BRIGHT SIGNALS

A HISTORY *of* COLOR TELEVISION

SUSAN MURRAY

B R I G H T S I G N A L S

SIGN | STORAGE | TRANSMISSION

A series edited by Jonathan Sterne and Lisa Gitelman

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SUSAN MURRAY

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FOR MUNRO & QUINN

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FIGURE 1.1 Image from a 1954 Inco Nickel TV Shadow Mask ad.

Introduction

> The prevailing U.S. apathy to tinted TV was echoed last week by an idle viewer at Rich's department store in Atlanta. "I know the grass is green at Ebbets Field," he said. "It isn't worth $400 more to find out *how* green."
>
> —*Time*, 1956

Color television was a hard sell. Although the public, regulators, and industry insiders were impressed by the relatively crude images they saw at even the very first demonstrations of the technology in the late 1920s, and while color was generally thought to be the inevitable technological addition that would ultimately complete the sensory experience of television, it was deemed impractical from the start. At times, color television was considered too expensive, technologically cumbersome, and challenging to stabilize and manage; it required too much bandwidth and would set a higher bar for "true fidelity." As a result of this demanding complexity, the technology for color television existed for over twenty years primarily either as a novelty or as a challenge to what the industry came to quickly accept as the speediest route to standardization and commercialization—black and white television. Even after the color standard was adopted by the Federal Communications Commission (FCC) in 1953, it would be more than a decade before color television became widely available in the United States. Consequently, the historical narrative of color television is full of false starts, failure, negotiation, and contention. Yet it is also a narrative that reveals the

complex interconnections between the development of color television and the study of subjectivity and perception, the presumed role of video aesthetics, the psychological power of color use, the play between the spectacular and the real, the assumptions that structure the production and reception of specific genres, and the power of television's narrational and commercial agency, especially when compared to film and photography. The unique qualities of color television are both historically located in the larger context of nineteenth- and twentieth-century color media and tied to the specific discourses framing the capacities and affordances of television as a seeing device.

Surprisingly, there has been little scholarly attention paid to this fertile history. While there have been countless books and articles written about postwar U.S. television, few mention color as more than an aside, a footnote, or a singular moment in the history of broadcast regulation. These histories have ignored the many ways in which the quest for and production of color became central to the operations, finances, branding, and marketing of RCA (which owned NBC) and CBS at different moments in their maturation. Or how color was widely considered the ultimate victory in innovation for the industry and a defining factor in the modernization of the look of television and its relationship to other forms of visual media post-1960. Moreover, unlike in some recent color film scholarship, television scholars have not yet read industrial discourses around, and studies of, electronic color in relation to broader philosophical and cultural conversations about the nature of color. And even though the study of color in design and media has become a key area of research as of late in other fields, surprisingly this interest, with a few exceptions, has not extended to research on television color specifically. In the last five years or so, a number of notable books have been published on the topic of film and color (primarily in the United States and United Kingdom) that have explored production techniques, color management, technical and artistic processes and practices, and the meanings generated by color use.[1] Additional works on color and consumerism, design, and digital color released in recent years have also altered our understanding of color use and production.[2] For these authors, color represents a fresh vantage point through which to reconsider well-trodden histories, analyses, and approaches to various forms of media and consumer culture. Color also invites meditations on sub-

jectivity and perception, which opens up new pathways for discussions of aesthetics and spectatorship.

The explanation for the oversight of color in the study of television likely involves the placement of the battle for FCC approval as the sole focus of all color television history, as well as the reluctance of many contemporary U.S. television studies scholars to engage with questions of technology, vision, and aesthetics. Television is most commonly thought about in terms of the cultural narratives and ideologies it creates and engages with, rather than as a highly complex technology of visual culture. Consequently, thinking through how technology and the processes of development and regulation shape the look of the television image is not something that has been considered until recently.

In the past, technical histories of television have primarily been left to the engineers, most notably George Shiers, Raymond Fielding, and Albert Abramson, who have written books and articles in technical journals, and Ed Reitan, who slavishly chronicled the history of color television technology and production in mostly nonnarrative form on his website before his death in 2015.[3] These technical histories are highly detailed chronicles of the processes and results of innovation in television; however, they often lack the cultural, industrial, and/or political context needed to provide a more complete picture of the various forces at work in the formulation of the idea and material object of television. This marginalization of the technical in relation to the rest of television studies scholarship has been showing signs of change in the last few years, in large part due to the growing influence of media archeology and the history of science and technology on the methods and focus of media historiography. A handful of scholars have even recently begun to engage with color television history specifically.[4] For example, Andreas Fickers has chronicled the history of color television standards in Europe, while Jonathan Sterne and Dylan Mulvin have written two articles that explore rich and intricate "perceptual histories" of the American standards period.[5]

While my analysis of the FCC color standards helps frame this book, my overall focus is more expansive. The question of color and the nature of its attendant affordances, conventions, limitations, and complications were unremitting and influenced not only the priorities and direction of the television industry but also the way that viewers understood them-

selves in relation to that industry and its technology. In conceptualizing the project, my aim was to locate the core period from the moment of the technology's invention to the time in which it was no longer considered novel in U.S. broadcasting. What I discovered through archival research was an extended and rigorous discussion, over more than forty years, about electronic color, occurring across commercial, regulatory, consumer, and scientific communities, that not only was one of the primary forces determining television's future but also configured the broader understanding and use of a distinctly modern form of vision.

One of the primary lines of argument threaded through all the chapters of this book is that color television, distinct from both monochrome television and other forms of color media, was imagined and sold as a new way of seeing. Color not only represented a new aesthetic for television (largely determined by FCC standards for color technology and the color management and production techniques established by networks) but also promised a peculiar viewing experience for audiences. Even though color television was not broadcast in 3D or even high-definition during the years before 1970, there was a consistent assertion made about its dimensionality and the way that it invited viewers to completely immerse themselves in the image, which is similar to the way that IMAX or 3D technologies are discussed today. Fabric textures were said to pop, the reflection on bodies of water shimmered, and dancers and their costumes revealed a new level of subtlety and expressiveness in movement—the viewer felt transported, her senses stimulated on a multitude of levels. The sense of immersion arose from the way that the electronic color images were said to overwhelm the senses, refine and enhance vision, and expand horizons. Jack Gould, television critic for the *New York Times*, made this very argument in a 1964 review of two color documentaries, stating, "The addition of color imparted a vibrancy and dimension to the superb photography that left no doubt there is virtually a new medium of TV at hand. The delicacy of the shading and greater pictorial depth stemming from the contrast offered by various hues were integral parts of a more exciting process of communication." He added that in the documentary on Rome he was reviewing, "one could almost feel the texture of the historic streets and buildings."[6] The 1952 manual for the CBS Remington Rand Vericolor TV camera chain asserted this idea even more vigorously:

> Much of the significance of color in television is striking, even to the casual observer. Aside from the most obvious effect, namely, that color introduces a sense of reality and a lifelike quality into the picture, comparison of a color television picture with the corresponding black-and-white image makes it apparent that not only are small objects more perceptible, but outlines in general seem to be more clearly defined. . . . Color television also seems to introduce a certain perception of depth. This is due, in part, to the increased ability of color to reproduce the contrasts and shadows as well as highlights and reflections in different hues, while the degree of color saturation, which is a function of distance, strongly enhances the three dimensional quality.[7]

Color television's promise of an immersive and intimate level of visual proximity fostered its development in a field outside of entertainment too: medical education. Largely promoted in the late 1940s and early 1950s by investor Smith, Kline and French (SKF), a Philadelphia-based pharmaceutical company, along with I. S. Ravdin, chief of surgery at University of Pennsylvania Hospital, and Peter Goldmark, head of CBS Laboratories, color television technology modified for medical use was adopted by teaching hospitals across the nation and was demonstrated regularly at medical conventions.[8] Praised for offering the ability to virtually transport viewers to an ideal viewing position of a live surgery or other medical event, for being able to transmit live and large-scale microscopic images from one location to another for diagnostic purposes, and for enabling medical practitioners to see what they otherwise could not on a microscopic image through the manipulation of color and light, color television promised to improve upon medical vision and the traditional surgical amphitheater experience. Although there were attempts to use monochrome television for medical purposes, the technology proved insufficient. Dr. Ravdin argued that one of the unique properties of color television that made it so ideal for medical use was "a sense of depth which is necessary for the adequate teaching of surgery," noting that with color television, "the deep recesses of body cavities which ordinarily are difficult to discern can now be readily observed because of the various color gradations."[9]

Coupled with the claims about its distinctive form of vision, color television was said to have a unique psychological and emotional hold

over viewers that made them more attentive, engaged, and open to the images and claims made before them. These beliefs about the power of color television were, of course, sold to advertisers and audiences by the networks and manufacturers in an effort to get them on board with the color project. Yet they also informed what genres and production techniques would be used to illuminate the purported unique qualities of the technology. Color television was positioned as the ideal form of modern American consumer vision, a discursive construct that by the 1960s had begun to intersect with Cold War rhetoric regarding surveillance and truth-telling devices and technologies. At that point, color television came to also represent American scientific prowess and the ability to withstand seeing and being seen via a technology of revelation and veracity.

The other argument underpinning this book is that color, as a concept and a phenomenon, came with a significant amount of cultural and industrial complexity and baggage and therefore brought with it tension, instability, and anxiety as it shaped the discussion about what television was ultimately supposed to do and be. In placing electronic color in relation to the aims and ideologies of American consumer culture and alongside the history of color theory and of other forms of color media (film and photography), we see how both the subjectivity and the volatility of color in general informed the way that color television was produced and received. We also come to understand how the processes and practices around electronic color and its management were simultaneously extensions of and distinct from those developed for other forms of color media.

These arguments give shape and direction to this book, which is organized chronologically, starting at the moment of invention (1928) and ending at the point at which the U.S. networks completed their conversion to color and a significant portion of the audience owned color sets (1970). This bracketing allows me to explore color television technology as a point of difference in the production and experience of television and to investigate the various ways color was, over time, integrated into the system of production and process of reception through cultural, industrial, regulatory, commercial, technological, and aesthetic negotiation. Each chapter is organized around a particular issue or stage—for example, innovation, standardization, calibration, conversion, and global expansion—that defined the industry's relationship to color at a specific

moment. The first half of the book focuses more overtly on the technology of color television, while the second half brings that history and conceptual framing to bear on moments in more traditional cultural and industrial histories.

Chapter 1 examines the early experimentation in and demonstration of color television technology, focusing primarily on the mechanical systems of John Logie Baird in the United Kingdom and Herbert E. Ives at Bell Labs in the United States. In this chapter, I am decidedly not interested in any sort of "inventor as hero" narrative or making claims about who should be considered the *true* inventor or patent holder of color television. Instead, I investigate the ways the technology was conceived of in terms of its relation to vision and veracity, as well as to other image-based mediums, while also considering the specifics of the demonstrations of this new technology and how they were described and received. Because this was a period in which the various possible applications for the technology were being imagined and debated, it is a rich moment to explore in terms of what were considered to be the unique qualities of electronic color and how it was expected to alter communication, pleasure, knowledge, and access to cultural and educational experiences. I end with a brief discussion of Baird's part-electronic high-definition and stereoscopic color systems (demonstrated in the late 1930s and early 1940s) and CBS's 1940–1941 demonstrations and public relations push for Goldmark's mostly electronic field-sequential system. With these demonstrations, which were primarily to the press, retailers, and regulators, CBS was attempting to disrupt the National Television Systems Committee (NTSC)—a group formed by the Federal Communications Commission to study systems and recommend standards—and the FCC process that appeared at that time to be leading toward a 525–scan line black and white standard, which the network and others felt was too limiting for future technological advancements, such as the broadcasting of color, which, as CBS argued, required a larger bandwidth. The protracted process of setting a separate color standard for U.S. television almost a decade after the black and white standard was established is a discussion that is saved for the following chapter.

My objective in chapter 2 is to place the process of color television standardization within a larger history of color theory, measurement, and management across various disciplines and industries. In framing the chapter this way, my intention is to intervene in the typical television

history narrative of the "color wars" between RCA/NBC and CBS, wherein standards are primarily a result of the moves and machinations of various governmental and broadcast industry players. This approach to the history creates the impression that the debates and discussion and ultimate outcome of this process (from 1948 to 1953) occurred in isolation and without the influence of complicated scientific, organizational, and historical precedents and entanglements. Like a number of recent books on the histories of color film, I begin the chapter outlining the philosophical and theoretical engagements with the question of color and subjectivity and then go on to explore the nineteenth-century development of color measurement systems (by scientists, artists, and philologists) that relied on studies of the nature of human vision and empirical research into the makeup of and interaction between colors. However, I then track how these systems of colorimetry made possible the standardization of color in industry and governmental institutions in the twentieth century and the role that those institutions and systems of measurement had in the formation of standards for film and then, eventually, television. The chapter concludes with an extended discussion of the approval process of the FCC and the work of the NTSC panels, detailing their psychophysical and technical tests of various color systems and the theories and cultural assumptions about color, television, and perception that structure them.

Even after the NTSC color system became the standard in 1953 and commercial broadcasting had been approved, color television remained technologically unstable and required much refinement and management at the levels of production, transmission, and reception. The first half of the decade, therefore, primarily served as an experimental and promotional period. In chapter 3, I analyze the discourses that framed the responses of critics, advertisers, network executives, and the public to the arrival of color to television in the context of both the specific value of and concerns over electronic color and the larger cultural anxieties around the potentialities and failures of color. I trace the development of color training for ad agencies, sponsors, and network employees, along with systems of calibration and color adjustment at the points of production and reception. The chapter wraps up with an examination of the earliest color programs and NBC's strategy behind its "introductory year" of color programming in 1954.

Chapter 4 moves beyond NBC's first year of color broadcasts and ex-

amines the use of color and video technology as a central component of modern design on network specials during the mid-1950s. However, before I get to the topic of network programming in this chapter, I first recount RCA/NBC's investment in local station conversion, their road-showing of color television across the nation, NBC's branding in relation to symbols of color, the building of color studios, the placement of color sets in public places, and the network's initial attempts at studying and then selling the "quality" color audience to advertisers. In covering this ground, we witness the processes of both conversion and expansion, and also the way that color had to be marketed and promoted through specific means and referring to specific rhetorical tropes and visual symbols. At a time in which color set ownership was still limited to relatively well-off early adopters, executives had to devise strategies for consumers to envision color television, whether through network identifications that announced color programs as they came on their black and white sets or through local promotional events that not only provided opportunities for people to view color television but in some instances lit up buildings and the sky in RGB color as the company worked to place electronic color into the public imagination. This was also a time in which both specific emotional and perceptual engagements with color were analyzed and then used to promote color viewing. Color use in television was said to engender a more intensive psychological and visual attentiveness in relation to the image, and that belief framed the assumed relationship between a viewer/consumer and color commercials and color programming. It also buttressed the idea that color viewing as an experience is more immersive, expansive, and both more realistic and more sensational than viewing monochrome.

I continue to delineate color media's relationship to the indexical and fantastical in chapter 5 by examining the use of color in, and marketing of, certain genres in the early to mid-1960s that were considered to be better at highlighting the features of color television viewing than others. Specifically, I spend the majority of the chapter discussing color cultural documentaries. Documentaries of this period are typically thought of as sober, highly political black and white endeavors intended as a cultural corrective to late-1950s network scandals and FCC chair Newton Minow's 1961 "vast wasteland" speech to the National Association of Broadcasters (NAB). Yet color cultural documentaries, which combined educational imperatives with visual exploration and entertainment,

were also popular at this time and were considered to be an excellent form through which to sell the need for and attributes of color on television. These documentaries tended to focus on art, travel and tourism, and nature, and promised to transport or immerse viewers in another world—one that could only be fully experienced through color. Whether the topic was diving deep with Jacques Cousteau, traveling through Rome with Sophia Loren, or receiving a guided tour of the Louvre, these colorcasts encouraged viewers to linger on the spectacular and realistic image before them in order to increase their sense of "being there" and temporarily submerge themselves in another world.

This purported ability of color television to expose the spectacular "real" or "natural" as it extends human sight continues to be explored in chapter 6, but is placed in the context of color television's 1960s global expansion through international displays, satellite technology, the adoption of color systems by other nations, and eventually, the inclusion of a color TV system on Apollo missions to the moon. In this chapter, I also look at the way color television's heightened relationship to veracity was picked up by and fused with forms of Cold War rhetoric that worked to claim color television as a potential tool of surveillance and detection.

I end the book by looking ahead from the 1960s to the normalization and full dissemination of analog color television and point toward the questions that need to be raised in terms of contemporary screen color in an effort to link them up to the history explored here.

The governing idea of this book is that color television was an incredibly complex technology of visual culture that disrupted and reframed the very idea of television while also revealing deep tensions and aspirations about technology's relationship to and perspective on the "natural" world and, relatedly, our potential to extend human sight and experience. As the following pages will demonstrate, color television was considered both an assumed next step in the advancement of the technological extension and replication of human sight as well as a radical departure from the norms, procedures, and priorities set by the black and white standard.

NOTES

INTRODUCTION

1 Simon Brown, Sarah Street, and Liz Watkins, eds., *Color and the Moving Image* (New York: Routledge, 2013); Angela Vacche Dalle and Brian Price, eds., *Color: The Film Reader* (New York: Routledge, 2006); Tom Gunning, Joshua Yumibe, Giovanna Fossati, and Jonathan Rosen, *Fantasia of Color in Early Cinema* (Amsterdam: Amsterdam University Press, 2015); Scott Higgins, *Harnessing the Technicolor Rainbow: Color Design in the 1930s* (Austin: University of Texas Press, 2007); James Layton and David Pierce, *The Dawn of Technicolor: 1915–1935* (Rochester, NY: George Eastman House, 2015); Richard Misek, *Chromatic Cinema: A History of Screen Color* (New York: Wiley-Blackwell, 2010); Steven Peacock, *Colour* (Manchester: Manchester University Press, 2010); Sarah Street, *Colour Films in Britain: The Negotiation of Innovation 1900–55* (London: BFI, 2012); and Joshua Yumibe, *Moving Color: Early Film, Mass Culture, Modernism* (New Brunswick, NJ: Rutgers University Press, 2012).

2 See, for example, Regina Lee Blaszczyk, *The Color Revolution* (Cambridge, MA: MIT Press, 2012); and Carolyn Kane, *Chromatic Algorithms: Synthetic Color, Computer Art and Aesthetics after Code* (Chicago: University of Chicago Press, 2014).

3 Albert Abramson, *The History of Television*, 2 vols. (Jefferson, NC: McFarland, 1987), and *Electronic Motion Pictures: A History of the Television Camera* (Los Angeles: University of California Press, 1955); Raymond Fielding, *A Technological History of Motion Pictures and Television* (Berkeley: University of California Press, 1967); George Shiers, *Technical Development of Television* (Stratford, NH: Ayer, 2010); and Edwin Howard Reitan, website for the history of early color television, last updated January 30, 2007; available at https://web.archive.org/web/20160206062925/http://www.novia.net/~ereitan.

4 Brad Chisholm wrote a fantastically detailed dissertation in 1987 about CBS's development of a color system as well as a book chapter on the relationship between color film production and color television. See Chisholm,

"The CBS Color Television Venture: A Study of Failed Innovation in the Broadcasting Industry" (PhD diss., University of Wisconsin–Madison, 1987), and "Red, Blue and Lots of Green: The Impact of Color Television on Feature Film Production," in *Hollywood in the Age of Television*, ed. Tino Balio (Boston: Unwin Hyman, 1990).

5 Jonathan Sterne and Dylan Mulvin, "The Low Acuity for Blue: Perceptual Technics and American Color Television," *Journal of Visual Culture* 13, no. 2 (2014): 118–38; and Mulvin and Sterne, "Scenes from an Imaginary Country: Test Images and the American Color Television Standard," *Television and New Media* 17, no. 1 (January 2016): 21–43.

6 Jack Gould, "Tinted TV Shows Its Colors," *New York Times*, November 29, 1964, X17.

7 *Vericolor Television Studio Equipment Instruction Manual* (n.p.: Remington Rand, 1952), p. F. Available at www.earlytelevision.org/pdf/vericolor_manual.pdf.

8 Initially, Ravdin and SKF worked exclusively with Goldmark and CBS after RCA had turned the pharmaceutical company away when approached about a color system. (The color system RCA had developed was not at an especially advanced stage in 1949.) However, not long after the company's system became the color broadcast standard in 1953, RCA began to invest in medical color television too, eventually producing a camera in 1956 that claimed to be a significant improvement on previous models such as the ones produced by CBS. Weighing two hundred pounds and operated by remote control, the cameras would be installed on runners above operating tables on the same overhead fixtures that housed surgical lamps. Walter Reed Army Medical Center in Washington, DC, SKF in Philadelphia, and the University of Michigan Medical School in Ann Arbor were the first to order these new cameras. Walter Reed Army Medical Center developed a close working relationship with RCA after the hospital committed to installing three complete RCA color broadcast studios, replete with color microscopic mounts and a six-by-four-foot projector screen, within their medical system and promising to purchase more as they began to build out a "medical network for exchange of information and services." SKF, "Color Television at Medical Conventions," spring program pamphlet, 1950, Ravdin Papers, University of Pennsylvania Medical School archives, "Admin," box 44, folder 4.

9 "Color Television at Medical Conventions."

CHAPTER 1

1 Maurice le Blanc in 1880 and Jan Czczepanik in 1897 both described proposals for color television, although these did not result in practical, working models. For Bronk, see George Shiers, *Early Television: A Bibliographic Guide to 1940* (New York: Garland, 1977), 43.