Chromophilia: The Design World's Passion for Colour

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The history of colour in design practice is an overlooked area in design history. Historical research on colour has been divided into aesthetic and cultural studies by art educators, curators, art historians, and cultural theorists, and into work on dye production and distribution by historians of technology and the chemical industry. This special issue of the *Journal of Design History* reviews the state of the field, and presents five essays that open the doors on to new approaches to the history of 'Colour and Design'. Recent research shows colour to be part of the broader field of creative practice, with its own trajectories, objectives, and outcomes. The history of colour and design allows researchers to bridge the gap between the study of Modernism and study of modern industry, as colour provides a platform for examining the give-and-take between these two realms and to the transition to the digital age.

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The year 2013 marked the fiftieth anniversary of the American publication of the influential manual *Interaction of Color* by the German émigré painter and art educator Josef Albers (1888-1976). In 1971, more than a decade after the Bauhaus-trained Albers retired from the chairmanship of the Department of Design in the School of Art and Architecture at Yale University, an abridged paperback of his folio masterwork was published. The concise paperback edition became a staple for college art courses, at least

in the United States. Between 1963 and 2013, *Interaction of Color* sold more than half a million copies.[1]

For American art students who came of age in the third quarter of the twentieth century, *Interaction of Color* was *the* reference work in seminars on colour theory. 'Elements of Josef Albers's teachings have become so familiar and ingrained in current art curricula through his influence', wrote art historian Eva Díaz in the *Art Bulletin* in 2008, 'that it is difficult to recall how radically art education was altered by the widespread adoption of his methods'.[2] Albers's colour methods were popularised around the globe through the work of his students from Black Mountain College and Yale University. Many Yale graduates who became art teachers used his methods to teach colour in the classroom. His former student Michael Peters, a British designer who founded the Michael Peters Group, and more recently, Identica, drew on Albers's teachings to advance the field of corporate identity branding.[3] 'Bauhaus brought together designers, artists and craftsmen to create something that changed the world they lived in', Peters wrote in *Design Week* in 2005. 'Indirectly, I became a beneficiary at Yale and was taught by Albers. I found him to be a truly inspirational teacher as well as a design giant'.[4]

Building on his work at the Bauhaus, Albers developed a colour pedagogy that cast aside established colour theories and colour systems (such as the Munsell Color System that the painter Ellsworth Kelly studied at the Pratt Institute in Brooklyn in the 1940s), in favor of empirical tests that students set up for themselves using packets of silk-screened pigmented papers. While the Munsell Color System aimed to impose order on the world

of the senses, Albers believed that colour was neither objective nor subjective, but situational and relational (influenced by the quantity of the colour, and by the surrounding light, atmosphere, and adjacent colours). 'His own work as a painter had led him to realise that theoretical, systematic and intellectually based attempts to organise and determine the use of colour were doomed to fail in practice. To be able to explain colour was not to understand how to use it. How could a colour chart or colour wheel be usefully accurate when no two printings of the same book would produce precisely the same colour, let along those of the artwork provided for the printer?', explained the British conceptual artist Michael Craig-Martin, who took the Albers-designed colour seminar at Yale University in the early 1960s. 'Albers located the understanding of colour in perception, and quality of perception in practice'.[5]

Interaction of Color was a roadmap to be used in the quest for universal truth. Through the exercises with pigmented papers, students were expected to uncover the true nature (or form) of colour and develop the perceptual ability to use colour in their own work or simply to appreciate colour in their everyday lives.[6] With his emphasis on perception, Albers marched to the same Modernist drummer as the collector Albert C. Barnes, the philosopher John Dewey, and the art theorist Denman Ross, all of whom valued 'art as experience'.[7] Although *Interaction of Color* advocated 'learning by doing', it outlined a 'one best way' that would have pleased Frederick Winslow Taylor (1856-1915), the efficiency engineer who fathered scientific management.[8] In a recent assessment of Albers, the British art historian Briony Fer described his colour methods as being 'under the spell. . . of the ideal system and the quasi-scientific rhetoric, the kind of discourse that

seemed like an exhausted hangover from Bauhaus aesthetics'.[9] In other words, Albers had rejected the perceived orthodoxy of commercial colour systems—only to replace them with a new doctrine.

In some respects, Albers's obsession with colour and truth was a high Modernist's reaction to the trivialisation of colour in popular culture, to the ubiquitous readymade synthetic hues that dominated the media, the streets, and the shops. If these eyesores could not be obliterated, they could be bypassed in pursuit of higher, more cerebral concerns. The British artist and critical theorist David Batchelor has posited that a fear of corruption or contamination through colour is a longstanding theme in Western thought.[10] From the nineteenth century onward, European and American tastemakers had associated colour combinations that 'shouted' with the 'unwashed masses'—the poor and working classes who shopped at penny bazaars—and identified pale hues with gentility and refinement, 'good taste', and spiritual purity.[11] Batchelor explained:

> '[C]olour has been the object of extreme prejudice in Western culture. . . . It is, I believe, no exaggeration to say that, in the West, since Antiquity, colour has been systematically marginalized, reviled, diminished and degraded. Generations of philosophers, artists, art historians and cultural theorists of one stripe or another have kept this prejudice alive, warm, fed and groomed. As with all prejudices, its manifest form, its loathing, masks a fear: a fear of contamination and corruption by something that is unknown or appears unknowable. This loathing of colour, this fear of corruption through colour, needs a name: chromophobia'.[12]

Chromophobia is a useful concept that helps us to place the influential colour work of Josef Albers within a cultural and historical context, to analyse some of its blind spots, and to identify areas of colour history were hidden in its shadows. Batchelor shows how chromophobia played out in literature and architecture, leading the novelist Herman Melville to make the great white whale the protagonist in *Moby-Dick* (1851), and impelling Modern architects and interior designers to proliferate white walls in chic upscale interiors well into the late twentieth century.[13] In nineteenth-century France, explains the art historian Laura Kalba, the addition of colourful plants to public gardens and the concomitant growth of an artificial flower industry to make colourful ornaments for ladies' fashions raised the ire of tastemakers.[14] In his posthumously published book, *Aesthetic Theory*, the cultural critic Theodor Adorno praised the use of black in contemporary art and implied there was something infantile in bright colours.[15] Similar prejudices shaped *Interaction of Color,* which eschewed the utilitarian task of mixing and matching colour chips to create colour harmonies in favour of the heady pursuit of understanding colour as truth.

In his quest for universality and authority, Albers downplayed the long history of Western colour practice that began in the 1600s, reached adolescence in the 1800s, and matured in the early 1900s within the fields of natural philosophy, industrial art, science, technology, textile design, fashion, and commerce. Subsequently, the postmodern moment helped us to understand that there are many ways of looking, learning, and interpreting the world. Recent scholarship has begun to acknowledge the legitimacy of popular and mass culture, as did the artists of the 1960s who reacted against Albers. In

2008, the landmark *Color Chart* exhibition at the Museum of Modern Art (MOMA) and Tate Liverpool explored how color field painters first took cues from Albers and then distanced themselves from his anti-commercial stance. Commercial colour systems, colour charts, and readymade colours intrigued them. The Abstract Expressionist Joseph Stella used newly developed industrial paints on his canvasses, and tried to 'keep the paint as good as it was in the can'.[16] The sculptor John Chamberlain, who assembled junkyard fenders, tailfins, bumpers, and hoods into Abstract Expressionist-Pop Art objects, put it simply: 'De Kooning knew about the color of America. The color of America is reflected in their automobiles'.[17] In the *Color Chart* catalogue, Briony Fer hit the nail on the head as she reflected on the commercial culture dismissed by Albers and embraced by these avant-garde artists: 'Just because the color chart is rooted in a desire to rationalize and standardize, it does not follow that its aesthetic effects are either rational or standard'.[18]

Albers's preoccupation with universal truth, including the notion that perception is a building block for art, earmarked him as one of the last Modernists. His highly intellectual approach to colour stemmed from the catholic belief that the role of art in society is to challenge tradition and to capture and re-present authentic reality. In a prescriptive Modernist fashion, *Interaction of Color* provided one-stop lessons to students seeking to sharpen their colour sensibilities. Today, this approach seems rigid, ahistorical, and disconnected from the realities of design practice. Recent historical research has shown that when working with colour in a commercial context, it is possible, and even desirable, to mesh rational imperatives with personal intuition.

Chromophilia, Modernism, and modernisation

It seemed appropriate to start this special issue on ‘Colour and Design’ with a critique of Josef Albers’s *Interaction of Color* because of the volume’s near iconic status within art education and design history, at least in the United States. While doing my own historical research on colour, I often fielded one of two questions: ‘Are you writing about dyes?’ or ‘Are you writing about Josef Albers?’ The simple answer to both questions was ‘no’, but that I was interested to understand how colour choices were managed in commercial culture, using design practice as a focal point. In some respects, I was following the path of the Pop artists who rejected the colour-as-truth trope and alternatively embraced, analysed, and commented on colour’s role in mass culture. I was interested to know more about the design world’s historical passion for colour—to explain the ‘chromophilia’ that had reshaped design practice in the nineteenth and twentieth centuries and that generated the colourful world of synthetic mass-market goods around us.[19]

One challenge before historians of the material world is that the subjects at hand—fashion, design, and colour—stretch across a research divide to encompass the rise of Modernism as an aesthetic and cultural phenomenon, and the social and economic modernisation process that was wrought by industrialisation, urbanisation, and commercialisation. Modernism has been long associated with highbrow thinkers, artists, reformers, and educators such as Josef Albers, while modernisation is discussed largely within the context of invention, innovation, commerce, and capitalism. Yet the cultural

history of colour and design (like other facets of design history) can be used to explore how aesthetic and commercial modernities intersected and informed each other.

The modernisation of the dyestuffs and pigment industries—the shift from craft to quantity production, and the expanding role of science and technology in innovation, manufacturing, management, and marketing—has been addressed by historians of the chemical industries, sciences, and technologies. Historians such as John Beer, Anthony Travis, and Peter J. T. Morris, and popular writers such as Simon Garfield, have identified 1856 as the banner year for chemical innovation in colour. That year in London, the brilliant teenaged chemist, William Henry Perkin, accidently discovered a way to synthesise the fashionable colour 'mauveine', or aniline purple, from the byproducts of the coal-tar industry, while doing a homework assignment for Professor August Wilhelm von Hoffmann at the Royal College of Chemistry (now Imperial College). Perkin's discovery of synthetic mauve laid the groundwork for one of the nineteenth century's 'high-tech' industries—synthetic organic chemicals—whose dyes, paints, and pigments were instrumental in transforming the look of the material world. Thanks to historians of the chemical industry, we know a good deal about the rise of the German synthetic organic chemical industry to global dominance through scientific discoveries, entrepreneurship, and marketing innovations, and of the subsequent rise of the American competition during and after World War I and World War II.[20]

On the cultural side, the relationship between modernity and colour has been the subject of suggestive research in several disciplines. The art historians John Gage and Michel

Pastoureau have examined the ever-changing meanings of colours in art, science, and culture from medieval times to the late twentieth century.[21] Colour appears to have perplexed the best scientific minds from Newton onward. In *Synthetic Worlds*, the Marxist cultural critic Esther Leslie describes how the natural philosophers struggled to understand how blackened coal, created from death and decay, could produce a glistening new synthetic world, and their belief that sensory perception had to adjust to the changing times. In Leslie's account, Johann Wolfgang von Goethe (1749-1832), the great nineteenth-century German colour theorist, was convinced of the subjectivity of colour and believed that the human eye could be trained to see it better. 'The eye is active in perceiving the world', Leslie wrote. '[C]olour perception depends as much on the condition of the eye and the mind, as well as the moment and conditions of seeing, such as the ambient light, the distance from the object. Colour is not a stable given, but rather as likely to be present in reflected rays on the transparent skin of a bubble, the iridescent green-gold of an insect or the physiological and psychological colours caused by an overexposure to light or to another colour.'[22] As the forces of bureaucracy and specialisation ushered the West toward Modernity, colour eluded the best minds, who struggled to fathom its perceptual mysteries and cultural contradictions.

If we shift the angle of vision from philosophy to practice, commercial colour begins to come into focus, and we can get a grip on its place in the culture and the economy. The history of colour in creative practice—one of the spaces where Modernism and modernization merged—has only recently been the subject of scholarly research. As the chemical industry distributed the sophisticated new dyes and pigments around the globe,

the creative industries responded to the new colour technologies in different ways. The history of innovation—the study of how firms, industries and individuals brought products to market, and how those products were adapted to particular circumstances—is one of the most promising avenues for colour studies.

One creative industry that has long been deemed chromophobic is British filmmaking. In a comprehensive new study, *Colour Films in Britain: The Negotiation of Innovation, 1900-55*, historian Sarah Street evaluates the chromophobic concept of 'colour restraint' that dominated the British discourse over Technicolor, a new process for colourising movies by using dyes. But the debate over chromatic restraint did not lead to the wholesale rejection of colour; instead, it inspired British cinematographers develop a bold Technicolor aesthetic that stood apart from Hollywood gaudiness while embodying British notions of appropriate taste. Based on archival research, a close reading of films, and oral histories with filmmakers, Street's book is a model work that explores the symbiotic relationship among new colour technologies and artistic expression, demonstrating how modernisation and modernity intersected in one creative field.[23]

A similar thread on modernisation and modernity runs through my book, *The Color Revolution*. Focusing on design practice, the book examines the relationship between science-based manufacturing industries and the creative professionals that provided them with colour advice and guidance. The story begins in the era of the industrial arts and the practical man, and explores their adaptation to the organisational and structural changes of the Second Industrial Revolution. [24]

Specifically, *The Color Revolution* focuses on how the first colour design professionals—colour stylists, colour managers, colour forecasters, and colour engineers—crafted a new creative occupation within a business environment that was increasingly dominated by large national corporations. It examines how new mechanisms, design tools, individuals, companies, and trade organisations facilitated the two-way flow of colour data between Europe and North America. Starting in the 1870s, product designers and retail buyers relied on colour information acquired from Europe in the form of shade cards, first from French dye houses and later from Parisian style bureaus such as J. Claude Frères et Cie **[1].** (Style services like Claude Frères also exported fabric swatches to foreign customers who wanted to keep abreast of continental textile trends.) Factory art directors and salesmen looked to these reference tools for inspiration as they planned new lines. World War I changed this routine, as the hiatus of international trade shut out German dyestuffs and French shade cards from the world market.[25]

As the US economy expanded during World War I, American industry responded to the dearth of German dyes and French shade cards. The US synthetic organic chemical industry grew dramatically, replacing German dyes with those made on US soil. At the same time, the followers of Frederick Winslow Taylor lobbied to extend the principles of scientific management from the assembly line to other corners of American life. Born of these developments, modern colour management had several goals: to wrestle style hegemony away from Paris, to create a palette suited to the segmented US market, to develop more efficient methods for collecting, studying, and disseminating information

on colour trends, and to help manufacturers and retailers make rational colour choices in product design and merchandise management. Put simply, the ultimate aim was not to eliminate the colour choices in Easter bonnets, but to produce Easter bonnets in colours and prices that would appeal to the greatest number of consumers. [26]

American colour management pioneers understood that colour perception is a subjective experience, but as pragmatists, they worked to rationalise colour selection. Under the direction of Margaret Hayden Rorke (America's first professional colour forecaster), a now-forgotten trade association called the Textile Color Card Association of the United States (later the Color Association of America) responded to the needs of America's multicultural market and developed colour forecasting practices that were widely emulated around the world until the triumph of the digital age. Concurrently, entrepreneurs such as Hazel H. Adler, H. Ledyard Towle, Howard Ketcham, and Faber Birren created the first colour and design departments at high-tech firms such as E. I. du Pont de Nemours & Company, Pittsburgh Plate Glass Company (PPG), and General Motors Corporation (GM), and established consultancies that served the Fortune 500, including Philip Morris Company and Pan American Airways. H. Ledyard Towle was the 'colour' in Harley J. Earl's famous Art and Colour Section at GM in the late 1920s, while Howard Ketcham help to lay the foundation for corporate identity branding with his creation of the signature airline colour, Pan American Blue, in the 1930s.[27]

Just as Josef Albers believed that the designer had an ethical responsibility to create the best product with the least waste of materials, these pioneer colourists were heady

idealists who embraced the idea that good colour management could 'change the world.' To be sure, consultants like Faber Birren had to keep their businesses afloat, and Harley Earl's Art and Colour Section at GM was beholden to corporate accountants concerned with the bottom line. But these colourists shared the common objective to make colour-design practice more efficient, and to pass on the savings to consumers in the form of lower prices. H. Ledyard Towle eliminated unpopular colours from DuPont's line of auto finishes by studying sales statistics and making educated guesses about consumer tastes based on his experience as a fine-arts painter, a camoufleur, and a Madison Avenue art director. As business historians have shown, this blend of rational analysis and intuition was characteristic of modern American industry, whether the area was consumer product design or the field of economic forecasting.[28]

Other researchers have begun to explore aspects of colour's relationship to modernity and modernisation. In 2012, the German Historical Institute in Washington, DC, sponsored the 'Bright Modernity' conference, which assembled researchers from Austria, France, Germany, Italy, New Zealand, Sweden, the UK, and the US to discuss new research on the business and cultural history of colour practice. Historians of science, art, design, and business, as well as anthropologists and fashion practitioners, presented innovative work on German dyes and pigments, the American paint industry, the impact of popular science on colour materials for the Victorian classroom, the rise of new trend forecasting organisations such as Première Vision and Modeurop, and the role of gender stereotypes in marketing colourful mass-market products, from cosmetics to light bulbs. Collectively, the papers highlighted an important thread: Modernist sensibilities favored by the avant-

garde had some impact on commercial practice, but perhaps not as much as conventional art history would have us believe.[29] These case studies demonstrate that colour management is not a simple 'top down' matter. Motivations, directions, and inspiration for new colour practices come from a variety of sources.

In this special issue

This special issue on 'Colour and Design' spotlights important stories and actors who have been hidden from design history through the marginalisation of colour as a research topic. Each of the colour stories in this special issue in some way addresses matters of style, taste, aesthetics, and perception. But these stories are also inexorably linked to the social construction of scientific and technical knowledge, to the management of innovation for the mass market, and to a desire to accommodate and celebrate multicultural societies. Colour, the essays collectively suggest, is the ideal site for merging the study of Modernism and modernisation, and for deepening our understanding of how commercial innovations had an impact on culture and design practice.[30]

I. Colour, gender, and science

In the first article, 'One Essential Thing to Learn is Colour', design historian Charlotte Nicklas analyses colour advice published in major Anglo-American women's magazines in the mid to late nineteenth century. Recent work by Jo B. Paoletti and by Margaret

Maile Petty explores how twentieth-century marketers imbued colour with gendered characteristics, with Petty examining how colour choices in electric lighting for domestic interiors embodied early-twentieth century beliefs about feminine beauty and identity.[31] Through a careful reading of earlier prescriptive literature, Nicklas shows how Victorian editors on both sides of the Atlantic Ocean encouraged women to learn colour harmony to augment their *scientific* expertise as homemakers. Understanding how green ribbons flattered a redhead's freckled skin was considered just as important as knowing which compounds to obtain from the chemist to soothe wounds, how to prepare vegetables for winter storage, or how to remove stains from a man's silk cravat. By focusing on the discourse about science, Nicklas shows how emerging colour theories resonated with editors and journalists, who in turn reframed those theories in scientific terms and disseminated them to middle-class readers as fashion advice. Her work suggests that the twentieth-century phenomena identified by Paoletti and Petty may have their roots in the housewifery literature of the nineteenth century.

Nicklas's analysis of gender, science, and colour illuminates the mechanisms for the dissemination of the chromatic theories of the French chemist Michel-Eugène Chevreul (1786-1889), who served as the director of the Atelier des Teintures at the Manufacture Royale des Gobelins in Paris. As a state-supported enterprise, Gobelins supplied the French authorities with tapestries for state apartments and diplomatic gifts, showcasing the fine craftsmanship that had been a symbol of France since the era of King Louis XIV and his finance minister, Jean-Baptiste Colbert, who had channeled national funds into the luxury industries. Chevreul's job as head chemist at Gobelins was to improve the

quality of French tapestries, and to this end, he focused on colour challenges to the French textile industry writ large.[32]

Chevreul's main contributions to colour-design practice lay in his theories on visual perception and their practical application. In *The Principles of Harmony and Contrast of Colours*, published in French (1839), German (1840), and English (1854) and in subsequent editions, he introduced the concepts of *successive contrast* and of *simultaneous contrast.* The law of successive contrast described the visual effect that we now call an 'afterimage', whereby long exposure to an object of a certain colour leaves the observer seeing a shadow that fades after some time. The law of simultaneous contrast described how two colour samples placed side-by-side would appear to radiate on to each other. For example, a yellow paint sample juxtaposed against a red paint sample might cause the latter to look as if it were orange. There was no chemical or physical reason; the change in colour was an illusion due to the way the eye and the brain perceived colour. In many respects, Chevreul's theories anticipated Josef Albers's argument that colour is relational by more than a century.[33]

Chevreul's observations had important implication for textile designers, who still worked with the limited palette made from vegetable, animal, and mineral dyes. Chevreul devoted an entire section of the *Principles* to tapestries, explaining how novel colour effects could be achieved by mixing different threads of different colours into one yarn. Other sections discussed colour harmony in calico printing, wallpapers, architecture, interior design, and horticulture. Chevreul advised portrait painters to dress their male

and female subjects in flattering colours, based on their skin tones. Besides having wide impact on textile mills, Chevreul's ideas influenced the fashion world, which adopted his theories to the design of dresses, coats, and hats and to advise shoppers to pick millinery colours suited to their complexions.[34]

Chevreul's colour theories gained wider currency through fashion magazines, particularly after the new synthetic organic chemicals industry began supplying the textile industry with dyes in eye-popping hues. One such piece of fashion advice appeared in an 1874 issue of *Authur's Illustrated Home Magazine*, a monthly American periodical with a fashion column. *Authur's* noted that while black and gray were the preferred tints for 'out-of-doors costumes', women's 'growing taste for colors' was expressed in the 'the use of ribbons, sashes and knots for the bosoms, sleeves, pockets and hair'.[35] The Victorian fashionista could browse through dry-goods establishments for the newest fabrics and trimmings, but she was wont to know how to mix-and-match colours to suit her complexion or the furnishings in her parlor.

Nicklas deepens our understanding of what seems at first glance to be straightforward fashion advice by linking the familiarity with new colours to the Victorian cultural expectation that homemakers master natural philosophy. Today's popular culture defines 'science' in terms of physics, biology, chemistry, and mathematics, as the 'big science' of corporate R&D and government-business-academic collaborations such the Manhattan Project and the Human Genome Project. But these types of distinctions did not exist in the mid-1800s, when knowhow and skill had not yet morphed into expertise and

specialisation. The arts and sciences stood side-by-side under the umbrella of the practical arts. Nicklas's analysis reminds us of the importance of looking beyond Modernist assumptions to examine past colour practices on their own terms.

II. Colour and aesthetic reform

The second essay of this special issue, 'White Walls, White Nights, White Girls' by Sally-Anne Huxtable, shifts the discussion of colour's use and dissemination from the middle class to the avant-garde. Huxtable's work draws on insights from art history, literature, and philosophy to offer a new interpretation of colour in the Aesthetic Movement and the Arts and Crafts Movement in Britain. Much like Nicklas on Victorian fashion, Huxtable considers a familiar topic from a new point-of-view, connecting the historical dots to recast the proto-Modernist and Modernist canons. The cast of characters—Dante Gabriel Rossetti, William Morris, E. W. Godwin, Walter Pater, James McNeill Whistler—is familiar, but Huxtable's insightful and unusual conclusions about Aesthetic sensibilities and colour choices are new for design history.

Fitting to the nineteenth-century context, Huxtable refuses to draw barriers between 'fine art', 'decorative art', and 'literature'. She acknowledges the linkages among these forms, and understands that literature or poetry did not simply influence painting, or vice versa. Her analysis of high-end design demonstrates a web of connections that was the lifeblood of the creative set behind the British Arts and Crafts Movement and the Aesthetic Movement. As early as 1850 the artist Dante Gabriel Rossetti painted the traditional

theme of ‘The Annunciation’ with a palette dominated by white and accented with tints seen in Chinese export porcelain. Rossetti thus borrowed from the eighteenth-century aristocratic fascination with Far Eastern goods and adapted Asian colour sensibilities to Victorian art and decoration. This trend extended to other designs by the Morris circle. Huxtable’s reading of the White Room at Kelmscott Manor—the home of William Morris and his family from 1871—and several all-white interiors designed by Charles Rennie Mackintosh in Glasgow around 1900 links the reformers’ interests in white to a revival of vernacular English and Scottish traditions. This trajectory was also powered by a belief in the spiritual qualities of white, as articulated by Rossetti, Pater, and Whistler. Ultimately, Huxtable contends, it was the use of white by the Glasgow School that influenced Modernist pioneers such as Adolf Loos and Le Corbusier, leading them to replace ornament (perceived as degenerate) with plain white in interior design.

In many respects, Huxtable’s article parallels the work of Nicklas by highlighting the need to rethink historiographical trajectories that were shaped by the Modernist project. In *White Walls, Designer Dresses*, the architectural historian Mark Wigley points to Le Corbusier as the father of the Modern white wall. Although Le Corbusier designed chromatic spaces, his book *L’art decorative d’aujourd’hui* (1925) posited that modern architecture could only be modern if it was white. Whitewashed interiors had a purifying effect, obliterating the taint of the decorative past and allowing for the appreciation of the space itself.[36] In contrast, Huxtable shows that reform-minded British artists and designers had a longstanding affinity for whitewashed walls. As such, she uses the history of colour to demonstrate the whiteness trope associated with twentieth-century

continental Modernists was rooted in the activities of the nineteenth-century British avant-garde.

III. Day-Glo: From mystical to mainstream

In the twentieth-century United States, colour intrigued creative individuals across the trades and professions who relished the prospect of crossing boundaries. Some of the most imaginative work involved synaesthesia, a neurological phenomenon in which the divisions between the senses do not exist. Composers and musicians who were fascinated by the prospect of 'seeing' sound turned their energies to creating fantastic musical light shows that would help audiences stretch the boundaries of perceptual normalcy.[37] The British-born American architect Edmund Lind of Baltimore used colours to depict the harmonies and melodies in different types of music, anticipating the visual experiments of later generations of avant-garde artists such as the Synchromists.[38] These avant-garde efforts attracted some publicity, and the fascination endures to this day.

The allure of the mystical and spiritual qualities of colour, which had informed the work of the Pre-Raphaelites, played out in the mid-twentieth century fad for fluorescent colours. The third article in this special issue—'Synthetic Fluorescents' by media scholar Carolyn L. Kane—examines the history of fluorescence and its pathways into American popular culture through the inventive efforts of the Switzer brothers and the Day-Glo Corporation. In an analysis that harks back to the work of Esther Leslie, Kane explores

the longstanding cultural association of naturally occurring fluorescent materials with magic, spiritualty, death, and mysticism.

Looking at the Switzer brothers as inventors and innovators, Kane considers how and why their efforts succeeded, and offers an informative counterpoint to the example of colour practice in large corporations like DuPont. Whereas H. Ledyard Towle and Faber Birren colourised products for the mass market, the Switzers had to find alternative outlets for fluorescent paint, building a customer base among offbeat artists who made black-light installations and posters for Hollywood in the 1930s. After World War II, fluorescent colours briefly came to be associated with mainstream consumer goods, such as Prell shampoo and packages for Tide detergent.

After their foray into the mass market, fluorescent hues again became the darlings of the dark side with the rise of the counterculture in the 1960s. In turn, the hippie psychedelic look was embraced by mainstream designers, manufacturers, and brands, such as Maidenform lingerie and Braniff International Airways, and by Pop artists such as Peter Max and Andy Warhol. By the late twentieth century, fluorescent colours—once oddities associated with magic shows—were so ubiquitous that consumers hardly noticed them.

The case study of Day-Glo colours shows how a small business carved a niche for specialty colourants in a market that was dominated by large paint makers such as DuPont, Sherwin-Williams Company, the Glidden Company, and Benjamin Moore. National paint manufacturers had neither the interest nor the wherewithal to venture into

psychedelia. Experimentation with new uses for colour was left to entrepreneurs on the margins, continuing the pattern established with the inventor William Henry Perkin and the painter Dante Gabriel Rossetti in the mid nineteenth century.

IV. Chinese colours redux

The fourth contribution to this special issue, 'Chinese Colours and the Sydney Opera House', co-authors Chiu Chen-Yu, Peter Myers, and Philip Goad tells another colour story that bridges West and East. Between 1956 and 1966, the Danish architect Jørn Utzon developed an obsession with Chinese architecture that led him to create a distinctive 'Asian' colour scheme for the Sydney Opera House. Focusing on Utzon's artistic debt to China, the article considers the cross-cultural influences in Modernist architecture. By examining Utzon's background, travels, and interests, the authors demonstrate the flow of colour influences between China, Denmark, Sweden, and Australia. Their conclusions about the free flow of colour theories and colour practices support the contentions of this volume that colour is best understood as an interdisciplinary, transnational phenomenon.

Colour has long been an important design element in architecture, as demonstrated by Owen Jones's sumptuous polychrome interior for the Crystal Palace at the Great Exhibition of 1851 and by the tile and terracotta craze embraced by Anglo-American builders up through the interwar years. Mid-nineteenth century aesthetes revelled in white interiors with accent colours from Chinese ceramics, as Huxtable has shown. In this case

study of the Sydney Opera House, we learn how a once-obscure Danish architect looked to examples of Asian-influenced architecture and design available in his native Scandinavia, and adopted Asian forms, motifs, and colours to create an other-worldly, festive atmosphere fitting to a performance space.

The evidence in this essay buttresses the critique of Modernist colour paradigms presented in the discussion of Josef Albers. In 1947, Utzon and fellow Danish architect Tobias Faber co-authored a manifesto on contemporary architecture, which criticised fellow architects for blindly imitating traditional styles or rigidly adhering to functionalism. Some of the functionalists, Utzon and Faber contended, embraced formalism by rote, creating lifeless designs that were 'like a language without a grammar'. For fresh inspiration, Utzon looked away from European Modernism to traditional Chinese buildings and Imperial colours. At first glance, the Sidney Opera House, with its glistening white tile façade, might look to be a early postmodern interpretation of the International Style, but on closer inspection, the project has more in common with the Qing dynasty porcelain dishes that fascinated and inspired Dante Gabriel Rossetti.

V. Colour sources

The final contribution to this special issue appears in the 'Archives, Collections and Curatorship' section. Neil Parkinson, the archivist and collections manager of the Colour Reference Library at the Royal College of Art (RCA) in London, describes the nearly

2,000 published works (and some archival materials) that fall under his care. Located at the RCA since 1977, the Colour Reference Library is one of the world's major research collections of colour imprints, parallel to the Faber Birren Collection of Books on Color at the Robert B. Haas Family Arts Library at Yale University. The RCA's holdings include dozens of works on colour theorists from Chevreul to Albers, and colour charts and colour cards that document the efforts to standardise and tame the unruly realm of colour—challenges that preoccupied Isaac Newton, Philipp Otto Runge, Albert Munsell, the Textile Color Card Association of the United States, and countless others. Parkinson explains how contemporary art practitioners, including postgraduate students from the Royal College of Art, have used the Colour Research Library to create fashion, jewellery, ceramics, glass, and metal products, showing how the themes that fascinated the Victorians and Modernists have been given new life.

Parkinson's text describes a number of historical materials that point to promising new areas of research or augment the stories in this special issue. In terms of new research, for example, materials created by the British Colour Council (BCC) suggest a logical comparison with the Textile Color Card Association of the United States (TCCA), whose managing director Margaret Hayden Rorke visited Manchester in the late 1920s and coached industrialists on how to set up a colour forecasting organisation.[39] The library holds a group of little-known books by Mary Gartside, a contemporary of Goethe whose contributions to scientific colour theory were marginalised due to her gender. Her experience buttresses Nicklas's contention that scientific colour was an important aspect of women's work in the nineteenth century. The personal notebooks of the illustrator

Maxwell Armfield show how one British artist developed a fascination with the mystical side of colour and attempted to understand the correlation with music as did the architect Edmund Lind. But perhaps most relevant to this special issue, Parkinson reminds us of the similarities between Chevreul and Albers. In discussing the legacy of Albers, Parkinson notes that the 1963 large-format edition of *Interaction of Color* 'remains the most frequently consulted single item in the CRL'. Again and again, researchers are intrigued by the 'fresh-from-the-tin colour of the screen-printed plates' that seem to exude 'irresistible power'. *Interaction of Color* is indeed a seductive artifact whose enduring allure speaks to the sway of the 'one best way'.

Conclusion: Colour futures

In the videos shown at *Hello, My Name is Paul Smith*, an exhibition at the Design Museum, London, in 2014, the contemporary British menswear designer Paul Smith discussed his approach to colour.[40] It seems apt to end with a summary of Smith's ideas, which stand apart from the Modernist perspective of Josef Albers and, as such, bring us full circle. As he explained his approach, Smith excitedly talked about found objects, vintage bits and bobs, streetscapes, and everyday colour. His delight in the commonplace colours around us—chromophilia—connects Smith to earlier generations of commercial colour enthusiasts from Chevreul at Gobelins to the Switzer Brothers at the Day-Glo Corporation.

In the early twenty-first century, there is no 'one best way' in colour practice. Trade fairs such as Première Vision in Paris and trend forecasting organisations such as the Worth Global Style Network (WGSN) in London use exhibitions and the Web to guide customers rather than to dictate mandates. Like the Fifth Avenue department stores of the Modern era that eschewed colour coordination across the retail sector, today's global brands see colour variety as one of the many tools that can be used to create a distinctive signature look.[41] Paul Smith, for example, borrows colours from the past while celebrating new fabrics, textures, and harmonies, and vice versa. His smart vintage designs reference older styles while avoiding postmodern kitschiness, and his eclectic colourways seem very much of the present. As Smith noted in one video at the Design Museum, colour can refer to '**COLOUR**': the shouting hues that raised design reformers' hackles in the 1860s and that distinguished the youthful London fashions of the late 1960s. Or it can refer to the more demur '*colour*' as represented by two subtly contrasting burgundy stripes in a man's silk tie. The point is that both **COLOUR** and *colour* coexist in the contemporary designer's toolkit. Boldness co-exists with restraint, and nearly all combinations are acceptable.[42]

Back in the mid-twentieth century, Josef Albers pondered over colour and aesthetic truth, and expected his acolytes to be equally serious. Generally playful, contemporary design culture, like earlier Pop Art, is less worried about matters of truth and beauty and more appreciative of the commercial possibilities of colour. Even in Modern times, the realities of the commercial world encouraged a certain degree of creative flexibility, as demonstrated by the recent histories of British cinematographers and of American colour

stylists. Although born of rational impulses, Modern colour systems and colour charts seemed to encourage an emotional attachment to colour and fostered a do-it-yourself attitude that looked to postmodernism and beyond. Paul Smith came of age as a designer in the 1960s, just as the most rigid of Modern orthodoxies were under siege. Smith's quirkiness is a mighty contrast to Albers's sobriety, and the comparison helps us see the differences between the high Modernist and contemporary approaches to colour.

As the essays in this special issue have suggested, colour provides design historians with the opportunity to explore important relationships among science and art, creativity and marketing, entrepreneurship and innovation, commerce and culture, and subjectivity and objectivity. Historians readily admit the significance of these themes, but the stories of how they intersected internationally in design theory, corporate practice, and consumer culture are still largely unexplored. The rise and fall of Modern colour, and its relationship to modernisation, allows historians to examine connections among design professionals, international knowledge transfer, and the globalisation of consumer culture. The examples of the Sydney Opera House and Day-Glo point to the rise of postmodernist sensibilities, which have in turn been reshaped by the digital age. There is still a good deal of work to be done on colour and design history, and it is hoped that this special issue will inspire new research, new perspectives, and new interpretations.

[1] For the sales figures on *Interaction of Color*, see '20 Books on Color and Design,'

Designers & Books, 15 May 2014, <http://www.designersandbooks.com/blog/20-books-color-and-design> accessed 15 June 2014.

[2] E. Díaz, 'The Ethics of Perception: Josef Albers in the United States', *Art Bulletin*, vol. 90, no. 2, 2008, p. 261. A few years after Albers's death, one researcher noted that although *Interaction of Color* was widely used in the classroom, Albers's ideas on color had never been critically assessed. See A. Lee, 'A Critical Account of Some of Josef Albers' Concepts of Color', *Leonardo*, vol. 14, no. 2, 1981, pp. 99-105.

[3] A. Temkin, *Color Chart: Reinventing Color, 1950 to Today*, Museum of Modern Art, New York, 2008, pp. 18, 21, 30, 33.

[4] 'INSPIRED: Michael Peters, Identica', *Design Week*, vol. 10, 2005, p. 10.

[5] M. Craig-Martin, 'The Teaching of Josef Albers: A Reminiscence', *Burlington Magazine*, vol. 137, no. 1105, 1995, pp. 249-250.

[6] For more on Albers, see The Josef & Anni Albers Foundation, <http://albersfoundation.org>, accessed 14 July 2014.

[7] For example, see M. Frank, *Denman Ross and American Design Theory*, University Press of New England, Hanover, NH, 2011.

[8] On Taylor's work, see R. Kanigel, *The One Best Way: Frederick Winslow Taylor and the Enigma of Efficiency*, Viking, New York, 1997.

[9] B. Fer, 'Color Manual', in Temkin, op. cit., p. 33.

[10] D. Batchelor, *Chromophobia*, Reaktion, London, 2000.

[11] A racial factor parallels issues of class and taste. Several decades ago, the American historian W. D. Jordan explored the history of Anglo-American attitudes toward skin tones in *White Over Black*, arguing that Biblical references to the mark of Cain were used

to justify the 'inferiority' of dark-skinned people. Recent studies have explored how representations of whiteness in Western visual culture served to establish and support hierarchical racial power structure. As 'whiteness' was socially constructed as a superior category, some white people tried dissociate themselves with the 'crass' tastes—and colours—of former slaves, recent immigrants, and other upstart ethnic groups. See, for example, W. D. Jordan, *White Over Black: American Attitudes Toward the Negro, 1550-1812*, University of North Carolina Press, Chapel Hill, NC, 1968; V. Ware, *Beyond the Pale: White Women, Racism, and History*, Verso, London, 1992; R. Dyer, *White: Essays on Race and Culture*, Routledge, London, 1997; V. Ware and L. Back, *Out of Whiteness: Color, Politics, and Culture*. University of Chicago Press, Chicago, 2002; and N. I. Painter, *The History of White People*. W. W. Norton, New York, 2010.

[12] D. Batchelor, op. cit., p. 22.

[13] Ibid., pp. 9-19.

[14] L. A. Kalba, 'Blue Roses and Yellow Violets: Flowers and the Cultivation of Color in Nineteenth-Century France', in *Representations*, vol. 120, no. 1, 2012, pp. 84-85.

[15] Briony Fer, 'Colour Manual', in Temkin, op. cit., p. 29.

[16] Batchelor, op. cit., pp. 98-99.

[17] Temkin, op. cit., p. 82; 'John Chamberlain, Who Wrested Rough Magic from Scrap Metal, Dies at 84', *New York Times*, 21 Dec. 2011.

[18] Fer, op. cit., p. 35.

[19] For a slightly different take on 'chromophilia', see Batchelor, op. cit., pp. 97-112.

[20] See, for example, J. J. Beer, *The Emergence of the German Dye Industry*, University of Illinois Press, Urbana, IL, 1959; A. S. Travis, 'Perkin's Mauve: Ancestor of the Organic

Chemical Industry', *Technology and Culture*, vol. 31, no. 1, 1990, pp. 51-82; A. S. Travis, *From Turkey Red to Tyrian Purple: Textile Colors for the Industrial Revolution*, Jewish National and University Library, Jerusalem, 1993; A. S. Travis, *The Rainbow Makers: The Origins of the Synthetic Dyestuffs Industry in Western Europe*, Lehigh University Press, Lehigh, PA, 1993; A. S. Travis and P. J. T. Morris, 'A History of the International Dyestuff Industry', *American Dyestuff Reporter*, vol. 81, no. 11, 1992, available at < http://colorantshistory.org>, accessed 15 July 2014; A. S. Travis and C. Reinhart, *Heinrich Caro and the Creation of the Modern Chemical Industry*, Kluwer, Dordrecht, 2000; J. P. Murmann, *Knowledge and Competitive Advantage: The Co-Evolution of Firms, Technology, and National Institutions*, Cambridge University Press, New York, 2003; S. Garfield, *Mauve: How One Man Invented a Color that Changed the World*. W. W. Norton, New York, 2002; A. Engel, 'Colouring Markets: The Industrial Transformation of the Dyestuff Business', *Business History*, vol. 54, no. 1, 2012, pp. 10-29; K. Steen, *The American Synthetic Organic Chemicals Industry: War and Politics, 1910-1930*, University of North Carolina Press, Chapel Hill, NC, 2014.

[21] M. Pastoureau, *Blue: The History of a Color*, Princeton University Press, Princeton, NJ, 2001; M. Patoureau, *Black: The History of a Color*, Princeton University Press, Princeton, NJ, 2009; A.B. Greenfield, *A Perfect Red: Empire, Espionage, and the Quest for the Color of Desire*, Harper Collins, New York, 2005; J. Gage, *Color and Culture: Practice and Meaning from Antiquity to Abstraction*, University of California Press, Berkeley, CA, 1999; J. Gage, *Color and Meaning: Art, Science, and Symbolism*, University of California Press, Berkeley, CA, 2000.

[22] E. Leslie, *Synthetic Worlds: Nature, Art and the Chemical Industry*, Reaktion Books, London, 2006, p. 33.

[23] S. Street, *Colour Films in Britain: The Negotiation of Innovation, 1900-55*, Palgrave/ British Film Institute, London, 2012.

[24] R. L. Blaszczyk, *The Color Revolution*, MIT Press, Cambridge, MA, 2012.

[25] Ibid.

[26] Ibid.

[27] Ibid.

[28] Ibid.; R. L. Blaszczyk, *Imagining Consumers: Design and Innovation from Wedgwood to Corning*, Johns Hopkins University Press, Baltimore, 2002; W. Friedman, *Fortune Tellers: The Story of America's First Economic Forecasters*, Princeton University Press, Princeton, NJ, 2014.

[29] U. Spiekerman, 'Bright Modernity: Color, Commerce, and Consumption in Global Perspective,' conference at the German Historical Institute, 21-23 June 2012, conference report available at <http://ghi-dc.org/index.php?option=com_content&view=article&id=1259&Itemid=1085> accessed 2 June 2014. In November 2014 in Florence, Italy, the Costume Colloquium IV focuses on 'Colors in Fashion', with presentations on textiles, clothing, couture, and the fashion press: see < http://www.costume-textiles.com/?page_id=1893 > accessed 2 June 2014.

[30] For similar arguments about haute couture, see I. Parkins, *Poiret, Dior and Schiaparelli: Fashion, Femininity and Modernity*, Berg, London, 2012.

[31] J. B. Paoletti, *Pink and Blue: Telling the Boys from the Girls in America*, Indiana University Press, Bloomington, IN, 2012; M. M. Petty, 'Threats and Promises: The

Marketing and Promotion of Electric Lighting to Women in the United States, 1880s-1960s', *West 86th Street*, vol. 21, no. 1, 2014, pp. 3-37.

[32] Blaszczyk, *The Color Revolution*, chap. 1; F. Vienot, 'Michel-Eugène Chevreul: From Laws and Principles to the Production of Colour Plates', *Color Research & Application,* vol. 27, 2002, p. 4.

[33] Blaszczyk, *The Color Revolution*, chap. 1; M.-E. Chevreul, *The Laws of Contrast of Colour: and Their Application to the Arts of Painting, Decoration of Buildings, Mosaic Works, Tapestry and Carpet Weaving, Calico Printing, Dress, Paper Staining, Printing, Military Clothing, Illumination, Landscape, and Flower Gardening, Etc.*, new ed. Routledge, Warne, and Routledge, London and New York, 1861; F. Vienot, op. cit., pp. 4-8.

[34] Ibid.

[35] 'Fashion Department', *Arthur's Illustrated Home Magazine*, vol. 42, no. 7, 1874, p. 463.

[36] M. Wigley, *White Walls, Designer Dresses: The Fashioning of Modern Architecture*, MIT Press, Cambridge, MA, 1995; J. de Heer, *The Architectonic Colour: Polychromy in the Purist Architecture of Le Corbusier*, 010 Publishers, Rotterdam, 2009.

[37] Blaszczyk, *The Color Revolution*, pp. 193-96.

[38] J. Kargon, 'Harmonizing These Two Arts: Edmund Lind's *The Music of Color*', *Journal of Design History*, vol. 24, no. 1, 2011, pp. 1-14; W. South, *Color, Myth, and Music: Stanton Macdonald-Wright and Synchromism*, North Carolina Museum of Art, Raleigh, NC, 2001.

[39] On the BCC and the TCCA, see Blaszczyk, *The Color Revolution*, p. 188.

[40] *Hello, My Name is Paul Smith*, exhibition at the Design Museum, London, Nov. 2013 to July 2014. See also P. Smith, D. Sudjic, D. Loveday, and A. Aboud, *Hello, My Name is Paul Smith: Fashion and Other Stories*, Rizzoli, New York, 2013.

[41] On department stores, see Blaszczyk, *The Color Revolution*, chap. 7. Mary Lisa Gavanas, 'Who Decides the Colors of the Season? How Première Vision Changed Fashion Culture', paper presented at the Bright Modernity conference, German Historical Institute, Washington, DC, 2012. I am grateful to Cher Potter for sharing her insights as a WGSN staff member.

[42] *Hello, My Name is Paul Smith*, exhibition, op. cit.