of each frame is condensed so that three Chronochrome frames exist in the space allotted for two standard size frames.<sup>9</sup> By condensing the frame size from the traditional 18mm x 24mm measurement, Chronochrome aspect ratio is approximately 1:1.71 and uses only 2¼ to 2½ times ordinary film length.<sup>10 11</sup> The result is a slightly panoramic projection, but one of “higher image quality than that of other systems using filters” achieved by using “almost full size component images”.<sup>12 13</sup>



*“A demonstration film in Gaumont Chronochrome” presenting the red, green, and blue records on film and the resulting projected ‘color’ image.<sup>14</sup>*

<sup>8</sup> Ibid.

<sup>9</sup> Hugh Hoffman, "The Gaumont Chronochrome: Gaumont Convinces a Critical Audience of the Success and Permanency of Pictures in Natural Color," *The Moving Picture World* XVI (April 1913): 1346.

[http://www.archive.org/stream/movingpicturewor16movi/movingpicturewor16movi\\_djvu.txt](http://www.archive.org/stream/movingpicturewor16movi/movingpicturewor16movi_djvu.txt).

<sup>10</sup> Léon Gaumont, "Gaumont Chronochrome Process Described by the Inventor," (Berkeley: University of California Press, 1967), 67.

<sup>11</sup> Paolo Cherchi Usai, "The Way of All Flesh Tones," in *Silent Cinema: an Introduction* (London: BFI Publishing, 2000), 30.

<sup>12</sup> Ibid., 31.

<sup>13</sup> Brian Coe, *The History of Movie Photography* (London: Ash & Grant, 1981), 121.

<sup>14</sup> American WideScreen Museum, "Gaumont Chronochrome." Last modified 1998. [Photo credit]

Complications are not restricted to its function. Chronochrome is an additive color system but with particulars. It indicates a specific camera and projector pairing, as well as the layout of the frames on film stock. It is referred to as Gaumont Chronochrome, Chronochromie, Trichromie, Trichrome, Gaumont-Color, among other identifiers across nations and languages. The ambiguous identity provided for Chronochrome foreshadowed its initial acceptance and eventual obsolescence.

Chronochrome's debut was to the Photographic Society in Paris on November 15<sup>th</sup>, 1912, followed by screenings in London on January 16<sup>th</sup> and New York City at the 39<sup>th</sup> Street Theater on June 6, 1913.<sup>15</sup> <sup>16</sup> A six-year period - 1913 to 1919 - remains strangely undocumented. Some films have surfaced from the neglected era, including Gaston Ravel's 1915 work, *Des pieds et des mains*, listed alongside "Trichromie Color Process films [...] and newsreels" in a 1994 press release from the Museum of Modern Art in New York City.<sup>17</sup> <sup>18</sup> Chronochrome did not produce any single film that was a commercial success and did not break into the commercial market as a product. The process produced mainly nature studies, still object portraiture, and newsreels. Screenings were restricted mostly to the Gaumont Palace, where the complex Chronochrome projector system was installed and handled by projectionists and their assistants.<sup>19</sup> The

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<sup>15</sup> DB Thomas, *The First Colour Motion Pictures*, 2nd ed. London: Her Majesty's Stationery Office, 1983, 32.

<sup>16</sup> *The New York Times*, "Talking Pictures in Natural Colors," June 7, 1913, ProQuest Historical Newspapers.

<sup>17</sup> "Des pieds et des mains [Feet and Hands] (1915)," The Internet Movie Database (IMDb), section goes here, <http://www.imdb.com/title/tt0160180/>.

<sup>18</sup> The Museum of Modern Art, "GAUMONT PRESENTS: A CENTURY OF FRENCH CINEMA," news release, [http://www.moma.org/docs/press\\_archives/7173/releases/MOMA\\_1993\\_0080\\_50-1.pdf?2010](http://www.moma.org/docs/press_archives/7173/releases/MOMA_1993_0080_50-1.pdf?2010), 1.

<sup>19</sup> "BEHIND THE G-B LABEL", *The New York Times (1923-Current file)*; Dec 29, 1935; ProQuest Historical Newspapers: The New York Times (1851-2007) with Index (1851-1993) X4.

public had access to these films, in addition to an audience who was interested in seeing 'color' films.

Chronochrome information and video available today highlights the system's inception and collapse. Many snippets of footage from 1912 or 1913 are available online for free or from the Gaumont-Pathé Archives. Vibrant flowers in the Vilmorin-Andrieux Gardens, the Gaumont logo in shifting hues, and sunny exterior shots communicate the experimental feel of Chronochrome. Camera operators and the inventor himself used the system with wonderment, and were excited about the opportunity in color it presented.<sup>20</sup> Léon Gaumont had direct influence on the subjects; he expanded his studios to Cimiez, near Nice, France and footage of a carnival from the area resulted. Gaumont was personally as well as professionally invested in the success of Chronochrome, as evident by the system's intricacies and range over multiple continents.<sup>21</sup>

Towards the end of Chronochrome's life, the color system had two swan songs. In celebration of the armistice signed in 1918 to end World War I, "Gaumont released the victory parade in [Trichrome]".<sup>22</sup> The following year, Bastille Day celebrations and the inaugural *Défilé de la Victoire* [victory parade] on the Champs-Élysées in Paris were filmed using many early color systems of the day. Involved in the observation was Chronochrome, and this event is celebrated as the last great affair documented in the tri-color Gaumont method. By 1921, Gaumont Chronochrome was dead.

Technical setbacks of Gaumont's early color system prevented it from flourishing or becoming viable for the commercial market. The most interesting aspects of the

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<sup>20</sup> Ibid.

<sup>21</sup> François Garçon, *Gaumont: a century of French cinema*, New York: Harry N. Abrams, Inc., 1994, 26.

<sup>22</sup> Ibid, 30.

system were also its failures. Firstly, the cradle-to-grave concept was monopolistic and ineffective. To produce viable Chronochrome films, one had to use a Chronochrome camera to shoot and a Chronochrome projector to screen. According to Gaumont's own description, any 35mm film stock could be used as long as it was exposed with reduced frame height – perforation standards need not change. In the early 20<sup>th</sup> century, the film would most likely be nitrocellulose (nitrate) based. There have been some reports of early 'Safety Film', or cellulose di-acetate based film used in the Chronochrome system. So, while the film stock was left to one's discretion, the motorized requirements were restricted.

The machines themselves had built-in failures. Both the camera and the projector were fitted with three lens filters – red, green, and blue – to accurately record or display color records.<sup>23</sup> In theory this would produce beautiful and detailed images complete with natural colors. In reality the lenses were imperfect; they moved before and during use. The center lens was fixed, and the top and bottom lens could be adjusted for optimal quality on both pieces of machinery. During shooting or projection, the operator had to continuously adjust for accuracy.

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<sup>23</sup> George Eastman House, "Technology Archive: Gaumont Chronochrome camera." Last modified 2002. [http://www.geh.org/fm/precin/htmlsrc5/mG27000001\\_ful.html](http://www.geh.org/fm/precin/htmlsrc5/mG27000001_ful.html).

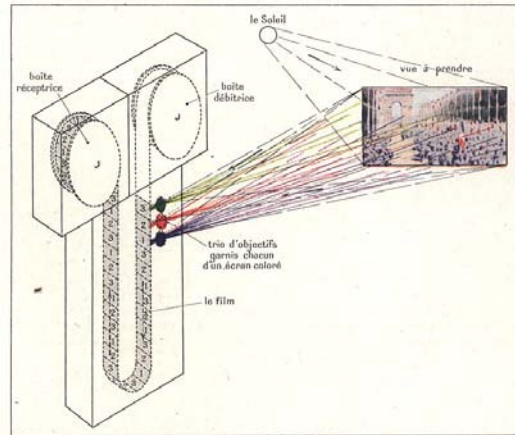


Fig. 3. — SCHEMA D'UNE PRISE DE VUE (Les chambres noires sur lesquelles sont montés les objectifs ont été ici supprimées pour que le dessin fût plus clair). — 1, 2 et 3 représentent les trois portions égales du film vierge qui sont impressionnées en même temps, 1 par les seuls rayons bleus (exactement bleu-violet), 2 par les seuls rayons rouges (rouge-orangé), 3 par les seuls rayons verts (jaune-verdâtre). — En figurant des faisceaux colorés qui aboutissent respectivement aux trois objectifs garnis chacun d'un écran, on a voulu seulement indiquer que chaque écran n'admet que les rayons de sa coloration.

*Diagram of the simultaneous capture of three-color records in a Chronochrome camera.*<sup>24</sup>

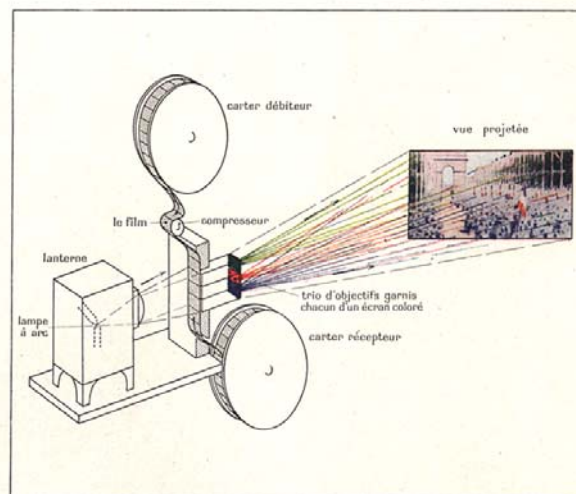


Fig. 6. — SCHEMA D'UNE PROJECTION DE VUE. — La lampe envoie sa lumière blanche au travers des trois éléments qui se présentent chacun devant son objectif. Chaque écran sélecteur ne laisse passer que les rayons qui correspondent à sa coloration.

*Diagram of the simultaneous projection of three color records by a Chronochrome projector.*<sup>25</sup>

<sup>24</sup> Mauduit, Karine, and Delphine Warin. La Cinémathèque française, "La Couleur dans le fonds Gaumont : le Chronochrome." Last modified 2006.

<http://www.bifi.fr/public/ap/article.php?id=252>. [Photo credit]

<sup>25</sup> Ibid. [Photo credit]



Another bittersweet aspect of Chronochrome's mechanical structure was the pull down action. Simultaneous frames meant a three-frame pull down [represented in the image above], which is extremely dangerous to a single perforation. Perforation damage and edge tears on film stock had to be a factor under that level of strain. Though the audience benefitted from relatively clear images, the trade-off was harm to the film. The effect of use in the Chronochrome system on a film object item has not yet been discussed in published literature. A specially designed pull down movement was developed to reduce strain.<sup>26</sup> It was a nine-sprocket pull down system that successfully cleared three exposed frames and arranged for the subsequent three frames.<sup>27</sup>

In addition to the restrictions and potential hazards of this system, the operation of a projector was extremely complicated. At first, in the Gaumont Palace, an assistant would stand in the theater and use a linked telephone to inform the projectionist in the booth when to adjust the filters. Later, a projectionist would watch the film and use an antiquated remote system to change the lenses and filters. The system, whose results were inspiring, could not be easily duplicated on tight budgets across the commercial market.

Historical context is relevant to the birth, life, and death of Chronochrome. Scholarly publications concerning Gaumont's tri-color system are largely contextual, arguing that its sole purpose was "establish[ing] the principle (of using three, simultaneously created colour records) which would be incorporated in the world's first

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<sup>26</sup> DB Thomas, *The First Colour Motion Pictures*, 2nd ed. London: Her Majesty's Stationery Office, 1983, 32.

<sup>27</sup> George Eastman House, "Technology Archive: Gaumont Chronochrome camera." Last modified 2002. [http://www.geh.org/fm/precin/htmlsrc5/mG27000001\\_ful.html](http://www.geh.org/fm/precin/htmlsrc5/mG27000001_ful.html).

successfully mass-marketed three-colour subtractive system, Technicolor”.<sup>28</sup> Overall, Chronochrome currently acts as fodder for lists and footnotes. In many texts, it is listed as a blip in cinematic color system history, with dispassionate origin dates ranging from 1911 – 1913. Chronochrome’s nuances are sometimes explored in published research<sup>29</sup>; Paolo Cherchi Usai applauds Chronochrome’s ability to give an image “a startling sense of three dimensionality” through a slight panoramic bend and color values.<sup>30</sup> Chronochrome also lead the pack of additive color processes by achieving impressive colorization and vibrancy of projected images.<sup>31</sup> In another text, Usai reveals the dismissive attitude of overlooking these inventive, albeit flawed, color systems. He insists that hand coloring, tinting, and toning is more valuable in comprehending silent era color work, a view shared by others in the field.<sup>32</sup> It is another example of the bias

Chronochrome faces:

[...] early attempts at additive color processes, such as George Albert Smith’s Kinemacolor (1906 – 1908) and Gaumont’s Chronochrome (1912), never moved from the experimental stage into the commercial market. Therefore the study of these four techniques [coloring/tinting/toning film stock, not additive systems] yields an understanding of the basic technology of color during the silent era.<sup>33</sup>

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<sup>28</sup> Leo Enticknap, *Moving Image Technology: from Zoetrope to Digital* (London: Wallflower, 2005), 82.

<sup>29</sup> "Session 3: A Slippery Topic: Colour as Metaphor, Intention or Attraction?," *Disorderly order: colours in silent film*, ed. Daan Hertogs and Nico De Klerk (Amsterdam: Stichting Nederlands Filmmuseum, 1996), 42.

<sup>30</sup> Paolo Cherchi Usai, "The Way of All Flesh Tones," in *Silent Cinema: an Introduction* (London: BFI Publishing, 2000), 31.

<sup>31</sup> John B. Rathbun, *Motion Picture Making and Exhibiting* (Chicago: C.C. Thompson, 1914), 222, <http://books.google.com/>.

<sup>32</sup> Paul Read, "'Unnatural Colours': An introduction to colouring techniques in silent era movies" (2009), <http://www.jstor.org/stable/27670755>, 10.

<sup>33</sup> Paolo Cherchi Usai, "The Color of Nitrate: Some Factual Observations on Tinting and Toning Manuals for Silent Films," In *Silent Film*, Richard Abel, New Brunswick, NJ: Rutgers University Press, 1996, 22.

Before Technicolor's reign, a surge of color processes sparred with Chronochrome to leave a mark on movie color history. In 1899, Edward Turner and Frederick Marshall Lee attempted to create a tri-color system that exposed color records on three successive frames of film, which lead to heavy fringing of color and blurred images.<sup>34</sup> In Gaumont's announcement, he credits Gros and [Louis Arthur] Ducos de Hauron with the "well-known three-color additive method used" in his research.<sup>35</sup> Chronochrome may have been a reaction to Pathé color, which was a stenciling and tinting process developed by the Compagnie Générale des Établissements Pathé Frères Phonographes & Cinématographes, or simply Pathé.<sup>36</sup> To pit these two systems against each other is unfair; mechanical or hand color stenciling on film stock cannot rival the accuracy and consistency of projecting monochromatic film through static color filters. Despite the mechanical dilemmas associated with the Chronochrome camera and projector, its ability to capture and represent natural colors was unrivaled during the 1910s. It is interesting to note that Gaumont and Pathé worked on many projects together, and most recently joined forces to create the Gaumont- Pathé Archives in December 2003, despite competition in the early 20<sup>th</sup> century.<sup>37</sup>

Kinemacolor, a 1906 color system, was a direct predecessor of Chronochrome. Its two-color additive process, sequential images, and doubled shutter speed may have seemed an easy overthrow. Chronochrome one-upped Kinemacolor, incorporating a blue filter to achieve total natural color. Its simultaneous capture provided a clearer image than

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<sup>34</sup> Leo Enticknap, *Moving Image Technology: from Zoetrope to Digital*, 80.

<sup>35</sup> Léon Gaumont, "Gaumont Chronochrome Process Described by the Inventor," 67.

<sup>36</sup> Leo Enticknap, *Moving Image Technology: from Zoetrope to Digital*, 82.

<sup>37</sup> "Gaumont Pathé Archives: Our Story," Gaumont Pathé Archives, <http://www.gaumontpathearchives.com/>.

Kinemacolor's successive capture system. Kinemacolor ran at roughly twice the normal 16 frames per second speed and had intense color fringing, as demonstrated below.



*Still from a Kinemacolor film with severe color fringing in image (left) and a still image from a Chronochrome print with no fringing (right)<sup>38</sup>.*

Both color systems needed considerable amounts of light during shooting and projection. For this reason many films shot on both systems are exteriors during the day, like the stills above. Kinemacolor reigns as king of natural color prior the First World War in scholarly and popular memory.<sup>39</sup> Its advancements in the field of color historically outshine Gaumont's method, despite similarities between the two systems and the overall maturity and quality of Chronochrome images.

External color systems were not the only things competing with Chronochrome for recognition. A sibling, Gaumont's sound and image synchronization system called Chronophone, overshadows the ingenuity of Chronochrome. The integration of the

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<sup>38</sup> Cinematography.com, "Discovering Cinema."  
<http://www.cinematography.com/index.php?showtopic=27345>.  
 [Photo credit]

<sup>39</sup> Luke McKernan, "'The modern Elixir of Life': Kinemacolor, royalty and the Delhi Durbar," *Film History*, no. 21 (2009): 122.

Chronophone and Chronochrome systems does not appear to have been explored by Gaumont or others. In searching for information about Chronochrome, the Chronophone usually rears its head and is discussed at length. Gaumont's experimental color process is documented as an indulgent afterthought.

Preserving Gaumont Chronochrome raises unique issues. It is a very complicated, very specific color system. A Gaumont-provided projector and/or camera must be acquired and in working condition to accurately recreate the film's original environment. The complexity and intricacy of the additive color system must not be overlooked and the preservation of this system cannot be treated without genuine concern for the object. Nicola Mazzanti explores the concept of sacrificing the film as an object to create a truer sense of 'theatrical experience':

[...] in case of special processes and techniques (The original Cinemascope, or a 3D, a Kinemacolor or a Chronochrome, etc.) we might be forced to give prominence to the final effect on screen, independently from the characteristic the original piece of film had and/or still has.<sup>40</sup>

In the *Journal of Film Preservation*, Mark-Paul Meyer also struggles with the concept of restoring something to its origins. He writes, "One can try to reproduce a Gaumont Chronochrome and the result may look wonderful, but how do we know what it really looked like and whether the restoration resembles the original?" and exemplifies a common problem in film preservation that specifically addresses the distinctive needs of Chronochrome.<sup>41</sup>

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<sup>40</sup> Nicola Mazzanti, "Restoring Sound: Which Sound to Restore?," *Le son en perspective: nouvelles recherches / New Perspectives in Sound Studies*, ed. Dominique Nasta and Didier Huvelle (Brussels: Presses Interuniversitaires Europeennes, 2004), 227.

<sup>41</sup> Mark-Paul Meyer, "Film Restoration using Digital Technologies," *Journal of Film Preservation*, 57 (1998), [www.fiafnet.org/pdf/uk/fiaf57.pdf](http://www.fiafnet.org/pdf/uk/fiaf57.pdf), 35.

Chronochrome's system used mainly nitrate film so most items would need to be preserved and transferred to safety film as soon as possible. The George Eastman House in Rochester, NY owns roughly thirty titles and has begun conservation efforts on Chronochrome stock, which it has exhibited.<sup>42</sup> <sup>43</sup> The Museum of Modern Art presented "restored Trichromie films" during a 2009 preservation celebration, in hopes that awareness of Chronochrome would be a result.<sup>44</sup> An undocumented issue that is quite striking considering the amount of light needed to capture and project images is the effect of extreme exposure on deterioration rates of Chronochrome prints. This is especially relevant for nitrate film, as it becomes increasingly unstable and hazardous with decay.

There are countless defunct formats and systems clogging the pages of pre-cinema history. Léon Gaumont's Chronochrome system should be acknowledged for its introduction of a simultaneous capture/projection technique to early additive color systems and to the celebrate Technicolor. Its reduction of fringing and flicker is admirable and impressive, considering the other inventions on which Gaumont worked concurrently. The three-color system presented a beautiful spectrum of natural colors that was unseen from its peer two-color systems that were ripe with faulty image registration and color bleeding. Though Chronochrome met its death through its own technical impasses, it should be celebrated for the contributions it made in the 1910s and beyond.

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<sup>42</sup> Laurent Mannoni, "Chronochrome Gaumont," in *Encyclopedia of Early Cinema*, by Richard Abel (Abingdon, Oxon, OX: Routledge, 2005), 169.

<sup>43</sup> Luke McKernan, "Colourful stories no. 14 – À la recherche du chronochrome," *The Bioscope*, <http://bioscopic.wordpress.com/2008/09/14/colourful-stories-no-14-a-la-recherche-du-chronochrome/>.

<sup>44</sup> The Museum of Modern Art, Film Exhibitions, "Gaumont Presents: Trichromie!," news release, October 19, 2009, MoMA | The Museum of Modern Art, <http://www.moma.org/visit/calendar/films/998>.

## Annotated Bibliography

American WideScreen Museum. "Gaumont Chronochrome." Last modified 1998.

- This website was established in 1996 and served as part of my introduction to Chronochrome. It is extremely user-friendly, with bright graphics and explanative blurbs. It does not always, or accurately, cite sources. It is a valuable tool for those beginning their research on a format or process they are unfamiliar with.

“BEHIND THE G-B LABEL”, *The New York Times (1923-Current file)*; Dec 29, 1935; ProQuest Historical Newspapers: The New York Times (1851-2007) with Index (1851-1993) X4.

- A decent portion of my research came from primary source documents, like this NYT article. It is necessary to include objects from the past and interpret them in new ways – relying on published analysis can only take an argument so far.

Cinematography.com, "Discovering Cinema."

<http://www.cinematography.com/index.php?showtopic=27345>.

- This is a popular resource that attracted my attention with its array of images for various color systems.

Coe, Brian. *The History of Movie Photography*. London: Ash & Grant, 1981.

- An extremely valuable resource, especially for early film topics. It may not go into extraneous detail, but it provides an anchor for contextualizing how something arrived in the field and its effects on the history of cinematography.

Corcy, Marie-Sophie, Jacques Malthete, Laurent Mannoni, and Jean-Jacques Meusy. *Les Premières Années de la société L. Gaumont et Cie*. Bibliothèque du Film, Gaumont. Paris: 1999.

- French resource. The subtitle of this collection translate to “commercial correspondence of Leon Gaumont 1895-1899”. It is a treasure trove of primary source material – extreme value for anyone researching early cinema, Gaumont, or the myriad of his contacts.

"La couleur - Gaumont Chronochrome."

<http://www.cineclubdecaen.com/analyse/couleur.htm>.

- French resource. Blog style, repetitive information for Chronochrome (including a photo from Eastman House’s site) but interesting tidbits about other formats. A good site to peruse if stuck on direction for an argument.

Enticknap, Leo. *Moving Image Technology: from Zoetrope to Digital*. London: Wallflower, 2005.

- Literally, an A-Z guide for all things film/video/digital. One of the more robust discussions on the value and uniqueness of Chronochrome. Extremely handy for citing “common knowledge” that only people in the field would know.

Garçon, François. *Gaumont: a century of French cinema*. New York: Harry N. Abrams, Inc., 1994.

- This is a problematic text. Formatted like a pamphlet advertising Gaumont, it contains historical specifics. It is also interesting to view it as a forced memory of the history of the company, and how systems like Chronochrome fit in (or do not).

Gaumont, Léon. "Gaumont Chronochrome Process Described by the Inventor." In *A Technological History of Motion Pictures and Television; an Anthology from the Pages of the Journal of the Society of Motion Picture and Television Engineers.*, edited by Raymond Fielding, 65-67. Berkeley: University of California Press, 1967.

- I admit that my giddiness in finding this translated document overwhelmed me for a few moments. Another ‘source’ document, even though other books have noted that the translation is not flawless [I have not seen the original French, so I cannot pass judgment]. Extremely valuable for describing Chronochrome and understanding how it fit in to Gaumont’s other endeavors.

"Gaumont Pathé Archives: Trichromie / Chronochrome." Gaumont Pathé Archives. <http://www.gaumontpathearchives.com/>.

- Helpful, well-translated web document that describes the process well and with hard dates that are trustworthy – Gaumont’s own company. Also offers a video that I could not access without being a ‘professional’, but interesting record for footage.

"Gaumont Pathé Archives: Our Story." Gaumont Pathé Archives. <http://www.gaumontpathearchives.com/>.

- Like Enticknap’s book, the background history one picks up during research needs a resource. The general overview – complete with a Chronochrome mention on their “Our Story” page – is a great way to understand the direction of the archive and comprehend how history fits into their mission statement.

George Eastman House, "Technology Archive: Gaumont Chronochrome camera." Last modified 2002. [http://www.geh.org/fm/precin/htmlsrc5/mG27000001\\_ful.html](http://www.geh.org/fm/precin/htmlsrc5/mG27000001_ful.html).

- A simple catalog record with photograph. Only place I found some description of pull down technique for Chronochrome projector. These records and primary sources are incredibly valuable.

Hart, Martin. "Early Color Motion Picture Processes." American WideScreen Museum. 1998. <http://www.widescreenmuseum.com/oldcolor/additive-subtractive.htm>.

- Like the entire site, this particular page is extremely informative and exciting. It allows the reader to be involved and ensures comprehension on some level with clear explanations and accompanying images.



Hoffman, Hugh. "The Gaumont Chronochrome: Leon Gaumont Convinces a Critical Audience of the Success and Permanency of Pictures in Natural Color." *The Moving Picture World* XVI (April 1913): 1346-347.  
[http://www.archive.org/stream/movingpicturewor16movi/movingpicturewor16movi\\_djvu.txt](http://www.archive.org/stream/movingpicturewor16movi/movingpicturewor16movi_djvu.txt).

- This excerpt represents the entirety of this text: “[Leon Gaumont] is a handsome, gentle-mannered man of the Latin type, on the sunny side of fifty.” It is a quaint and eye-opening primary source document about the reception of Gaumont and his color system.

"The invention of cinema in colour." europafilmtreasures.eu.

- This archive’s website offers brief explanations of different color processes and has sample photographs of projected images and film stock. Useful, straightforward, and a portal to other valuable websites.

Mannoni, Laurent. "Chronochrome Gaumont." In *Encyclopedia of Early Cinema*, by Richard Abel. Abingdon, Oxon, OX: Routledge, 2005.

- Very straightforward text with relevant asides in each individual entry. Mannoni explicitly mentions conservation actions for Chronochrome, which is not standard definition fare.

Mauduit, Karine, and Delphine Warin. La Cinémathèque française, "La Couleur dans le fonds Gaumont : le Chronochrome." Last modified 2006.  
<http://www.bifi.fr/public/ap/article.php?id=252>.

- French resource. Extremely valuable in an overall reference sense, and cemented certain facts that were unclear or of suspicious origin. Concentrating on trusted, established institutions – like la Cinematheque francaise -will always yield results, especially if they happen to be interested in early French film topics. Amazing photographic evidence, also.

Mazzanti, Nicola. *Restoring Sound: Which Sound to Restore? Le son en perspective: nouvelles recherches / New Perspectives in Sound Studies*. Edited by Dominique Nasta and Didier Huvelle. Brussels: Presses Interuniversitaires Europeennes, 2004.

- The compilation of essays proves useful for the surveying scope at which I began researching. It is an effective tool in covering many topics in a condensed form. Also further proof that the Chronophone frequently outshined Chronochrome.

McKernan, Luke. "Colourful stories no. 14 – À la recherche du chronochrome ." The Bioscope. <http://bioscopic.wordpress.com/2008/09/14/colourful-stories-no-14-a-la-recherche-du-chronochrome/>.

- Initially, I believed this to be a popular source but after learning of McKernan’s pedigree I am happy to have found this site. Blog-style with an abundance of photographs and information. Very clear writing and ease of access.

McKernan, Luke. "'The modern Elixir of Life': Kinemacolor, royalty and the Delhi Durbar." *Film History*, no. 21 (2009): 122–136.

- Great resource for contextualizing Kinemacolor and the attitude towards its peer color systems. Interesting read outside the scope of this research project.

McMahan, Alison. *Alice Guy Blaché: Lost Visionary of the Cinema*. New York: Continuum International Publishing, 2002.

- Alice Guy Blaché was Gaumont's secretary-turned-filmmaker. She is an unsung female hero of early cinema who is only now getting recognition for her work. Though not explicitly related to this project, McMahan's text offered director to Gaumont Publications and other useful background information on the company.

Meusy, Jean-Jacques. "How Cinema Became a Cultural Industry: The Big Boom in France Between 1905 and 1908." (2002). International Index to Performing Arts Full Text.

- Interesting point for contextualizing history and significance of Chronochrome. Lots of graphic information that may be useful for surveys or statistic-based research.

Meyer, Mark-Paul. "Film Restoration using Digital Technologies." *Journal of Film Preservation*. 57. (1998): 33-36. [www.fiafnet.org/pdf/uk/fiaf57.pdf](http://www.fiafnet.org/pdf/uk/fiaf57.pdf).

- Not a typical article about restoration and digital – but does become repetitive if you are familiar with the topic. It holds some value in its asides regarding ethics, object idealization, and the function of an archive.

"Movies - Prizma or Chronochrome?." (online forum message). *GroupSrv.Com*. July 14, 2009. <http://www.groupsrv.com/movie/about105467.html>.

- Very interesting online discussion about how to 'determine if a YouTube video is a certain stock. Reveals that there is a market and knowledge base around these processes. Great reference tool for pursuing people who are active in online discussion communities and have fanatic knowledge of obscure things.

The Museum of Modern Art. "GAUMONT PRESENTS: A CENTURY OF FRENCH CINEMA." News release. 1994.

[http://www.moma.org/docs/press\\_archives/7173/releases/MOMA\\_1993\\_0080\\_50-1.pdf?2010](http://www.moma.org/docs/press_archives/7173/releases/MOMA_1993_0080_50-1.pdf?2010).

- Using both these primary source materials from MoMA, I suggested that Chronochrome is not lost and still remains relevant and interesting, over the span of a decade plus. The opportunity to comb through MoMA's press releases is a great one and it is representative of many institutional and social attitudes in a particular time period.

The Museum of Modern Art. Film Exhibitions. "Gaumont Presents: Trichromie!" News release, October 19, 2009. MoMA | The Museum of Modern Art.

<http://www.moma.org/visit/calendar/films/998>.

- [See previous annotation.]

*The New York Times*. "Talking Pictures in Natural Colors." June 7, 1913. ProQuest Historical Newspapers.

- This source appears under multiple pseudonyms, including a French-English mash up that ultimately lead to nothing. Again, primary sources create some of the most interesting discussions. This article is extremely brief but confirms dates that need to be confirmed – a researcher's dream.

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Nordin, Jonas. "All Talking! All Singing! All Dancing!." Last modified May 12, 2010. <http://talkieking.blogspot.com/2010/05/color-in-movies-part-2-chronochrome.html>.

- A professor of undetermined origin who has the ability to clearly demonstrate complex processes runs this informational blog. A great introductory tool for a researcher, but not thorough with citations as is common with most blogging.

"Des Pieds Et Des Mains [Feet and Hands] (1915)." The Internet Movie Database (IMDb). <http://www.imdb.com/title/tt0160180/>.

- I cited this title from MoMA's presentation of Chronochrome films because it exists on IMDb. Lots of pre-cinema titles are assigned to archives and academic repositories. I was glad to see this page exist, bare as it is, and thought it is worth confirming that at least one other person had an interest in its existence.

Rathbun, John B. *Motion Picture Making and Exhibiting*. Chicago: C.C. Thompson, 1914. <http://books.google.com/>.

- This resource is available for free download in a .PDF version from Google Books. It is extremely precise in technical explanations for an array of formats and processes. It is extremely dense and without a Search tool, nearly impossible to navigate.

Read, Paul. "Unnatural Colours': An introduction to colouring techniques in silent era movies." (2009). <http://www.jstor.org/stable/27670755>.

- Excellent source for beginning research on tinting or toning. There is a specific mention of color processes for monochromatic film, but a very interesting read and great tool for getting acquainted with the silent era.

*Session 3: A Slippery Topic: Colour as Metaphor, Intention or Attraction?. Disorderly order: colours in silent film*. Edited by Daan Hertogs and Nico De Klerk. Amsterdam: Stichting Nederlands Filmmuseum, 1996.

- Intriguing transcript of discussion at the conference concerning intention with color in early cinema. Hard to navigate, but easy to find valuable information.

Symptoms of desire: colour, costume, and commodities in fashion newsreels of the 1910s and 1920s. Eirik Frisvold Hanssen. *Film History*, Volume 21, pp. 107–121, 2009.

- This is a beautifully worded document that addresses key issues specifically concerning color versus b&w cinema/pre-cinema. Great recreational read but also extremely informative and useful for dipping your toes into the knowledge pool.

The Technicolor Notebooks at the George Eastman House. Ulrich Ruedel. *Film History*, Volume 21, pp. 47–60, 2009.

- A bleary-eyed retrospective on the Technicolor Notebooks, but with some interesting nuggets of information. Also interesting to note what is mentioned – Chronochrome – and what topics are overlooked.

Thomas, DB. *The First Colour Motion Pictures*. 2nd ed. London: Her Majesty's Stationery Office, 1983.

- This write-up focuses mainly on Kinemacolor – contextualizing time as ‘pre’ or ‘post’ Kinemacolor. It is a revealing text and explicitly mentions the mechanical intricacies of Chronochrome and how that led to its demise. Heavily biased, this source deserves some observation.

Usai, Paolo Cherchi. "The Color of Nitrate: Some Factual Observations on Tinting and Toning Manuals for Silent Films." In *Silent Film*, Richard Abel, 21-30. New Brunswick, NJ: Rutgers University Press, 1996.

- Usai’s “factual observations” were interesting and noteworthy for specifically tinting and toning topics. His relatively dismissive attitude towards early additive color systems as contributors to the silent era made for an interesting read and a point of contention in my research.

Usai, Paolo Cherchi. "The Way of All Flesh Tones." In *Silent Cinema: an Introduction*, 21-43. London: BFI Publishing, 2000.

- This specific chapter is extremely valuable. Usai is well known and rightfully so – the entire book provides clear and detailed descriptions of a variety of topics. Essential for any study in silent era film.

## Viewed

“Nice Carnival – 1913,” <http://www.youtube.com/watch?v=eMqETxjlp3Q>.

“Gaumont Logo – 1912,” <http://youtu.be/2S-RB0DJOU8>.

“Flowers – 1913,” <http://www.youtube.com/watch?v=JDYwfSwZyjY>.