COLOR AND CINEMA: PROBLEMS IN THE WRITING OF HISTORY

EDWARD BRANIGAN

Branigan's 1979 article is an excellent model of practical historiography. Rather than discussing the general principles that can be used to organize history, Branigan examines four particular examples of film history writing in order to compare and contrast their assumptions and procedures. (Comolli's, Ogle's, and Gomery's articles are included here; the fourth is Terry Ramsaye's A Million and One Nights.) But what makes Branigan's essay even more valuable is that he extrapolates governing principles from the texts he examines and applies them to a new, common topic: the history of color cinematography. In this way, not only do the differences in methodology of the original texts become apparent, but the way in which they might govern each author's approach to another set of "facts" is also illuminated.

Although Branigan does not emphasize it, his analysis also points out how each of the four authors chooses somewhat different sources for his information. Ramsaye's facts derive largely from biography or autobiography and tend toward the anecdotal. Patrick Ogle relies on technical trade journals and, to a lesser degree, on the comments of cinematographers. Douglas Gomery goes to corporate records, economic journals and newspapers, and court records involving film industry firms. Comolli depends heavily on Marxist theories of culture, art, and ideology to reread and challenge the claims of previous film histories. He places less emphasis on independent research than the other authors, and he, like Branigan, pays careful attention to the use of these sources in a construction of history. Thus, Comolli's primary sources are less historical than they are theoretical.

Each of these four perspectives generates a different history and a different view of what constitutes history. Branigan's comparative method could be used to examine other writers, like Edward Buscombe, Barry Salt, and Janet Staiger, who are represented here. If Branigan sometimes makes assertions that other authors would dispute (for example, that color enhances the reality effect—a view quite different from Buscombe's), he nonetheless demonstrates how much can be learned about other writers' approaches by comparing them one with another. If it is correct to say that a firm conception of previous film history is necessary for the construction of new historiographic models, then the work that Branigan carries out here is not only a helpful summary and dissection of other texts but also a prolegomenon to film histories yet to come.

I wish to examine the subject of color, and more specifically, the early history of color in cinema. Underlying this subject, however, is a more important issue and
my major concern: the different ways in which that early history of color has been
told or might be told. It should be emphasized at the outset that my purpose is not
to work toward an eclecticism or pluralism where the history of color becomes
the sum of all the histories of color, or all the methods of writing that history.
Such a history is really only one more history, and a peculiarly indigestible one at
that. Of much greater interest to me are the different ways of seeing the history of
color. What forces and events are singled out by a given historian as “significant”
and how are they arranged into a narrative of time? In this manner I hope to
expose the assumptions (framework, theory) which a historian uses to generate a
history—all of which is normally obscured beneath apparently neutral and unassum ing titles, such as “The Development of Colour Cinematography” or “Re
finelements in Technique.” I take this “history of histories” approach because I'm
convinced that one cannot write about the history of color without a particular
conception of that history.

In a practical sense, a conception of history depends upon a set of categories
which are used to analyze (break up, articulate) the world. Michel Foucault, in a
preface to his history of sixteenth- and seventeenth-century European science,
discusses the following passage from a Borges story which, in turn, quotes a “cer
tain Chinese encyclopaedia.” In this encyclopaedia it is written that

animals are divided into: (a) belonging to the Emperor, (b) embalmed, (c) tame, (d) suck
ing pigs, (e) sirens, (f) fabulous, (g) stray dogs, (h) included in the present classification, (i)
frenzied, (j) innumerable, (k) drawn with a very fine camelhair brush, (l) et cetera, (m)
having just broken the water pitcher, (n) that from a long way off look like flies.

What is important for us in this passage is the recognition that categories ar
ranged in a scheme are not just a way of looking at the world but in some sense
determine what we see. The world is not out there holding a secret which at best
has already been recorded in an encyclopedia and at worst remains to be discov ered
by the persistent and perceptive analyst. Instead the world is constructed by
the analyst in the act of analyzing. Analysis proceeds via a set of categories which
are selected—consciously or unconsciously—to suit a particular purpose.

I will now examine four types of histories of color which might be constructed
from the perspectives of (what I will term) adventure, technology, industrial man
agement, and ideology. In each case I will focus on the analytical method characteri stic of the approach and ask how such an approach might conceive the history
of color in the cinema. In particular, what data from the early history of color
might these approaches select, what arguments would be made, and how would
the data be organized into a historical narrative? In this way I hope to illustrate
how one might proceed in the writing of at least four different histories of color
technology. These four histories, of course, do not exhaust the ways one might
write the history of color.

I will employ the three criteria of cause, change, and subject in order to distin guish the analytical methods of the four histories. By cause I mean a historian’s
reasoning about the determinants or conditions of a state. By change I mean a
reasoning about the difference between temporal states. That logic may appear in
innumerable guises; for instance, change may be characterized in terms of a transition, evolution, progression (progress), regression, transformation, mutation, permutation, repetition, substitution (exchange), mediation, and in many other ways. By *subject* I mean that role or function ascribed to the individual with respect to a historical process. That role may run a spectrum from the individual as a psychological agent to the individual as one constructed (placed, positioned) by large-scale forces.

I. THE ADVENTURE OF COLOR

Terry Ramsaye devotes one chapter in his history of the motion picture to color. Entitled "Adventures of Kinemacolor," the chapter traces the fortunes of two film companies exploiting the Kinemacolor process: Natural Color Kinematograph Co. Ltd. (England) and the Kinemacolor Company of America. The title of Ramsaye's book, with its reference to *The Arabian Nights* or *The Thousand and One Nights*, is suggestive of his method. The second sentence of the chapter states that "the course of color history in the films has been as romantically adventurous as the story of the screen." The history of color for Ramsaye is a romantic adventure story, a tapestry of tales. This assertion is more than a metaphor or a rhetorical flourish. It reveals a way of conceiving history which is characteristic of nineteenth-century historians. Such histories are structured as dramas of disclosure, with a stress on conflict and climax. They are written in a dramatic, staccato rhythm and in a vivid, even inspirational way.

For example, Ramsaye describes the work of the inventor Edward R. Turner, an early contributor to Kinemacolor, as follows:

Turner set to work to seek a new approach to the problem.
One day in 1902, as Urban sat at his desk nearby, there came a crash from the workshop where Turner was striving with his perplexities.

Urban ran into the room and found Turner dead on the floor.

Turner's notes, models and formulae were scattered about in confusion. No one else knew the meaning of half of them. The most of what Turner had attained died with him.

Note that the first three paragraphs in the description contain only a single sentence each, and the last paragraph only three. This helps create a dramatic rhythm in which the telling of the death is more important than the date of the death. The anecdote is arranged to create suspense and surprise ("a crash from the workshop"), and its ending to perpetuate a mystery about the man and his work. It is not that the anecdote leaves something unexpressed but that it suggests the inexpressible, a mystery lingering beyond death in the ambiguity of the real. (What did Turner discover? What was he thinking? If only his notes and models could speak . . .)

Another history of Kinemacolor—in many ways more comprehensive than Ramsaye's account—devotes one sentence to the death of Turner: "Unfortunately Turner died of a heart attack while working in his laboratory soon afterwards." A third history says only, "A short time later, Turner died." Ramsaye's selection of this event and his expansion of it reveals a preoccupation of nineteenth-century
history writing: the concentration on an event-centered time span of short duration. History is reduced to a point—often to the decision-making individual. The reduction is rendered, whenever possible, in an anecdote about an individual which serves to concentrate history further to a particular time, place, and circumstance. For example, Technicolor's abrupt (?) change from a two-color additive to a two-color subtractive process is explained in terms of a "decisive" event, "one terrible night in Buffalo."13 The event was a particular showing of the film The Gulf Between (1917) attended by Dr. Herbert Thomas Kalmus, one of the directors of Technicolor, Inc. It is not important in this type of history writing whether the anecdote is true or false or unverifiable because even if false it may yet (metaphorically) serve its purpose, which is to explicate the past as a linear chain of events; that is, historical cause is linear. It is not accidental that such histories choose a literary style which obeys the neo-Aristotelian unities (time, place, action); nor is the style chosen merely to capture the interest of a lay reader; rather, the drama is itself evidence of a way of seeing and articulating the world.

What then is linear narrative? Such a narrative depends on a logic of reducing the set of future possibilities by events already realized in the past and thus a "climax"—that archetypal figure of the linear narrative—quite rightly assumes the shape of a pyramid where every element in the signifying space redoubles and builds consistently in one direction until there remains but one (inevitable) possibility. Thus, what is inevitable in a linear narrative is only the certainty of a climax or decisive event.14 We see that the linear narrative depends on reducing signification to points—an individual, a decision, an event, the new invention, a pithy anecdote—and then linking the points one by one, through conflict and struggle, to a climax or decisive point which reveals/resolves what has gone before, that is, history. In this way the linear narrative is always looking back, repeating itself, summing up grandly, reducing; and most importantly, preparing the climax. Hence the charge that the linear history is "presentist"; that is, depends on a backward projection of current events (or rather, current beliefs about events) in order to seek the elements of a climax in their pure state. These elements are then arranged into a narrative which climaxes in the present. The present is also taken as an absolute reference point in order to measure change. Linearity, with its devices of foreshadowing, suspense, and surprise, often produces teleological overtones to the causal chain. Jacobs asserts that "After almost half a century of progress, the American film has achieved a degree of maturity. It now moves forward toward a more profound destiny."16 Note the implicit view of historical change in the words "forward," "progress," "maturity," and "destiny."

If the relation of events to one another is stipulated in linear causal terms, what about long-term change? In the adventure story type of history, change is specified as an evolution, a gradualism, usually based on an organic growth metaphor.17 Hence the common break-down of time into the periods of birth, youth, maturity (peak), decline (sterility), death, and then perhaps rebirth. This schema may be overlaid on anything—technology, film style, genre, studio, the film industry—in order to account for change. (Witness the table of contents of many
film history books.) Jacobs, for example, asserts that D. W. Griffith's career falls into three periods—apprenticeship, maturity, and decline.¹⁸

In summary, the adventure history is written on the assumption that historical cause is one-to-one; in it, a chain of pithy anecdotes and events marks a linear progression of time. Change in such histories often takes the form of an organic evolution. The source of this evolution is, again, located in a point: a decisive event, the genius of an individual, a revolutionary invention.

I now wish to consider a history which seizes on new inventions and uses their developments to model historical cause and change.

II. THE TECHNOLOGY OF COLOR

A second way one might approach the early history of color in cinema is to trace the technology which made it possible. In a technological reading of history, the artistic text is seen as a product of (1) the resources available and (2) the resources preferred by the artist. From an ever-expanding pool of materials, the artist makes certain selections. This schema translates into the categories of (1) technology and (2) aesthetics. If the project is a writing of history, the result combines a history of technology and a history of aesthetics. Thus is founded the autonomy of aesthetics and the search for the criteria which isolate the various arts, for example, the Russian Formalist and early structuralist search for cinematic "specificity" or "pure" cinema. The aim is to discover a unique, and permanent (i.e., timeless) place for film beyond history. Hence the technological approach perpetuates a split between history and aesthetics.

Often included in the category of technology is what might be called technique. The difference between the two is that between a process, or apparatus—such as a camera dolly—and a procedure involving that apparatus in a text—such as a dolly-in or a close-up shot. The justification for blurring the distinction between technology and technique is the implicit belief that many new techniques depend on new technologies; for example, the zoom shot depends on a new type of lens. It matters little that such a connection cannot always be made so readily (what technology gave rise to the "jump cut"?) in each case an aesthetic form is discovered which may receive any content. For example, Lewis Jacobs measures the developing potential of the film medium in part by what techniques have been "invented" or "discovered" and laid up for future filmmakers like nuts in a squirrel burrow. Jacobs, in a chapter entitled "D. W. Griffith: New Discoveries," says that with the film After Many Years (1908), Griffith "saw the chance to use his new device, the close-up." The film is important not only for adding the "dramatic" close-up to the long shot and full shot but for "another surprise, even more radical": breaking up a scene by cutting to a distant space, a second scene.¹⁹ For Jacobs this means, in the broadest sense, the discovery of editing as a tool and resource. In a now famous analysis Jean-Louis Comolli demonstrates that the isolation of technique (especially from narrative) leads to a search for "first times," and rapidly piles up meaningless distinctions, such as the first "enlargement" close-up, the first "dramatic" close-up, etc.²⁰
In many ways the common etymology of the words “technology” and “technique” provides a fortunate confusion for the writers of a technological history, because the terms reinforce each other’s autonomy and obscure questions about the social and economic forces which propel technology in certain directions and the ideological investment which creates and maintains techniques. Advances in technology make possible new techniques while at the same time the desire for new forms of expression in the film medium engenders advances in technology. Each justifies the other in a hermetic circularity.

An example of a technological approach is Patrick Ogle’s 1972 study of the technique of deep focus. The title of his history, appropriately, points to the split between technology and aesthetics mentioned above: “Technological and Aesthetic Influences upon the Development of Deep-Focus Cinematography in the United States.” Ogle traces how improvements and changes in design of film stocks, lenses, and lighting affected deep focus in cinema. The question now arises, if one were to write a history of color processes in technological terms, what sort of “facts” would be selected?

First, one might attempt to list various technological and technical devices and their impact on color. Thus when Ogle notes that a new lens coating for cameras and projectors greatly increased light transmission, the color historian could interject that this development would have a much greater impact on color films than on black-and-white films, since improved screen brightness and image contrast affect not only lightness but also the saturation of color (the colors black, white, and grey are without saturation). The first commercial application of coated projection lenses was for the opening of Gone With The Wind (1939) in twenty-five Loew’s theatres, and the color effects were stronger than any previously seen.

Along with new technology, one would also be interested in the “discovery” by filmmakers of techniques which affect color: for instance, compositions utilizing large blocks of homogeneous color, or juxtaposed primary colors, or a certain edited sequence of colors—all of which increase the perceived saturation of color and open the way for various aesthetic effects based on saturation (e.g., increased tension, unnaturalness, heightened emotion). Perhaps the single most cited example of editing for color effect is the succession of colors in the ballroom scene in Becky Sharp (Mamoulian, 1935). As the sound of cannon fire is heard and panic begins, the colors in the scene change, principally through the costume and lighting, from cool—greys, blues, greens—to a “climax” in the reds—yellow, orange, scarlet.

Secondly, a technological history of color would examine not only new discoveries but the interaction between color and other technologies and techniques. For example, with the arrival of Technicolor came a new sort of film stock which was very slow and balanced for the blue-green of daylight. This meant that the light sources used in filming needed to be enormously increased in power, their color balance (color temperature) significantly shifted, the rate of burning made uniform, the area of illumination controlled, and, since this was also the time of the sound film, the lights had to be quiet. Technology rose to the challenge. A whole new generation of arc lamps was developed to replace Mazda incandescent
lamps, and these new arc lamps were, in turn, necessary to the deep-focus style of the late thirties. Thus color technology was tied to deep focus.

Color technology also bore a relation with sound technology. In the early twenties, 80–90 percent of American films were tinted in some manner. The chemical baths used in tinting, however, interfered with the sound track and so color disappeared as filmmakers elected sound. The resulting flurry of activity led in 1929 to the introduction of Sonochrome by the Eastman Kodak Co., in which color was reintroduced by tints in the film stock itself. Sonochrome was a black-and-white positive film on one of sixteen tinted bases or a neutral base.

When change is measured by “perfection” it follows a rhythm similar to that of an evolution: inspiration, invention, modification, advance, improvement, new advance. The series can be extended in both directions: inventions are foretold by persons “ahead of their times” (mad visionaries) and fall into disuse when replaced by bold, new inventions. The problem with the technological approach is that science does not march triumphantly along—independent and autonomous—toward perfection. This approach commonly “explains” failure with the statement that a device “wasn’t practical”—but again, not practical with respect to what purpose? The demand for good quality, synchronous sound, for instance, is rooted in social forces larger than technology; and to say that Sonochrome is a response to the problem of tinting avoids such questions as what social and economic interests were served by color which forced its return in the form of Sonochrome (realism? profit?).

If failure is what is “impractical,” success is often explained by the mere fact of newness or novelty. Arthur Knight says that

At the very moment that sound arrived, a practicable color process was also ready.

And with the overwhelming success of their sound experiments, the producers were now willing to try almost any novelty.

However, only two paragraphs before, Knight explains the failure of early color by saying it was “merely a novelty.” What is missing is an analysis of the social forces which make a device a “novelty” or “merely a novelty.” It is not perfection which makes an invention successful but social and economic purpose. It is not enough to speak of the “spirit of the age,” the movies’ “loss of innocence,” or a “conservatism.” The last explanation is a particular favorite where a gap exists between available technology and actual practice (e.g., the very slow acceptance of panchromatic film despite its many “technical” advantages over orthochromatic film). Ogle speaks of the film industry as “conservative by nature,” and of the “innate conservatism of many cinematographers.”

It is true that many innovations in film—color, sound, widescreen—were imposed on the industry from outside. But to speak of the conservatism of an industry apart from an institutional and economic context explains nothing; and to speak of the conservatism of an individual leads to the construction of psychic or hereditary profiles and the view that history is generated by great men, great innovators with ideas whose time had come. In either case, the technological history is told at the expense of greater forces. Technology is not neutral or spon-
taneous but is a product of social and economic circumstances and only secondarily of great men.30

III. THE INDUSTRIAL EXPLOITATION OF COLOR

I now consider a third model for writing a history of color—one suggested by Douglas Gomery with respect to sound in “The Coming of the Talkies: Invention, Innovation, and Diffusion.”31 Like the technological model, Gomery separates out questions of aesthetics,32 but in place of technology he employs a principle capable of a more supple analysis:

[The] advent [of sound] can be appreciated by viewing it in terms of the economic theory of technological innovation, which posits that a product or process is introduced to increase profits in three systematic phases: invention, innovation, and diffusion . . . In each of the three phases, the producers and suppliers of sound equipment carried out their business decisions with a single view toward maximizing long-run profits.33

Gomery, therefore, concentrates on (1) those management decisions which (2) maximize the long-run profits of a business. The approach is that of industrial organization economics—a branch of neo-classical economic theory.

According to Gomery’s analysis the first stage of technical development is invention, which spans everything concerning the technical device from an “archaeology” to a time just short of commercial exploitation. Gomery discusses the beginnings of sound and the failure of some eighty-one small companies attempting to market their own versions of a sound system.34 He begins with commercial attempts to link sound and image for a viewer through the playing of a phonograph during the projection of the images (either synchronized to the images in some way or nonsynchronized) or through a sound-on-film method. He does not consider the development of the phonograph itself as a commercial device, nor does he examine the dominant method of linking sound and image in the early cinema (i.e., live musical and/or vocal accompaniment).

When we turn from sound to the relation of color and image, things become more complex. Do we begin with the black-and-white photograph? An accurate color record depends on a film emulsion which is uniformly sensitive to all the colors of the spectrum. If, for instance, the film were not sensitive to red and yellow then those colors would be rendered as black (absent) and there would be no hope of distinguishing red from yellow. The silver halides in a film emulsion are chiefly sensitive to blue, violet, and ultraviolet radiation. (Since the human eye does not see ultraviolet, its reproduction on film will somewhat “distort” the other colors.) The addition of certain chemical dyes by 1884 increased the sensitivity of “ordinary” film to include green and brought about “orthochromatic” film. Further advances in dyes expanded sensitivity to the reds and led to “panchromatic” film stocks in 1903 and 1905. Color photographs from nature were made in the late 1870s and the first commercially successful color photographic process was the Lumière Autochrome in 1907. Continual progress in sensitizing dyes made possible the great advances in color photography after 1930.
There are still earlier important dates in natural color photography: 1798 (the development of lithography by Senefelder), 1813 (the principle of the dye and bleach color film), and 1861 (Maxwell's demonstration of a three-color process). In fact by the time of Technicolor film (1932) there already existed a bewildering array of color processes and companies vying for success. There have been over 100 major color processes, about half of which originated or were used in the United States. Many were rarely or never used to make a film. It is enough to note, without exploring the details, that natural color processes are usually divided into two types—additive color systems (e.g., Kinemacolor, early Technicolor, and modern television) and subtractive color systems (e.g., Technicolor, Eastman Color, Kodachrome)—and that each type may be further classified according to whether it is based on a set of two or three primary colors.

So far we have considered the invention of color with respect to the photograph (natural color), but a second line of development lies closer to painting. Hand-painted daguerreotypes appeared around 1839 and hand-painted films appeared with the very first films in 1894. Hand coloring became a large and important industry. Factories of women applied as many as six colors to each frame of the film. A variation on the technique—stenciling—existed into the 1930s. Other techniques, related to painting, involved the use of chemical baths either to dye the gelatin (“tinting,” which colors the light areas) or to replace the silver image of positive film (“toning,” which colors the dark areas) or a combination of tinting and toning. One might even add a third line of color development, closer to the theatre than to either photography or painting: the use of separate, colored spotlights during the projection of a film. Griffith used the technique, which one reviewer called “revolutionary,” in the projection of Broken Blossoms (1919).

We see, then, that color experimentation appeared with the earliest photographs and the earliest films. The major techniques—additive color, subtractive color, painting, stenciling, and chemical baths—were all well under way in the early 1900s. In fact there is such a remarkable diversity that it is not immediately clear with which industries to begin a study of color, or how far back to go. One company, however, which was clearly involved in the invention phase of color was the Natural Color Kinematograph Co. (Kinemacolor).

Kinemacolor enjoyed considerable success in the years 1909–1915. Thereafter it declined and failed. If we were to follow Gomery's model, we would not search for the failure of Kinemacolor in a failure of technology, such as the requirement of outdoor sunlight for film exposure (thus no studio shooting); excessive wear on the film due to projection at twice the speed of black-and-white films; the need for special, complicated projectors; and other problems like fringing and reduced screen illumination related to the additive process. Rather, Gomery suggests that in the failure of the eighty-one or so early sound companies “technological inferiority played only a small role” or no role at all. More important were such factors as a solid financial underpinning for the business, a strong research and development laboratory, and superior marketing and managerial skill. It has, in fact, been claimed that poor management was a factor in the decline of Kinemacolor.
Let us consider a set of data—an event in the history of Kinemacolor—and see how it might be used by different historians. In February 1912, Kinemacolor premiered its film of the Delhi Durbar of 1911 which recorded the pageantry and celebration in Bombay, Delhi, and Calcutta in honor of the coronation of King George V and his visit to India. The Durbar at Delhi ran 2½ hours (16,000 feet) whereas the longest films produced before 1912 were 45–60 minutes. Black-and-white films of the same event, which preceded the Kinemacolor film, closed after three weeks. The immensely profitable Kinemacolor film, however, ran for 15 months and grossed three-quarters of a million dollars.²⁴ What can one say beyond the fact that The Durbar at Delhi was Kinemacolor's "greatest success"?²⁴⁶

For Terry Ramsaye the film provides material for several stirring anecdotes, including the image of Charles Urban burying the negatives of each day's shooting and sleeping on top of them to guard against sabotage by rivals. The reels are referred to by Ramsaye as "precious" which further prepares for the climax three sentences later: "He slept with his treasure."²⁴⁷ Ramsaye almost certainly based his account on the typewritten notes of Urban.²⁴⁸ An alternate explanation for burying the Durbar films—which would not suit Ramsaye's purpose at all—is that the films were buried to protect them from the intense heat of the Indian sun.²⁴⁹

Ramsaye also asserts that Urban lost a knighthood at the hand of the King because he fell ill and could not attend a royal showing of the Durbar film. Urban was "on the verge of death," says Ramsaye, and he concludes: "It was a tragedy reminiscent of the unfortunate death of Turner, the first of the color inventors, in Urban's office years before."²⁵⁰ Earlier we noted how Ramsaye portrayed Turner's death as a dramatic event, but why is it now mentioned again (and with certain details repeated) seven pages later? What is the connection between Urban's illness—from which he recovered—and Turner's death? Precisely this: to reinforce a narrative of history, to remind the reader of the story Ramsaye is telling—that the story connects up its events and is an organic whole. For Ramsaye, Urban is (here) a particular kind of character—a player in a "tragedy"²⁵¹ and the victim of an "unkind fate."²⁵² Thus, in an important way Ramsaye's history depends on a conception of character derived from classic literary narrative. He wishes to remind us that Turner, as a character, is important to the story.

Ramsaye says that at the time of the Durbar film Kinemacolor "was on the high tide of success."²⁵³ Note the use of the word "tide." The metaphor points to a theory of historical change (discussed earlier) based on an evolutionary model; more precisely, change according to an organic and natural growth process. Ramsaye does not deal with the decline of Kinemacolor (though he speaks obliquely of an "interruption" due to World War I²⁴), but instead chooses in the final page and a half of an eleven-page chapter to mention Prisma color, Kelcecolor, and Technicolor which are represented as carrying on the work of Kinemacolor ("The Kinemacolor method became in consequence the basis of practically all subsequent color processes"²⁵⁴). For Ramsaye, Kinemacolor is color and color is continuing to grow and evolve. The financial demise of a particular business is incidental.
How would Patrick Ogle deal with the Durbar film? He would undoubtedly cite it as proof that a certain level of technical perfection had been achieved in the camera, film stock, and projection of Kinemacolor movies. More difficult would be the question of why the company failed. Ogle might cite continuing technical problems which were never resolved, such as the frequent allegation that projection of the films near the threshold frequency needed for persistence of vision resulted in eyestrain and headaches for viewers. Ogle would more likely avoid the question and concentrate on the relations of Kinemacolor technology to subsequent color processes and the eventual “perfection” of color. Perfection in these terms would be measured against the state of color technology today or “foreseeable” by today’s standards.

Gomery would probably view the Durbar film as evidence of the long-term profit potential of the Kinemacolor enterprise, but would not attach special importance to the event because it does not provide answers to the sorts of questions he asks about financial stability, research facilities, and bold management decisions, though it does bear somewhat on the marketing of color. (Compare the Durbar film with Gomery’s treatment of early sound programs and films, like *The Jazz Singer*.) For Gomery the success of the Durbar film is for the most part irrelevant to the success or failure of Kinemacolor.

Although I have limited my inquiry to the early history of color, it may be useful to sketch the two phases of technological development which follow “invention”—innovation and diffusion. In the innovative phase of sound, Gomery discusses how sound was adapted for profitable use by Warner Brothers, Fox Film Corporation, the Big Five (after the expiration of the Big Five Agreement), and RKO. It is in this phase that Gomery’s criterion of “creative management” is especially prominent. The principal hero for Warner Brothers is Waddill Catchings. The management of both Warners and Fox is characterized as “bold,” the actions of the Big Five as “decisive,” and the management of RKO as “superior.” For Gomery it is in the context of “management” that the individual—if he is also “creative”—has the chance to enter history.

A history of color in the innovation phase would certainly include the Technicolor Company. Its president, Herbert Kalmus, would be portrayed as “unquestionably the man who put Technicolor over.” Taken to an extreme, this reliance on the individual corporate leader leads to the following description of Kalmus in a *Fortune* magazine article: “The Doctor shaves with a Gillette razor, likes his fried eggs done on one side only, reads a great deal of biography and physics but very little fiction.”

In the diffusion phase economists study how other firms in an industry react to what has become profitable for a competitor. In the diffusion of sound, Gomery includes the general adoption and conversion to sound by the large motion picture companies chiefly through mutual cooperation (the Hays Office and the Academy of Motion Picture Arts and Sciences played major roles). Smaller companies with little capital were forced out of business or merged with the majors. A history of color in the diffusion phase would include the antitrust and patent
problems of the Technicolor Company in the late 1940s. The diffusion phase completes an economic cycle of change which is driven by a desire for long-run profit. The individual's place in such a history is one of business management.

IV. THE IDEOLOGY OF COLOR

I will now consider a final approach to the writing of a history of early color. Jean-Louis Comolli, writing from an avowedly Marxist perspective, asserts in ‘Technique et idéologie’ that a history of technology and technical forms is not enough. He does not reject technical explanations but calls for the analysis of a larger context which locates and determines technology. This larger context is composed of two social demands—the ideological and the economic. Comolli states that “It is to the mutual reinforcement of an ideological demand (‘to see life as it is’) and the economic demand to make it a source of profit that cinema owes its being.” Before I consider in more detail the problem of ideology, it may be useful to indicate briefly in what ways Comolli’s theory of historical cause is nonlinear and his theory of historical change is nonevolutionary; that is, how Comolli differs from the sort of history written by Ramsaye.

What is the alternative to linear cause? For Comolli it is “a history characterized by discontinuous temporality, which is recursive, dialectical, and not reducible to a single meaning but rather, is made up of types of signifying practices whose plural series has neither origin nor end.” The reference to “neither origin nor end” is crucial to Comolli because, for the traditional historian, the beginning and the end points pose special problems in the linear narrative (a special embarrassment). In Aristotle’s words: “A whole is that which has a beginning, a middle, and an end. A beginning is that which does not itself follow anything by causal necessity.” To seek after beginnings and origins, then, in order to unify a historical narrative is in some sense an ahistorical inquiry; that which has no cause (a beginning) lies outside of time and history. The problem for the materialist historian is that in utilizing language to name, one has already cut out a point, a potential origin. The alternatives are either to no longer use language or to name a plurality of beginnings—a series of points which may even be contradictory—and thereby defeat the notion of an event—a coalescence of points into the master point or origin. This is what Comolli attempts by deconstructing the origin of cinema into a scattered series of events—visible and invisible, continuous and discontinuous, from yesterday to twenty-five centuries ago. By naming a great many events, Comolli hopes to block the very notion of a single event, a first cause, which leads (through the neo-Aristotelian unities) to a climax.

What is the alternative to evolutionary change? For Comolli change is measured in the Marxist terms of an unremitting class struggle. He thus attacks metaphors based on evolution and natural growth, such as the “birth” of cinema. Although modern theories of biological evolution have lost much of their “perfection” element—an organism’s inherent tendency toward perfection—there remains a weak “directional” component shaped by natural processes. In this respect the Marxist notion of change is not unlike evolutionary change. Evolu-
tion, however, is still characterized by gradualism, continuity, and adaptation to the environment, factors foreign to Marxism. Thus Comolli especially seizes on those “gaps” or discontinuities in the growth of technologies and techniques which are potentially damaging to a theory of smooth evolution. One such gap, he says, is the disappearance of deep-focus cinematography—widespread in early cinema—and its reappearance in the late thirties. Another gap is the delay in moving from ordinary and orthochromatic film stocks to panchromatic films.

What is the role of the individual—the subject—in the process of history? In a system of linear cause, the individual is easily singled out: he or she is largely autonomous and often the decision-maker, the event-maker. In a system of evolutionary change, the individual again is easy to identify: change is based on the metaphor of the body—birth, growth, death. By a curious alchemy, even gaps in the evolution may be referred to the body. Thus Robert Sklar in Movie-Made America says that D. W. Griffith’s After Many Years is a “rediscovery of cinema’s fundamental resources,” which “would not be lost again.” 72 The references to rediscovery and loss are the very figures of a linear and evolutionary history, which can pose a gap or even retrogression only in such terms as a failure of “memory,” something which was “forgotten” but is now assured. In this way the subject is continually present and reinscribed in the traditional history.

For Comolli, on the other hand, the subject exists only in relation to ideology. For present purposes I shall define an ideology as a possible relation between individual consciousness and its social ground. It is a largely coherent and logical system of images, ideas, values, feelings, and actions by which, and through which, persons experience their societies at various times; for instance, a “philosophy” or theology, although an ideology need not be formalized in this way. 73 (Strictly speaking, an ideology is not an image or an idea but a representational system through which the individual encounters the material conditions of existence.) Comolli therefore asks an epistemological question: What are the conditions that make it possible to know man? How does man represent himself to himself?

Comolli attempts to steer a middle course between those who claim that technology is neutral, independent of use (Ogle, Lebel) 74 and those who claim that technology is inherently ideological. In the latter group is Jean-Louis Baudry, who claims that certain features of the cinematic apparatus (lens, camera, projector) mark it with an original sin so that cinema will never truly escape bourgeois illusionism. 75 For Comolli, technology is already and always a part of an ideology and it functions along with “institutions” to hold the members of a society in a certain set of relationships or bond. Technology is produced by and functions in an ideology; thus it is not “neutral.” But neither is it determined forever by its past or present functions, for it may be adapted to serve in another set of social relations.

Let us consider ideology at work in the cinema through three concepts: science, art, and realism. We will then ask how color functions in each of these areas.

Comolli argues that cinema arose out of an attempt to compensate for the imperfections of the human eye by substituting the objective, scientifically accu-
rate eye of the camera lens. The cinema was vision perfected; science guaranteed the truth of cinema's reproduction of reality. According to Comolli this belief (or "myth," if one is outside of that ideology) was part of a complex of beliefs which shaped the development of cinema and its technology. Although Comolli does not work the argument out in detail, one can suggest evidence which would be marshalled in support of such a position. Thomas Edison or, indeed, Dr. Herbert Kalmus, for example, would be approached not as biographical figures but in the way in which these men were sold to the public. Thus Edison, the man of science and invention, was almost universally referred to in his day as the Wizard of Menlo Park, or simply the Wizard—for how else to explain the miracles of science? Ramsaye's history further the Edison myth with such chapters as "In the House of the Wizard." The Edison product was sold as a triumph of science. The 1902 Sears, Roebuck and Co. catalogue advertises the improved model of the Edison 1901 Kinetoscope as follows:

This season we shall handle the Edison Kinetoscope for projecting moving pictures exclusively. The moving picture apparatus is known as one of the greatest of the Edison inventions, and on it the Wizard of Originality has spent much time in the perfection of the present type of machine, embodying every improvement and every convenience which science, mechanical skill and research have been able to add to the first invention.

The marketing of Kinemacolor, too, emphasized its scientific character and how "the colours obtained are due to the agency of LIGHT only. No painting, hand-work, stencil-work or similar devices are used." The program for the first showing of Kinemacolor in the United States (December 1909) repeatedly stresses science, not just to differentiate its product from hand-painting and tinting but to claim a superior legitimacy derived from Science:

It has been pointed out in an American print by a critic, who, by the way, had never seen the results, that "THE MAIN PRINCIPLES OF THE URBAN-SMITH PROCESS WERE KNOWN TO THE SCIENTIFIC WORLD BEFORE EITHER MR. URBAN OR MR. SMITH TOOK UP THE MATTER!" Exactly! Messrs. Urban and Smith admit the fact and take special pride in it. Their invention is based upon the solid foundation of established scientific truths. If it were based upon some fantastic notion not in accordance with the principles of pure science there would be little hope for its future. It is just because Kinemacolor is based upon the solid rock of scientific fact that distinguished scientists all over Europe have been enthusiastic in its praise and have predicted a brilliant future for the young art, which has been born to the world for the entertainment and instruction of the people.

Messrs. Urban and Smith's only claim is that with the expenditure of much time and money they are the first to take up these sound scientific principles and materialize them into practical, everyday results, and it is for that reason that the Patent offices of every civilized country in the world have granted Letters Patent for the process.

The fact that cinema was taken to be a perfected form of the human eye is revealed in Ramsaye's history when he concludes his account of Kinemacolor by speaking of the "extraordinary possibilities yet to be explored... with light entirely below the visual range of the human eye." Ramsaye speaks of the development of a new film stock sensitive to infrared. The ideology which links science, camera, vision, and truth is as current as today's magazines. One advertisement
for a camera invites the reader to "explore the world of 1/500 second." The Canon camera "can literally make you master of your visual domain. . . . If you want a look at a world you've never seen before, look at the AE-1."82

A second center of ideology is the notion of Art (and its Aesthetics). Art is conceived to be, not a discourse, a kind of text, but a special, even sacred access to knowledge, the Human Condition, Truth (the complex, ambiguous, and ineffable), etc. Art, especially Great Art, is approached with reverence for it has universal and timeless value. Thus to the extent that cinema can become Art—and more than a "movie"—it is able to escape history. For example, Griffith's Broken Blossoms (1919) was marketed in a series of elaborate ways as an Art object.83 Its color effects were distinguished from the ordinary so as to become the very sign of Art. Thus cinema promised the reconciliation of science and art in a technologically precise reproduction of reality where science became the guarantor of the truths of Art.

A third area for the investigation of ideology is the insistence on realism. Since the cinema was linked to science, it became the perfect tool to record reality with precision. The 1902 Sears catalogue described the Kinetoscope as follows:

THE UNRIVALLED EDISON KINETOSCOPE, moving picture machine, giving a pictorial presentation, not lifelike merely, but apparently life itself, with every movement, every action and every detail brought so vividly before the audience that it becomes difficult for them to believe that what they see before them can be other than nature's very self.84

Color, of course, perfectly enhances a reality effect. An ad for a 1910 hand-painted film asserted that "the flesh tints [are] so natural that it is hard to believe that the people are only pictures on a screen."85 Natural color processes offered even greater possibilities for realism.86 Earlier I discussed the possible significance of Kinemacolor's The Durbar at Delhi for three historians. For Comolli the film would probably be important insofar as it demonstrates the new powers of realism provided by color. He would find significant the comments of the Russian Dowager Empress writing to her son, Nikolai, from London (April 29, 1912) after seeing the Durbar film:

We are lunching today with Georgie and May at Buckingham Palace. They both send you greetings. Last night we saw their journey to India. Kinemacolor is wonderfully interesting and very beautiful and gives one the impression of having seen it all in reality . . . 87

The only danger in all this was that "color experimenters are apt to go arty and prevent even natural colors from producing natural illusions."88 Many critics of early natural color processes spoke of the dangers of "gaudy," unrealistic color ("garish" was another favorite word). And Technicolor soon recognized the important investment they had in realistic uses of color. They insisted that anyone renting their color equipment also hire a color consultant from the company in order to "properly" orchestrate color combinations.89

It may be useful to consider a specific set of technological changes, related to the problem of realism, and to contrast the ways that these changes would be seen by different historical methods. In 1936–37, new and more efficient lighting equipment, and improvements in the laboratory processing of Technicolor film,
along with new techniques of photographing color, made possible lighting levels extremely close to average black-and-white standards. One director of photography, Ray Rennahan, testified, "I now light almost exactly as I would for monochrome." In 1939 Technicolor introduced a film stock three to four times faster yet, which meant a 50 percent reduction in normal lighting levels (the reduction was not greater because of the continued necessity for color filters and beamsplitting devices in the camera). This meant that color correcting filters became practical, allowing the use of smaller, more flexible incandescent light sources (which are also softer). In addition the film offered a wider exposure latitude and so allowed better rendition of shadows. Lighting levels approached those of black-and-white on Eastman Kodak Super X (ASA 40). Many other techniques of black-and-white photography also became feasible (e.g., the use of diffusion and of small spotlights for precise lighting of faces in close-ups) with the result that color became less garish, more natural. Director of photography Ernest Haller concluded:

Now that we have this fast film, which enables a cinematographer to use all the little tricks of precision lighting he has used in monochrome to glamorize his stars, I am sure that color is going to be more flattering than ever to the women.

At least the representation of women, it seems, was secure.

How might these changes be interpreted by the four historians we have discussed? For Ramsaye the data has a decidedly technical, unexciting cast about it. If he were to use it, he would want the data to coalesce about a personality or culminate in a dramatic event. One source of dramatic events in film history, of course, is the Great Film and it would be even better if some of these technical changes were first used in that great film. Thus Ramsaye would probably structure his presentation around the making of Gone with the Wind (1939), the first production to use the faster Technicolor film and on which both Rennahan and Haller worked.

For Ogle these technological changes would be evidence of a logical, natural perfection of technique. He would assert that the changes were largely scientific and so independent of cultural demands. The resulting techniques would be neutral in that they could be used in any way: in realistic and unrealistic films. The fact that cinematographers tended to reestablish monochrome techniques—that is, to conceive color in terms of black and white—would be due to the "conservatism" of the profession.

For Gomery the changes would be of interest to the extent that, for example, new lighting equipment might be more cost-effective and techniques resulting in less "garish" color might influence the demand for, as well as the marketing of, color. Were black-and-white techniques employed on color films because they were cost-effective? How should color be introduced? Through shorts and newsreels (as in the marketing of sound) or through some combination of roadshows, cartoons, special attractions, big budget features, etc.? These marketing decisions, in turn, have aesthetic implications. Nevertheless, the general return to black-and-white techniques would have less interest for Gomery and would probably fall into the province of "aesthetics."
Comolli, however, would find these changes of major significance. For him it would be an illustration of technology acting to reinvest the old in new ways. Technology, here, is responding to a deeper structure—a realistic order of discourse. This argument does not contend that all black-and-white films were realist films, but only that the realist codes were by the late 1930s well worked out and well established in black-and-white. Directors and cinematographers continued to think in terms of the black-and-white codes and with the increased importance of color, the demand was there to “improve” color film and equipment in line with the existing state of black-and-white technology. “Improve” in this context means to make a technological change so as to be able to deploy the familiar codes.

Comolli could cite as support the detailed advice of cinematographer James Wong Howe on the best use of background, costume, rim lighting, illumination levels, light placement, colored beams, composition, and other variables in order to achieve with color the same “illusion of naturalness” as in black-and-white. Technology reveals itself here through color and lighting codes in the text. Hence, for Comolli, technological refinements are important in the writing of film history, but only insofar as they are related to the social and economic matrix in which they find their function. Culture, for him, is a series of codes and textual systems accessible to semiotic analysis.

In summary, Comolli points to an ideology in which man defines himself by redefining his sight in terms of the cinema. He discusses the ideology of science and how the human eye is represented as being replaced by the camera eye—by the lens of science, which cannot lie. Color serves to increase the camera’s claim to scientific accuracy, and when used realistically is able to repeat the dominant forms of the culture. In this sense color does not begin with Technicolor, nor even with the hand-painting of film in 1894 but much further back in Western culture: at least to the colors and linear perspective of the paintings of the Renaissance. Comolli would suggest that in order to understand color in film one must first study the uses of color in the other arts, and the forms of intelligibility they sustain.

V. CONCLUSION

The accompanying Table presents in schematic form a comparison of the four types of history writing which I have explored. The problem I deal with is how one might uncover the various assumptions a historian makes about time, or rather the social view implicated in a conception of time. Using these assumptions one can construct at least four different histories of color technology in early film. The purpose, however, is not to settle historians into categories or reveal distinctive schools of historiography. It is not uncommon for a historian to make different assumptions in different portions of the same history. (I have indicated, for example, that Lewis Jacobs has written both an adventure and a technological history in The Rise of the American Film.) I am not strictly analyzing what might be termed the “style” of a particular type of writing. My purpose in utilizing the criteria of cause, change, and subject is to provide a way of comparing the different types of questions that a historian may ask and thereby to reveal what kind of
# A Comparison of the Assumptions of Four Types of Historical Inquiry

<table>
<thead>
<tr>
<th>Aspects of Historical Time</th>
<th>Ramsay</th>
<th>Ogle</th>
<th>Gomery</th>
<th>Comolli</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause</strong></td>
<td>Linear (events, anecdotes; neo-Aristotelian unities)</td>
<td>Relations among technologies (science)</td>
<td>Economic context (long-run profits; industrial organization theory)</td>
<td>Social and economic context (Marxist economic theory)</td>
</tr>
<tr>
<td><strong>Change</strong></td>
<td>Evolution (birth, growth, death)</td>
<td>Perfection of technique</td>
<td>Economic cycle (invention, innovation, diffusion)</td>
<td>Marxist class struggle (dialectical change)</td>
</tr>
<tr>
<td><strong>Subject (Role of Individual)</strong></td>
<td>Organic metaphor and anecdotes about individuals (psychology)</td>
<td>Inventors and cinematographers</td>
<td>Creative management</td>
<td>Member of economic class and subject in ideology</td>
</tr>
</tbody>
</table>

History arises from those questions. Thus I am primarily interested in historical logic rather than syntax.

I am not searching for the one, true, and genuine type of history writing because much can be learned from asking different sorts of questions, applying various time schemes, and using a variety of perspectives. If I tend to privilege the sort of history written by Comolli, it is because he is explicit about his method, conscious of the theoretical implications, and asks interesting questions which have produced new interpretations of certain data. Comolli attempts to use his theory at every level of his writing and in the process recasts technology, techniques, and their role in the cinematic machine.

## Notes

Reprinted with minor corrections and additions from *Film Reader 4* (Evanston, Ill.: Northwestern University Press, 1979), pp. 16–34. This essay has emerged in part from two courses at the University of Wisconsin–Madison, Spring 1977: Tino Balio’s “History of the Motion Picture Industry” and Russell Merritt’s “Historiography of Film.” It is a revision of a paper presented at the International Film Conference IV, The University of Wisconsin–Milwaukee, February 22–24, 1978. I wish to thank Douglas Gomery for his comments and Roberta Kimmel for her editorial assistance.


6. These criteria were suggested by the remarks of Michel Foucault in his "Foreword to the English Edition" of *The Order of Things*, pp. xii–xiv. They are useful because of their generality and because they address the logic of a historical argument.


15. The definition of linear narrative is derived from Edward Branigan, "Subjectivity Under Siege—From Fellini's 8½ to Oshima's The Story of a Man Who Left His Will on Film," *Screen* 19 (Spring 1978), p. 39.


17. Oswald Spengler develops an explicit "organic logic" whereby cultures simply are
organisms with the same cycles as animals, trees, and flowers; *The Decline of the West*, trans. Charles Atkinson (New York: Knopf, 1926).


19. Ibid., pp. 102–103. Griffith is still generally held to be the “father of film technique”; Arthur Knight, *The Liveliest Art* (New York: New American Library, 1957), p. 31. Barry Salt chronicles the “discovery” of devices such as the “cinematographic angle” within an explicit model of evolutionary change; “The Early Development of Film Form,” *Film Form* 1 (Spring 1976), pp. 92, 95, 96, 100 and “Film Form: 1900–06,” *Sight and Sound* 47 (Summer 1978), p. 149.

20. Comolli, part 3, pp. 47–49 and note 12 (pp. 3.5–3.8; 3.10–3.11), see note 65 *infra*.


28. Knight, p. 149.

29. Ogle, pp. 54, 50.


35. Ryan, pp. 1–2.
40. Thomas, pp. 31–33; Ryan, pp. 19, 132–33, 384–85.
44. Thomas, p. 35.
45. Ramsaye, p. 570. Charles Urban, head of Kinemacolor and present during the filming, gives the figure of £150,000+ in typewritten notes dated 1921 quoted by Thomas, p. 27.
47. Ramsaye, p. 570.
48. There is a striking similarity in wording between Ramsaye and the typewritten notes of Urban. Portions of the latter are presented in Thomas, pp. 26–27, 13.
49. Limbacher, p. 15.
50. Ramsaye, p. 570.
55. *Ibid.*
56. Thomas, p. 32.
62. Ibid., p. 166.

The first four parts are translated by Christopher Williams, "Ideas About Film Technology and the History of the Cinema, with Reference to Comolli’s Texts on Technology (Cahiers du Cinéma)," British Film Institute, mimeograph, part 1 (pp. 1.1-2a.9), part 2 (pp. 2b1-2b.10), part 3 (pp. 3.1-3.11), and part 4 (pp. 4.1-4.10). Half of the first part is translated by Diana Matias, "Technique and Ideology: Camera, Perspective, Depth of Field," Film Reader 2 (Evanston, Ill.: Northwestern University Press, 1977), pp. 128-140, reprinted here.

The reference in the text is to Comolli, part 4: pp. 40-41, 43 (pp. 4.1, 4.2, 4.5).
66. Ibid., part 1: p. 15 (p. 1.16). Edward Buscombe argues that economics can explain the necessary but not sufficient conditions for the innovation of color. He goes on to examine the needs and ideology served by color; Buscombe, pp. 24-25.
67. Ibid., part 3: p. 44 (p.3.2); see especially part 2: pp. 56-57 n. 13 (pp. 2b.9-2b.10).
69. Comolli, part 1: pp. 7-8, 11 (pp. 1.5, 1.6, 1.10).
70. Ibid., part 1: p. 9f. (p. 1.7f).
72. Sklar, p. 51 (my emphasis).
77. Frank Taylor, "Mr. Technicolor," The Saturday Evening Post (October 22, 1949).
80. Ibid.
81. Ramsaye, p. 572.
82. Time (May 9, 1977), p. 20. See also Time (February 13, 1978), p. 62: “A camera can explore the world in ways your eyes can’t.” The ideology of Art is also commonly invoked; see ibid., p. 5: “For me, photography has become a magic window to two minds: my subject’s and my own.”
84. 1902 Sears catalogue, p. 156.
85. Quoted by Limbacher, p. 4.
88. Fortune, op. cit., p. 168 (my emphasis).
89. Lansing Holden, a color designer for Selznick International, and Gilbert Betancourt, a color coordinator, offer some comments in “Color! The New Language of the Screen,” Cinema Arts 1 (July 1937), p. 64 and “Present Color Trend Is Toward Subdued Hues,” American Cinematographer (August 1937), p. 317. The color consultant was one of several tie-in services (including processing and printing) which were to cause antitrust difficulties for Technicolor. See note 64.
91. Stull, p. 236.