

TECHNOLOGY

Living Test Patterns: The Models Who Calibrated Color TV

The white women known in the 1950s as “Miss Color TV” reinforced longstanding hierarchies of gender and race that were built into generations of technologies.

BENJAMIN GROSS JUN 28, 2015



Marie McNamara poses in front of a color wheel during a test of NBC's new television cameras. (POPULAR MECHANICS)

In November 1953, *The New York Times* reported that late-night television audiences across New York had “discovered a new quiz game” on WNBT, the local NBC affiliate. It did not air on a regular basis and was not an official part of the station’s programming schedule. Nonetheless, a few nights a week, people gathered around their sets after midnight and waited for the flickering black-and-white image of a woman to appear on screen. She sat in a television studio, smiling and holding silent conversations with cameramen and engineers. The absence of a soundtrack did little to discourage viewers from staying up into the early morning, trying to figure out what she was saying or debating the color of her hair and eyes

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It may not sound like much of a quiz, but the latter question in particular would prove remarkably significant to people at NBC during the coming months. What the public was watching, albeit in monochrome, were over-the-air tests of a color-television system being developed by the network's parent company, RCA. Executives at NBC had hired the woman featured in these broadcasts, a red-headed model named Marie McNamara, to calibrate their cameras. "Her natural skin tones are perfect," the producer Vance Hallack noted, "and her hair, one of the hardest colors to telecast correctly, is among the toughest tests we have."

RCA's public relations department soon began referring to McNamara as "Miss Color TV," a deliberate effort to downplay the efforts of its competitor, CBS, which had used that appellation to refer to its main spokeswoman, Patty Painter. Painter and McNamara—two women sharing a common nickname—were the most prominent of the so-called "color girls," models that different networks hired to demonstrate their new television systems. Their careers mirrored the course of one of 20th-century America's great corporate debates, as RCA and CBS faced off to determine the technical basis for all future color broadcasts in the United States. At the same time, the selection of two white women as the literal faces of color television reflected and reinforced longstanding hierarchies of gender and race, with consequences extending well beyond the confines of 1950s America.

* * *

At its core, the dispute between CBS and RCA revolved around the best way to transmit and receive a color-television signal. After researching the question for several years, the two firms had settled upon very different answers. The CBS approach, developed by the Hungarian physicist Peter Goldmark, took an existing black-and-white television camera and mounted a rotating color filter behind the lens. The filter was divided into red, green, and blue sections, corresponding to the primary colors of light. As the disc spun, the camera captured the red, green, and blue components of an image and turned them into a television signal. A synchronized filter in the receiver ensured that a red, green, or blue filter was in place when the corresponding color information was presented on screen. Overlaying these three primary color fields on top of each other in rapid succession tricked the eye into seeing a full-color image.

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As David Fisher and Marshall Jon Fisher note in *Tube: The Invention of Television*, Goldmark's idea was not entirely new. The British inventor John Logie Baird had experimented with mechanical approaches to color television in the 1920s, but the CBS "field-sequential" system was the first to combine the concept with improved cameras and picture tubes. Despite rave reviews in the popular press, the CBS system faced strong opposition from other television manufacturers, most notably the RCA chairman, David Sarnoff. Under Sarnoff's leadership, RCA had spent millions to commercialize monochrome television with no moving parts. He warned that abandoning this all-electronic approach for CBS's whirling disc "would set back the cause of our technology by a generation." More importantly, field-sequential transmissions could not be viewed on any existing television sets. If the CBS system were widely adopted, thousands of RCA televisions would instantly be rendered obsolete. To avoid this fate, scientists at RCA's research laboratories in Princeton, New Jersey, engaged in a crash program to develop a compatible color system, which would also allow black-and-white TV owners to watch color programs (in monochrome) without any external modifications.

In the years following World War II, both CBS and RCA sought to persuade the federal government and the public of the superiority of their respective color TV systems. Goldmark had actually been lobbying the Federal Communications Commission (FCC) to endorse his field-sequential method since 1940, but faced pushback from other television manufacturers (including RCA) who had yet to recoup their investment in black-and-white TV. The commission granted CBS the right to transmit experimental color programs during the summer of 1941, but the bombing of Pearl Harbor interrupted the plan. Goldmark shelved further color-television work until after the war, at which point he unveiled a new secret weapon to win over the FCC.

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As World War II drew to a close, electronics firms who had spent the past four years on military projects once again turned their attention to television. Leading the charge was Sarnoff, who had earned the rank of brigadier general in the Army after coordinating communications during the D-Day invasion, and now embarked on a campaign to get RCA televisions into American homes. To Sarnoff—or “The General” as he preferred to be known—black-and-white sets remained the priority. According to his biographer, Kenneth Bilby, Sarnoff predicted compatible color televisions would not be available to the average consumer for at least five years.

Peter Goldmark was operating on a different timetable. In 1946, he arranged a demonstration of the field-sequential system for newly appointed FCC chairman Charles Denny. Goldmark invited Denny to the Tappan Zee Inn in Nyack, New York, where he had set up several 12-inch color monitors to receive signals from CBS transmitters in the Chrysler Building. A few seconds after flipping the switch, a young woman appeared on screen. “Her skin glowed a natural flesh pink, her long auburn blonde hair glistened, and the piquant smile and dancing blue eyes drew appreciative smiles from all of us,” Goldmark recalled in his autobiography. “Denny sat mesmerized.”

The woman who had captivated the FCC chairman was the 17-year-old advertising model Patty Painter, who soon became Goldmark’s favorite “animated test pattern,” as he put it to *The Washington Post* in 1950. Over the next five years, whenever CBS hosted a color-television demonstration, whether for government

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equipment by arranging flowers, preparing a fresh green salad, and flashing scarves on camera. “I’ve held up millions of scarves,” Painter told the *New Yorker* in 1951. “I’ve held up so many scarves we began to call CBS color ‘the scarf-sequential system.’”

The press heaped praise on Painter, referring to her as color television’s first star. *The Washington Post*’s Sonia Stein called attention to her “silver-blond hair and translucent complexion,” and noted that “she has actually become the CBS color trademark, chalking up more airtime than the geometric test pattern.” Goldmark and his boss, CBS chairman William Paley, once again decided to push the FCC to adopt the field-sequential system as the national broadcasting standard. Based on Denny’s reaction at the Tappan Zee Inn, both men thought their chances were strong.

Unfortunately, in January 1947, the commission announced that CBS would have to conduct additional field tests before its system could receive approval. Goldmark suspected foul play, especially after Denny took a job at NBC six months later, but he eventually won over a crucial ally. Denny’s successor, Wayne Coy, was a New Deal reformer who thought RCA’s influence over American broadcasting verged on monopolistic. On Coy’s urging, Goldmark invited members of the public to watch demonstrations of his new television system in Washington, D.C., featuring Patty Painter. During the first two months of 1950, Stein estimated, “more than 15,000 Washingtonians will have seen CBS color—and that means they will have seen Patty.”

The positive publicity surrounding these shows provided Coy with justification to organize formal hearings to discuss the future of American color broadcasting. Once again, the main figure standing in CBS’ way was Sarnoff. The General had hoped CBS would abandon its color ambitions when confronted with the growing popularity of black-and-white sets. When it became clear that Goldmark and Paley would not back down, he embarked on a public-relations campaign of his own. According to Bilby, Sarnoff attacked Goldmark as a “scientific charlatan.” He also warned the FCC that it was, according to an account in a 1968 collection of his speeches, “being urged by CBS to build a highway to accommodate the horse and buggy when already the self-propelled vehicle is in existence and has been

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RCA had certainly taken major steps towards the creation of a compatible color system since World War II. Engineers in Princeton had figured out how to compress a full-color television signal into the bandwidth normally allocated for standard monochrome programming. They also succeeded in building a picture tube that formed color images by firing three beams of electrons at a mosaic of red, green, and blue phosphors on its faceplate. Both of these inventions, however, were relatively recent developments and RCA's system still suffered from inaccurate colors and low contrast. These technical deficiencies, along with Coy's opposition to RCA, led the FCC to approve the CBS standard in October 1950.

* * *

Sarnoff's response to this news was swift. "We may have lost the battle," the General reportedly told an aide, "but we'll win the war." He immediately deployed RCA's attorneys to appeal the decision in federal court, but to no avail. At the end of May 1951, the Supreme Court ruled that the FCC had not overstepped its authority and that CBS could begin color broadcasts the following month. The network's color debut—appropriately entitled *Premiere*—aired on June 25, 1951, and featured appearances by Ed Sullivan, the New York City Ballet, and, of course, Patty Painter. After years of posing before the camera, Painter also joined the naturalist Ivan Sanderson as co-host of *The World Is Yours*, a science show that became the world's first regularly scheduled color-TV series.

Once again, "Miss Color Television" received rave reviews from critics, but as *The New Yorker* acknowledged, until more people bought CBS receivers, "the possibility of her name's becoming a household word is still somewhat limited." Since CBS had no manufacturing facilities of its own, only a handful of the country's 12 million televisions could display CBS color programming. Paley, the CBS chairman, sought to overcome this deficiency by purchasing Hytron Electronics, a Massachusetts-based vacuum tube maker, but essentially CBS was acting alone in its efforts to produce field-sequential color TVs. Most electronics firms agreed with RCA that there was no benefit to embracing a technology that would completely undermine the market for their black-and-white sets.

Compounding CBS' difficulties was the latest news from Princeton, where Sarnoff

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hosting television demonstrations for the press in New York City. The *New York Times* critic Jack Gould conceded that at this point the images presented by RCA and CBS systems were so similar that “only a side-by-side showing of the two systems would be pertinent in resolving the issue.”

CBS was threatened on multiple fronts. Not only was RCA rapidly closing the performance gap between field-sequential and compatible color television, but Hytron—the manufacturer of vacuum tubes—was having problems scaling up production of Goldmark’s invention. Meanwhile, CBS found it understandably difficult to convince advertisers to sponsor shows that could not be watched on the vast majority of televisions. Realizing that the network had taken on more than it could handle, Paley was perhaps grateful when word arrived from Washington that CBS had to suspend the production of color sets due to their reliance on materials deemed vital to the ongoing conflict in Korea.

The Korean War provided CBS with a graceful means of exiting the television manufacturing business. Meanwhile, Sarnoff took advantage of CBS’ color hiatus to funnel profits from RCA’s booming black-and-white TV sales directly into refining its color equipment. In May 1953, a group of industry representatives—the National Television Systems Committee (NTSC)—endorsed RCA’s compatible color system as the basis for a national broadcasting standard. This NTSC standard, which the FCC approved the following December, would govern all over-the-air TV broadcasting in the United States until the “digital changeover” in 2009.

* * *

Among the casualties of CBS’ color-television defeat was the medium’s first celebrity. When asked about her career goals in May 1951, Patty Painter hoped that she might “have a regular color-television show of my own.” Within six months she was out of a job. “Tradesters wonder if gal will land a berth in CBS black-and-white,” *Billboard* reported in October 1951. “One thing’s sure tho [sic], no matter which [network] takes custody, the telegenic blonde is bound to lead a colorless existence from now on.”

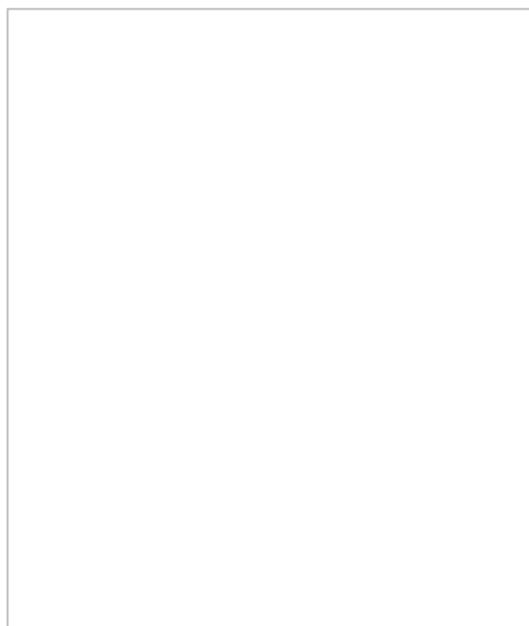
As Painter was withdrawing from the limelight, her RCA counterpart stuck around

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demonstrations, but her career really took off after the network moved its color tests to Broadway's Colonial Theater in November 1952. By that point, NBC was conducting regular color television tests, both over-the-air and on a closed-circuit link between its New York studios and RCA's Princeton laboratories. The main focus of these tests was the company's first commercially available color camera, the TK-40. It contained three separate camera tubes for red, green, and blue light, each of which had to be carefully adjusted to ensure correct color balance. Printed color charts provided studio engineers with some guidance, but more and more they turned to McNamara to confirm their settings. "You know what a black-and-white test pattern is," she told *The New York Times* in 1953. "Well, I'm it for color. I'm the final check."

Both of the women nicknamed "Miss Color Television" performed similar roles, but McNamara ended up getting greater public exposure, with the nationally syndicated columnist Walter Winchell describing her as "the most indispensable [sic] person" in color TV. Others had said similar things about Painter, but because most people did not own color receivers, they could not actually see her for themselves. Thanks to Sarnoff's insistence on a compatible color system, people could now watch McNamara, if only in black and white. Even before the official endorsement of the RCA color standard, McNamara appeared alongside Dinah Shore on the cover of TV Guide, and soon she had made her way on to *Howdy Doody* and *The Today Show*, all the while extolling the virtues of compatible color.



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But the woman once known as the “loveliest guinea pig of the electronic era” knew that her time as NBC’s living color chart was limited. Soon RCA engineers would create cameras that did not require as much calibration, and while she enjoyed the spotlight, the King Features Syndicate writer Reg Ovington reported in April 1954 that McNamara looked forward to “the day when she will no longer be needed for testing and when color-television broadcasting will be as standardized as is black-and-white.” In preparation for that day, she had enrolled in acting and singing classes, perhaps with an eye toward remaining involved in show business. Yet by 1960 she had vanished so completely from America’s public consciousness that the gossip columnist Dorothy Kilgallen was asking readers, “Remember Marie McNamara, ‘Miss Color TV’ on NBC a few years ago? She’s now Mrs. Hy Perlow, a Forest Hill housewife happily expecting her first baby.”

In hindsight, McNamara’s departure was not especially shocking. On several occasions she had expressed frustration with her long and irregular working hours. During the week, she was expected to be on camera between 50 and 60 hours, and NBC’s color tests could begin at any time from early morning to midnight. “Color television,” she told Ovington in 1954, “is a great thing, though it has ruined my social life completely.”

Beyond these scheduling concerns, over the years both McNamara and Painter came to realize that serving as “Miss Color Television” was not always a glamorous job. These were women hired primarily for their appearance. Newspaper articles frequently referenced their heights, weights, and hair color. To ensure that they would remain suitably telegenic, NBC and CBS exerted strict control over their behavior, both inside and outside the studio. In order for McNamara to keep her job, for example, she was instructed to avoid any activity that could alter her complexion. “I haven’t been near the sun in more than two years,” she confessed in 1953. “When I go on vacation everybody says, ‘Have a good time, but stay out of the sun.’” Painter recalled one memorable week when her bosses asked her to change the color of her hair so many times—from blonde to silvery-white to red to blonde to brown to blonde again—that during a visit to a stylist, a “great hunk” of it fell out. Both women also acknowledged feeling tired or on edge around the presence of bright colors once the cameras stopped rolling.

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namesake product. Patty Painter was an enthusiastic advocate for the field-sequential system, but CBS' ambitions always exceeded its manufacturing capacity during her time with the network. For her part, McNamara certainly helped raise awareness of compatible color, but Sarnoff had trouble transforming that publicity into television sales. The high cost and unreliable performance of RCA's new sets, along with a lack of programming, delayed any profits from color television until the early 1960s.

Painter and McNamara's true value to their respective corporate patrons was not in the commercial marketplace, but the regulatory one. With the technical basis of color television still uncertain, CBS and RCA mobilized these women to charm FCC officials and industry representatives on the National Television Systems Committee. At least part of the credit for CBS' initial victory over RCA in the broadcasting standard fight must be given to Painter, who had starred in every one of the network's color television demonstrations since 1946. Presumably, her success contributed to the selection of another alliteratively named model to represent RCA's interests as their own "Miss Color TV."

* * *

Together, these two women shaped the course of broadcasting in the United States for the next half-century. They did so directly, through their participation in the public relations campaigns for color television of the 1940s and 1950s, but also indirectly, as embodiments of the expected performance requirements of color television cameras and receivers. When putting a new television system through its paces, FCC and NTSC members paid particular attention to color fidelity. If Marie McNamara appeared on screen, they expected to see her red hair, blue-green eyes, and fair complexion, as vividly as though she were standing in the room beside them.

This last element was seen as particularly crucial. "Flesh is the key to all color TV," *Popular Mechanics* explained in January 1954, "and it's giving technicians some headaches right now." In this case, "flesh" exclusively referred to the white skin possessed by the models on screen and the official experts who constituted a color TV demonstration's primary audience. Cameramen at CBS and RCA therefore had

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manufactures continued to view white audiences as their primary market. Consequently, this practice of racially inflected optimization continued, eventually becoming embedded within the camera technology itself.

Viewed in this light, Patty Painter and Marie McNamara are part of a broader history of skin-tone bias in visual representation. Lorna Roth, a communications studies professor at Concordia University, has shown that Kodak chemists initially tailored color film stock to be more sensitive to the range of colors found in the white skin of their desired consumers. “Film emulsions could have been designed initially with more sensitivity to the continuum of yellow, brown, and reddish skin tones,” Roth argues in a 2009 *Canadian Journal of Communication* article, “but the design process would have to be motivated by a recognition of the need for an extended dynamic range”—a measurement of the lightest and darkest colors detectable by the film. According to *The Guardian*, this inability to accurately capture the facial details and overall appearance of darker-skinned subjects prompted New Wave filmmaker Jean-Luc Godard to dismiss Kodachrome as a “racist” technology.

A series of standardization procedures reinforced the visual biases intrinsic to these technologies. For decades, photography labs developing Kodak color film relied upon photographs of white women posed in front of a neutral background to calibrate skin tones. These “Shirley cards”—named for the first model who posed for one—were used as a reference for all color processing, regardless of the skin tones of the people captured on film. For its part, Hollywood turned to women known as “China girls”—a reference to either the porcelain mannequins used in early screen tests or the delicate skin of their human replacements—to maintain proper color balance between scenes.

Patty Painter, Marie McNamara, and other models featured in early color-television tests were therefore part of a much broader set of practices establishing whiteness as the default category in image representation. In her 2009 article, Roth confirms that up to the 1990s, television cameramen continued to use white-skinned color girls—either live models or photographs—to ensure their cameras were properly balanced. Afterwards if subjects with different skin tones appeared in the same scene, they supplemented the calibration process with special lighting

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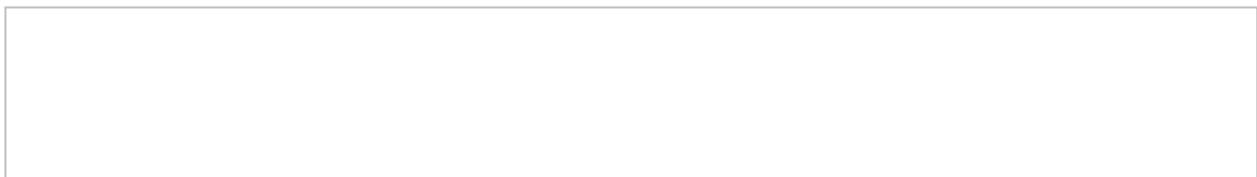


These types of patchwork solutions continued in darkrooms, on movie soundstages, and in television studios for decades, not explicitly due to the racism of photographers, cinematographers, or camera operators, but because of the assumptions built into their tools.

New technologies have since emerged capable of representing a wider range of skin colors. Kodak devised improved film stocks with an expanded range of brown and black tones. The growth of digital imaging has further transformed both photography and film-making, allowing artists an unprecedented degree of control over color balance once a still or moving image is captured. As for television, during the early 1990s, researchers at Philips (later Philips/Thomson) redesigned the company's LDK series of broadcast cameras, allowing them to detect multiple skin tones in a single frame and selectively adjust the color balance for each individual.

There are still occasions where the racial biases embedded in our cameras unexpectedly reveal themselves, as in 2009, when HP webcams had difficulties tracking the faces of African-American users. A year later, Microsoft's Xbox Kinect controller came under fire for a similar malfunction. Consumer Reports later attributed both problems to "low-level lighting and not directly to players' skin color," exonerating the two companies while sidestepping bigger questions about skin tone and the determination of "proper" lighting levels.

Nevertheless, unlike in the days of Paley and Sarnoff, some technology companies have begun to acknowledge these issues and take steps to address them. A particularly apt illustration of this transition is SRI's Visualizer Test Pattern, a display calibration tool created in the same Princeton facility where RCA scientists developed compatible color television. (SRI took over the research center following RCA's 1986 sale to General Electric.) This new test pattern, intended for digital video signals, features a racially diverse trio of models, rather than asking engineers to gauge picture quality on the basis of a single skin tone.



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The trio of models featured in SRI's Visualizer Test Pattern shows how a greater awareness of racial diversity has permeated the development of new imaging technologies. ([SRI](#))

Yet as much as SRI's Visualizer confirms the extent to which our test patterns have evolved in response to discussions of race, it also serves as a reminder of the countless women who anonymously contributed to the development of new camera and display technologies. Some of them were scientists or engineers working behind the scenes in industrial R&D programs, but for much of the 20th century they were more likely serving as “Shirleys,” “color girls,” “China girls,” or other nameless embodiments of a racially inflected—and exclusively feminine—vision of beauty.

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