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# Visibly Invisible: Color in Modern America

Color is the perfect subject for historians seeking to explore relationships among technology, modernity, and the culture of consumption. The history of twentieth-century color is full of intriguing personalities like the fashion maven Margaret Hayden Rorke, a pioneering color forecaster who directed the Textile Color Card Association of the United States, and alluring visual materials like the product advertisements that dominated magazines such as the *Ladies' Home Journal* and the *Saturday Evening Post* in mid-century America. As historians of technology, it is our remit to connect these historic actors and artifacts to important themes that can enhance public understanding about consumer culture and everyday life.

**I** remember those avocado green refrigerators!" "I can't find any yellow sweaters in any of the shops!" Inevitably, North American and European consumers respond to my research on the history of color in commerce with highly personal, nostalgic comments like these. Their remarks speak to the appeal of color to consumers and demonstrate the challenges facing historians who study it.

Today, shoppers around the world anticipate that fashion colors will change from season to season, and they look for consistency across product categories. Consumers can buy color-coordinated clothing outfits at Primark, H&M, or Zara and browse through rows of identical white or silver stoves, washer-dryers, and refrigerators at appliance stores. Frustration arises when the available colors fail to meet expectations: "I love this one shade of blue, and I can't find any blue shoes this spring!" Coordinated colors are so commonplace that no one thinks twice about them unless the technological system fails. More importantly, few consumers know that matching colors are social constructs with roots in the efficiency craze of modern times.

Color management as a business strategy dates from the early twentieth century when standardization and

marketing were in their infancy. Specifically, the roots of contemporary color management practices can be traced to the United States, mainly to the years between World War I and World War II. In the interwar period, American consumer society and the American chemical industry both grew by leaps and bounds, spurring a virtual "color revolution" in consumer products. As manufacturers and retailers competed for consumers' dollars, they devised tactics for expanding their sales in saturated markets. Companies of all sizes and in all product categories – from automobiles to household paints – began to pay close attention to style, fashion, and taste. American industry invented color standards as mechanisms for inventory control, adopted color order systems as design tools, and developed color forecasting as a method for anticipating changes in consumer demand.

Color standardization, in particular, owed much to new developments in chemistry, chemical engineering, and manufacturing technologies that made it possible to create stoves, upholstery, and carpets in colors that matched. There was also a link to progressive reform and the concern to improve the standard of living by applying engineering

practices to the production of consumer goods. The progressive commitment to standardization and efficiency permeated American business culture, popularized initially by the efficiency engineer Frederick Winslow Taylor (1856–1915) and then by his followers. "Taylorism", as the movement to apply engineering principles far and wide was called, was a celebration of rationalization, progress, and efficiency. The Taylorist efficiency craze paralleled the growth of Madison Avenue as a national center for advertising and marketing, and the advent of marketing theories that advocated emotional appeals as tools for increasing sales. Color was linked to these trajectories, and as such, corporate color practices have a unique history that sheds light on relationships between technology and consumer culture.

In 2012, I explored this multifaceted history in "The Color Revolution", a book that analyzed the role of the new color professionals – color forecasters, color stylists, and color consultants – in transforming American material life in the twentieth century.<sup>1</sup> "The Color Revolution" laid out a series of case studies on color that explored the relationships between product innovation and standardization in modern America. The book pivoted on two major questions: "Did color practice embody the impulse to achieve efficiency, the drive for planned obsolescence, or both?" and "Once the German chemical industry introduced standardized and reliable paints, dyes, and pigments in the colors of the rainbow, how did the creative industries develop strategies for managing the palette?" The target readership for "The Color Revolution" consisted of academics and curious college-educated adult readers interested in a range of topics: technology, science, and everyday life; consumer culture, aesthetics, and fashion; and business and innovation.

## Why Study Color?

Color has long intrigued authors – both science writers and academics – who have generated popular and scholarly books on the subject. Practitioners and journalists writing about color's past often work in the heritage mode, repeating heroic tales of breakthrough discoveries without fully interrogating the evidence, while scholars in anthropology and visual culture studies often focus on aesthetics and meaning.<sup>2</sup> Another method is to study original historical documents in libraries and archives to generate a new narrative, which was the approach of "The Color Revolution".

Color addresses three interrelated themes in the history of technology that lend themselves to archival research. The first theme is modernity. In the early twentieth century, the German sociologist Max Weber (1864–1920) noted that rationalization – the unbridled belief in progress and the widespread acceptance of rules and regulations – defined modernity and modern industrial societies. Early in the twenty-first century, the historian Thomas J. Misa and others then posited that modernity is inseparable from technology, while lamenting the paucity of scholarship connecting the two. The biggest challenge, they contended, is finding technologies that can shed light on modernity's big

picture.<sup>3</sup> Color systems, color standards, and color forecasts are rationalization tools linked to design and fashion and, as such, they are important artifacts that can be used to explore this theme.

Standardization is a second major issue addressed by the history of color. The eminent historian Ruth Schwartz Cowan noted that standards are the most important and least understood aspect of twentieth-century technology.<sup>4</sup> The literature on this subject remains surprisingly slim, perhaps because standardization is a dry topic that is difficult to explain in compelling ways. Lots of clues abound in the literature. Classic research on the history of screw threads tells us much about technical communities in industrializing America, while more recent work on the Internet, elevators, refrigerators, and concrete explores the ramifications of standardization for labor.<sup>5</sup> These studies are tightly focused on technologists and the "technical hardware" they created or used. An alternative approach is to look at color standards as "aesthetic software", that is, as a complex system of sophisticated visual codes used by experts to create new products. The actors who created and used color standards often earned their livelihoods in consumer-oriented professions, such as design, fashion, manufacturing, and retailing. These connections make color the ideal lens for examining how standardization fits into the broader context of consumer society.

The third theme that the history of color addresses is innovation, a subject that I first explored in "Imagining Consumers". My early research on products like Pyrex glass ovenware demonstrated the importance of interactions among different actors, including manufacturers, retailers, and consumers, to the creation of successful products. Consistently successful companies studied tastes and designed products to meet consumers' expectations, while less successful companies ignored consumers at their peril. Retail buyers and home economists (domestic scientists) contributed to the design process by watching the marketplace and channeling information about consumer preferences to manufacturing firms. The model of consumer mediation in technical change has important ramifications for the study of color.<sup>6</sup>

Overall, color is the ideal vehicle for exploring the relationship between commerce, culture, and consumers. "The Color Revolution" focused on the locus of chromatic change – sites at which colors were conceptualized and designed – to scrutinize the motives, decisions, and actions of technical actors, such as designers, forecasters, scientists, magazine editors, and salesmen. It showed that business users and individual consumers had very different values. Corporate customers like textile mills and automakers needed shade cards that enabled precise calibration and color forecasts with accurate predictions.<sup>7</sup> Consumers, however, had different expectations, depending on factors such as their race, ethnicity, or social class. In the mass market, colors often had little to do with elite or "highbrow" notions of beauty. Professional colorists who worked in the mass market created palettes that did not necessarily ap-

peal to consumers at the upper end of the market. The principal job of mass-market colorists was to manage aesthetic risk in a market apprehensive of quick change. Color standards, color systems, and color forecasts were tools in that process.

Research scientists with expertise in physics and visual perception figured prominently in the creation of color standards and systems. Beginning in the early 1930s, American scientists collaborated with design practitioners and style forecasters through the Inter-Society Color Council (ISCC), an organization expressly established to advance cross-disciplinary color practice. Members of the ISCC knew that chemical reactions achieved in laboratory beakers might, ultimately, have an effect on the look of the new Easter outfit or the cars produced by General Motors, while admitting, conversely, that market imperatives should help to guide laboratory research. United by a utopian vision of interdisciplinary cross-fertilization, research scientists and design practitioners routinely worked together, creating color standards for various projects, including the paint in factory interiors and "Old Glory", the American flag.

The history of color in the interwar years reveals the connection between science, standardization, and modern consumer society. The exchanges between color scientists and color stylists resulted in innovations that are recognizable by everyone. The history of color standards is relevant today, when educators and policymakers lament the lack of public interest in science. Young people, they claim, are more enthusiastic about media culture and mass consumption than biology, chemistry, and physics. Therefore, solutions may rest in placing greater emphasis on cross-disciplinary thinking, or "holistic design", in science education and practice. The history of commercial color – with its longstanding emphasis on interdisciplinary exchange and its links to mass consumer society – presents an opportunity to explain exactly how science and technology shaped everyday life in the past and may continue to do so in the future.

## Lessons from the Style Industries and the Fashion System

The example of color management in the transatlantic fashion system illuminates important themes in the history of color standards. For one thing, the case of American fashion demonstrates how the job of color forecaster became gendered as women's work. Professional color forecasters study the market and try to anticipate or predict changes in taste as an aid to product designers and merchandisers. The first color predictors were the anonymous salesmen and designers in nineteenth-century French dye houses. They created shade cards that showed textile mills what tints were likely to be in vogue in the upcoming season. Eventually, these shade cards morphed into formal color predictions. By the early twentieth century, French shade cards were widely exported throughout Europe and North America, where textile mills, garment manufacturers, and retailers used them to plan the lines for the new

fashion season. When World War I cut off America from its supply of French shade cards, a concerned group of businessmen in the United States fashion trades responded by establishing their own system of color cards. The American shade card was a product of multiple influences: the desire to oust the French from the American fashion market, the maturation of consumer society, and the progressive penchant for rationalization and scientific management.

Founded shortly after the outbreak of World War I in 1914, the Textile Color Card Association of the United States (TCCA, still operating today as the Color Association of the United States) applied the principles of scientific management to the creation of predictable, useable colors for the American fashion system. The TCCA established a rational system for color management for the New York garment industry, showing how the Taylorist vision of efficiency extended its reach into the most unlikely places.

The best lens for studying the TCCA is the career of its dynamic leading lady, Margaret Hayden Rorke (1883–1969), who served as managing director from 1919 to 1954. An actress, musician, and suffragette, Rorke assumed the executive reins of the TCCA after the all-male board decided to go for the "woman's viewpoint". Over four decades, Rorke oversaw routine operations and special projects at the TCCA. She attended to member queries and corresponded with Paris color scouts who kept her abreast of haute couture color trends, especially after the early 1920s when she convinced her bosses it would be foolish to ignore haute couture.

Rorke's dominion was a model of the "cooperative associationism" encouraged by Herbert Hoover's Department of Commerce, as studied by historians concerned with technocracy.<sup>8</sup> The TCCA's forecasts did not emerge from the wellspring of Rorke's imagination. They were the result of careful deliberations by committees that were made up of TCCA members from, among others, the textile, millinery, leather, straw, shoe, and garment industries. Color forecasts were circulated among the members who were free to use these chromatic management tools as they saw fit, principally for quality control. TCCA forecasts, thus, served as visual guidelines for helping manufacturers and retailers better select stock and manage inventories.

The rich TCCA archives at Hagley Museum and Library in Wilmington, Delaware, provide excellent material for an analysis of Rorke as a technical expert and fashion intermediary, whose job required the meshing of consumer needs with manufacturing imperatives. The archives' extensive documentation on the creation of shade cards – the handbooks of standard colors and the semi-annual forecasts of novel colors – illuminates the nuances of design practice, the interpersonal dimensions of creativity, and the unexpected paths of innovation. With dual commitments to standardized staple colors and changeable fashion hues, Rorke had to juggle her organization's need for reliable mass-market palettes with the allure of high styles from Paris. She negotiated the terrain like a real pro, circulating a newsletter called "The Broadcast" that explained which

Parisian hues matched the shade cards that she had already published. In this way, Rorke emphasized the fact that the TCCA had scooped the Parisian style makers. Examples like this one turn trickle-down theories of emulation upside down and inside out. Rorke's experience as a color forecaster and devotee of scientific management allow for a suggestive re-examination of the inner workings of the transatlantic fashion system.<sup>9</sup>

The TCCA was the first American organization exclusively dedicated to rationalizing and predicting color for the mass-market fashion industry. "Mrs. Rorke", as she was known in the trade, was America's first professional color forecaster. The color association did not exist in a vacuum, however. It evolved alongside other chromatic projects born during the color revolution. For example, Cheney Brothers Silk Manufacturing Company – America's leading broad silk manufacturer with factories in Manchester, Connecticut, and offices in New York City – hired the French stylist Henri Creange to create color forecasts for its luxury fabrics. America's leading chemical company, E. I. du Pont de Nemours and Company in Wilmington, Delaware, hired men trained in the fine arts to design new hues for household paints and, more importantly, for automotive lacquers used by the Detroit automakers. The DuPont Company and the General Motors Corporation vied for the talents of the nation's leading automotive colorist, H. Ledyard Towle. Around the same time, a major tobacco company hired Edward L. Bernays, a pioneer in the field of public relations, to promote green as a fashion tint that matched its new cigarette package. While the silk mill sympathized with the ethos of efficiency, the tobacco company used the emotional appeal of color as a coercive tool. In these examples, we see how advocates of commercial color management pursued disparate paths based on different market positions, ambitions, and ideologies.

Major companies like Cheney, DuPont, and General Motors hired men to manage hues, whereas the TCCA opened the doors to women by putting Rorke in charge. In doing so, it capitalized on cultural stereotypes that esteemed women's "natural" talents as negotiators and aestheticians, while nodding to psychological research that showed a higher percentage of color-blindness among men. The gender biases of the early twentieth century thus empowered Rorke to maximize her creative and intuitive skills as a color futurist while spreading the gospel of efficiency within the fashion world.<sup>10</sup> In the color field, gender stereotyping fused with popular theories of psychology, which held that women were best suited to manage the style palette because they were highly responsive to the emotional characteristics of color. In the long run, Rorke's distinguished record helped to reshape work in the field of commercial color into a legitimate career path for women. For historians of standardization, Rorke's experience signifies the reciprocity between science and culture, industry and aesthetics, in gendering a little-understood technical profession of color forecaster that is important to the fashion system of our own time even if the job is not highly visible.

By mid-century, American commercial color practice had reached middle age. During World War II, a number of factors – shortages of materials, rationing, and the patriotic impulse to cut back on consumption – temporarily circumscribed color innovation. The efficiency-minded Mrs. Rorke thrived, adjusting her TCCA forecasts to wartime exigencies. Male colorists joined the war effort and worked as camouflage experts. Large chemical companies like DuPont reoriented their chromatic practices, applying color to factory interiors to increase worker productivity and workplace safety. This equilibrium ended with the end of World War II and the advent of reconstruction.

Postwar industry witnessed a dramatic change in color management practices as stimulated by the rise of color consultants, growing media intervention, the booming economy, and the continued expansion of the chemical industry. Rorke and the TCCA continued to carry the banner for color standards in fashion, but their influence was overshadowed by the rise of superstar color consultants like Howard Ketcham (1903–1982) and Faber Birren (1900–1988). These high-profile celebrity colorists offered one-on-one consultancies with clients, much like the market researchers who worked at the famed advertising agencies on Madison Avenue.

Under the aegis of color marketers like Ketcham and Birren, the postwar era became the golden age of color styling. Color assumed even greater powers, or at least popular culture depicted it in this way. For example, in the Hollywood musical comedy "Funny Face" (1957), the fictional Maggie Prescott, a fashion editor played by Kay Thompson, takes up color styling as a remedy to the circulation woes of her magazine. "Think pink!" Prescott declares as she launches a pink promotion to stimulate readership. This comical scene captures the enthusiasm and extravagance surrounding color in the postwar years. Color styling connoted glamour, owing in part to the celebrated careers of consultants like Ketcham. After a stint at DuPont as the color forecaster for automotive paints, Ketcham opened his own "color engineering" firm to cater to the nation's leading businesses. Working from elegant offices in the newly opened Rockefeller Center in midtown Manhattan, he created some of the first colored telephones and designed calming interiors for passenger jets for prestigious firms such as Bell Laboratories and Pan American World Airways. As a self-styled color engineer, Ketcham empathized with the progressive era vision of social uplift, and his designs embodied those sympathies. The tenor of his achievements was exemplified by a profile published in "The New Yorker". Everything about Ketcham was upmarket.

The postwar period's major business trends – the triumph of celebrity entrepreneurs, branding, licensing, and mass advertising – influenced the path of color standardization in consumer products. The other prominent postwar corporate colorist was Faber Birren, an artist-entrepreneur whose consulting firm, American Color Trends, harnessed the media explosion to advance color psychology as a marketing tool. A prolific writer who published more

than forty “how-to” books, Birren also predicted color cycles for the “House & Garden Color Program”, sponsored by Condé Nast Publications in New York. The H&G color licensing effort had a broad reach. As a legal device, licensing provided a sure-fire mechanism for achieving coordination across product categories. For an annual fee, manufacturers making all sorts of household goods, from refrigerators to wall-to-wall carpeting, acquired the rights to use copyrighted color specifications approved by “House & Garden”. H&G had enormous market value as a brand name which Condé Nast touted to design professionals, retailers, and consumers in magazine and store promotions. There is no greater testimony to the popularity of the “House & Garden Color Program” than kitchen appliances introduced in the 1960s under the names Coppertone Brown, Sunset Gold, and Avocado Green.

Ketcham and Birren prospered just as color practice entered a period of crisis. Between 1957 and 1960, a left-leaning journalist and social critic named Vance Packard (1914–1996) wrote a series of best-selling books that drew public attention to the profligate design and production practices of American corporations. Packard used the Detroit automobile industry as a whipping boy in his war against corporate America. His crusade against design excesses such as king-sized tail fins and eye-popping paint jobs inspired the first generation of consumer activists and environmentalists. Packard condemned automakers for planned obsolescence, and his charge resonated with consumers. As scientific management and the progressive era receded in the public eye, color’s roots in the efficiency movement lay all but forgotten, the accomplishments of Ketcham and Birren notwithstanding.<sup>11</sup>

Other factors contributed to the changing face of color in the second half of the twentieth century. Packard’s invective against planned obsolescence eerily foreshadowed a major conflict within the ISCC over the divergent needs of color scientists and color marketers. By the early 1960s, visual thinking and tactile analysis stood at odds with powerful new scientific instruments that could measure color differences at the molecular level.<sup>12</sup> Physicists and marketers in the ISCC locked horns over what type of color knowledge mattered. Ultimately, the ISCC’s ambitions for a united color front cracked when fashion-conscious dissenters broke away from the ISCC to create a new organization, the Color Marketing Group, which was dedicated solely to color forecasting and color analysis for the interior design profession. Still, government color science experts at the National Bureau of Standards continued to insist on even more precise measurement and nomenclature for colors. It became difficult for marketers and scientists to communicate, as each group developed its own color language and practices. Disciplinary specialization, electronic instrumentation, and market segmentation had fractured the modernist dream that science and rationality could harmoniously co-exist alongside aesthetics and fashion.

## Conclusion

The story of the color revolution and the rise of color standards does not end with the professional skirmishes of the postwar years. Every historian knows that each generation distances itself from the methods, technologies, and achievements of its parents and, inadvertently, sometimes invents a new wheel that looks remarkably like the wheel of its grandparents. Today, global trend forecasting agencies such as WGSN (Worth Global Style Network) in London and the Doneger Group in New York predict color trends using methods and techniques that are similar to those developed by Rorke at the TCCA in the 1920s. Services such as Pantone Color Systems also owe much to the methods and techniques of the color pioneers of the modern era.<sup>13</sup>

Color is a seductive topic and it never fails to stimulate interest. People’s memories about the color of their first bicycle or their favorite shoe color can open the doors on to discussions about the deeper significance of colors and color standards. Once they hear that science and fashion are entwined, people get even more intrigued. “Clothing colors and standards are *related?*” they ask, and the conversation takes off. Therefore, color is the perfect subject – indeed, the ideal hook – for historians seeking to explore the relationship between technology, modernity, and standardization.

The story of twentieth-century color is full of punchy personalities and alluring artifacts, from Rorke, the fashion maven, to the stunning advertisements that dominated the pages of mid-century magazines. These actors and artifacts are excellent subjects precisely because of their popular appeal. Paint chips, fabric range books, and shade cards are also “small things forgotten” that can illuminate topics of historical importance.<sup>14</sup> As historians of technology, it is our challenge to connect these historic actors and artifacts to important themes that can enhance public understanding about consumer culture and everyday life. Color standards and modernity provide the threads that allow us to weave together that story. ■

## About the author

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Regina Lee Blaszczyk is Professor of Business History and Leadership Chair in the *History of Business and Society* at the University of Leeds in the UK. Blaszczyk has three research specializations: the history of consumer society, the history of design and innovation for the creative industries, and the history of the chemical industries. She has published twelve books, including a few on the history of color. "The Color Revolution" (Cambridge and London: MIT Press, 2012) received the Sally Hacker Prize from the Society for the History of Technology in 2013. In 2014, she edited a special issue of the *Journal of Design History* on "Colour and Design". Recently, she co-edited an anthology called "Bright Modernity: Color, Commerce, and Consumer Culture" (New York: Palgrave Macmillan, 2017), in collaboration with the German Historical Institute in Washington, D.C. Her latest book, co-edited with Ben Wubs, has just been published in March 2018: "The Fashion Forecasters. A Hidden History of Color and Trend Prediction" (London: Bloomsbury Academic, 2018).

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## Annotations

- 1 Unless otherwise noted, this article is based on Regina Lee Blaszczyk: The Color Revolution. Cambridge, MA 2012; and Regina Lee Blaszczyk and Uwe Spiekermann (eds.): Bright Modernity: Color, Commerce, and Consumer Culture. New York 2017.
- 2 For the heritage approach, see François Delamare and Bernard Guineau: Colors. The story of dyes and pigments. New York 2000; for the journalistic, see Simon Garfield: Mauve. How One Man Invented a Color That Changed the World. New York 2001.
- 3 Historians tackling modernity include Thomas J. Misa: Modernity and technology. Cambridge 2003; Thomas J. Misa: Leonardo and the Internet. Technology and Culture from the Renaissance to the Present. Baltimore 2004; Thomas Parke Hughes: Human-Built World. How to Think about Technology and Culture. Chicago 2004; Thomas Parke Hughes: American Genesis. A Century of Invention and Technological Enthusiasm, 1870–1970. Chicago 2004; and Terry Smith: Making the modern. Industry, art, and design in America. Chicago, Ill. 1993.
- 4 Cowan made these observations at the Reading Group on Postwar Technology, Department of the History of Sociology of Science, University of Pennsylvania, March 22, 2004.
- 5 Bruce Sinclair: At the Turn of a Screw. William Sellers, The Franklin Institute, and a Standard American Thread. In: Technology and Culture 10, no. 1, January 1969, pp. 20–34; Amy Slaton and Janet Abbate: The Hidden Lives of Standards. Technical Prescriptions and the Transformation of Work in America. In: Michael Thad Allen and Gabrielle Hecht (eds.): Technologies of Power. Essays in Honor of Thomas Parke Hughes and Agatha Chipley Hughes. Cambridge, Mass. 2001.
- 6 Regina Lee Blaszczyk: Imagining Consumers. Design and Innovation from Wedgwood to Corning. Baltimore 2000.
- 7 Few historians of technology have studied producer goods or business-to-business sales. Exceptions include Thomas J. Misa: A nation of steel. The making of modern America 1865–1925. Baltimore 1995; John K. Brown: Baldwin Locomotive Works, 1831–1915. A Study in American Industrial Practice. Baltimore 1995; and Steven W. Usselman: Regulating railroad innovation. Business, technology, and politics in America, 1840–1920. Cambridge 2002.
- 8 The classic interpretations of Hoover and "cooperative associationism" are Ellis Wayne Hawley: Herbert Hoover as Secretary of Commerce. Iowa City, Iowa 1981; and Joan Hoff Wilson: Herbert Hoover. Forgotten Progressive. Boston 1975.

**9** Thorstein Veblen: *Theory of the Leisure Class. An Economic Study in the Evolution of Institutions*. London 1899 is the major theorist on fashion emulation. Many fashion historians follow his model. See, for example, Christopher Breward: *The culture of fashion. A new history of fashionable dress*. Manchester 1995; Valerie Steele: *Paris Fashion. A Cultural History*. New York 1998; and Alexander Palmer: *Couture & commerce. The transatlantic fashion trade in the 1950s*. Vancouver 2001; Diana Crane: *Fashion and its social agendas. Class, gender, and identity in clothing*. Chicago 2000 is more sensitive to other social factors.

**10** On gender, science, and technology, see Margaret W. Rossiter: *Women scientists in America*. Baltimore 1982; Margaret Rossiter: *Women Scientists in America. Before Affirmative Action, 1940–1972*. Baltimore 1995; Carolyn M. Goldstein: *Creating Consumers. Home Economists in Twentieth-Century America*. Chapel Hill 2012; Sarah Stage and Virginia B. Vincenti (eds.): *Rethinking Home Economics. Women and the History of a Profession*. Ithaca 1997; Arwen P. Mohun: *Steam laundries. Gender, technology, and work in the United States and Great Britain, 1880–1940*. Baltimore 1999; and Nina Lerman et al.: *Gender & technology*. Baltimore 2003.

**11** On planned obsolescence, see Vance Packard: *The Waste Makers*. New York: D. McKay 1960; Daniel Horowitz: *Vance Packard and American Social Criticism*. Chapel Hill, NC 1994; Daniel Horowitz: *Anxieties of Affluence. Critiques of American Consumer Culture, 1939–1979*. Amherst, Mass. 2004.

**12** Historians of instrumentation include Robert Bud and Deborah Jean Warner (eds.): *Instruments of Science. An Historical Encyclopedia*. New York 1998.

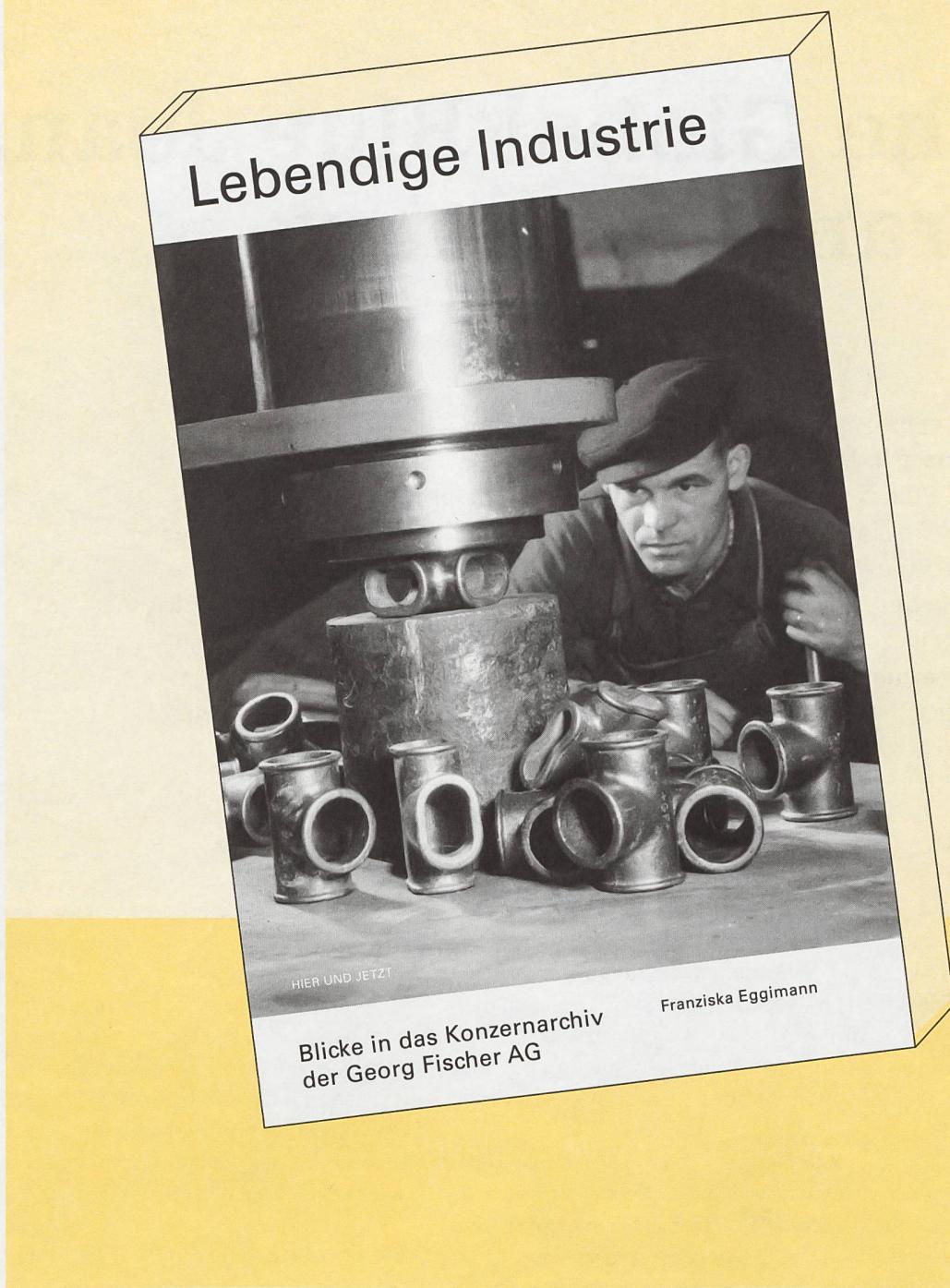
**13** Regina Lee Blaszczyk and Ben Wubs (eds.): *The Fashion Forecasters. A Hidden History of Color and Trend Prediction*. London 2018.

**14** Anthropologists, material culture scholars, and sociologists, such as Mary Douglas and Baron Isherwood: *The world of goods. Towards an anthropology of consumption*. London 1996; James Deetz: *In Small Things Forgotten*. New York 1996; Steven Lubar and W. David Kingery (eds.): *History from things: essays on material culture*. Washington D. C. 1993; and Mihaly Csikszentmihalyi and Eugene Rochberg-Halton: *The meaning of things. Domestic symbols and the self*. Cambridge 1981 have long recognized that commonplace artifacts can illuminate the big picture.

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