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Notes on the Evolution of Design Thinking: A Work in Progress

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*From the late nineteenth century onward, the
nexus between design and business is a story of
ever-new challenges met with vision, creativity,
and innovation.*

Notes on the Evolution of Design Thinking: A Work in Progress

by Craig M. Vogel

Five years ago, I left Carnegie Mellon University to come to the College of Design, Architecture, Art, and Planning (DAAP) at the University of Cincinnati (UC). As director of the newly formed Center for Design Research and Innovation (CDRI), I was expected to develop a strategy for increasing the size of the graduate program in DAAP's School of Design, to establish a more consistent way to conduct research, and to work more effectively with corporations. Working with the support and guidance of UC President Nancy Zimpher and Dean Robert Probst, and with Procter & Gamble's chief

technology officer, Gil Cloyd, and vice president of innovation, Larry Huston, I was able to conceive and develop the Live Well Collaborative (LWC), a nonprofit company. This initiative focuses on consumers over the age of 50. It is design-driven and multidisciplinary in its approach to running project studios for its member companies. To date, there are four corporate partners, and the LWC has completed a dozen projects.

The LWC is an example of what I believe companies and universities must do to leverage the capability of both undergraduate and graduate education—working with practitioners

to effectively and comprehensively design for the future. The concept of the LWC has helped Dean Probst to move design thinking to the center of the university and has created a new model for innovation among universities and companies focusing on a compelling and unmet global human need. Along the same lines, business schools and engineering colleges in universities are also seeking to work with design schools to forge new interdisciplinary programs.

For various reasons, the way designers are educated to think is now perceived as particularly relevant to companies that seek to change

their long- and short-term strategies for developing new products and services. These design insights are required to effectively respond to constantly changing social, economic, and technical forces (also known as SET factors). The interaction of these three forces results in the emergence of new, “preferred” states for customers and consumers.

The consistent theme throughout the twentieth century is that design has flourished in companies in which a design leader has been able to represent a full range of value to corporate management, from design strategy and brand equity to design implementation. Design leadership must have corporate champions at the CEO and CTO level who see the value of design and allow it to play a central role in the planning and execution of corporate strategy. This was as true in 1907, when AEG hired Peter Behrens, as it is today at HP, where Sam Lucente is director of design.

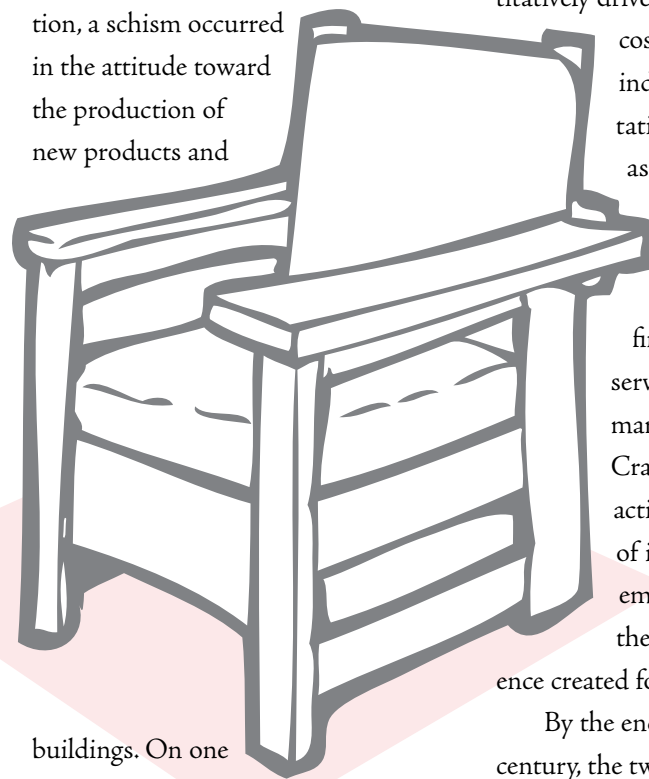
However, during most of the twentieth century, corporations and cultural institutions asked designers to play a focused and limited role in product and service development. Today, that role is expanding and the core of the field, design thinking, must expand with it. Design thinking has a rich history, and it is important

to trace how it evolved to help understand why design is now so valued.

Indeed, the LWC represents a synthesis of a number of design influences that have developed during the last century. This article provides an overview of those influences.

Case studies from the twentieth century

During the late nineteenth century, with the rise of the Industrial Revolution, a schism occurred in the attitude toward the production of new products and



buildings. On one side were John Ruskin and William Morris, who shared the belief that the Industrial Revolution was rapidly growing out of control, particularly in the second half of the century. They

reacted against the dehumanization of labor and the lack of craft sensibilities in mass-manufactured goods and services (the other side). Morris’s designs for products, graphics, and architecture expressed Ruskin’s argument and influenced others to become part of a major craft revival. The Arts and Crafts movement was a reaction to the emerging dominance of standardization requiring quantitatively driven management and cost approaches used by industrialists. The quantitative approach was viewed as a necessary approach in managing the dramatic increase of raw materials and finished goods in the service of emerging mass markets. The Arts and Crafts movement was a reaction against the process of industrial production, emphasizing the quality of the product and experience created for consumers.

By the end of the nineteenth century, the two clear sides of the argument about how best to manage change were fully developed. On one side were the industrialists, represented by Carnegie, Rockefeller, J.P. Morgan, and Ford. Supported by Fredrick Taylor’s theories of scientific

production, they promoted the rapid growth of the modern corporation. The opposing position was held by Arts and Crafts advocates, represented at that time by Charles Rennie Mackintosh, the Viennese Secessionists, Frank Lloyd Wright, and Gustav Stickley, who extolled human-scale production and consumption. Many of their designs combined historical reference with a modern interpretation. Wright's Prairie Style architecture integrated ideas from Japan, as well as from Native Americans, and emphasized the horizontal nature of the prairie with modern concepts of reinforced concrete and open-space planning. Wright stated that his buildings all contained "subliminal mathematics," an underlying logical order of visual elements that resulted in an elegant integrated whole, or *Gestalt*. In contrast, due to the necessities of using the assembly line and other cost controls, the design elements of Ford's Model T were merely a compilation of parts. The current theory of human-centered design includes the esthetics of the Arts and Crafts movement while also incorporating the scale of mass production.

The schism lasted throughout the twentieth century and persists into the present. For most of the previous century, the dominant

argument driving change was in the area of mass manufacture and distribution as directed by captains of industry using statistical methods of management and the emerging scientific method employed by corporate R&D. Two types of CEOs emerged after the turn of the century. One focused primarily on cost control and on engineering and manufacture. The other was open to integrating design and saw the value of brand identity in response to foreign competition and the emergence of consumer segmentation in America. The opportunity

for practitioners in fields of design in the early twentieth century was to fill the gap between insensitive, cost-driven mass production and the craft refinement of human-scale production and local distribution of goods and services.



Peter Behrens: Corporate identity and brand differentiation

Architect Peter Behrens was one of the first designers who tried to synthesize the two polar positions of technology and craft. In 1907, Behrens was hired by Emil Rathenau, the founder and president of the German electric company AEG. The company



needed a new approach to make electricity more acceptable to consumers; Rathenau hoped they would learn to use the technology more broadly during the course of the day, and more evenly in every season. Behrens's work is particularly notable in that he designed not only AEG's buildings and products but also the company's corporate identity and print advertising. Behrens has been called the first industrial designer, but he also paved the way for corporate design strategy and clearly understood the challenge of brand differentiation. Behrens sought to marry the sophistication and human scale of craft heritage in European products with the emerging massive systems of electrical power

generation and distribution. Indeed, he succeeded in finding a way to connect the system of electrification, as a new and underutilized source of power, to the quality and tradition of products in the home that could use electricity. Behrens's logo design is still in use (although the brand name is now owned by Electrolux), and his design standards and guidelines for elements in graphic communication predate the grids developed by Dutch and Swiss graphic designers later in the century.

The Bauhaus: A new design strategy for education

Behrens's work ended as a result of the outbreak of World War I, but his influence remained. His apprentices before the war were architects Walter Gropius and Ludwig Mies van der Rohe. The Bauhaus, founded in 1919 by Gropius, was the first school in the twentieth century to take Behrens's ideas and translate them into a curriculum for higher education. Mies served as its last director, for in the early '30s, pressure from the Nazi government forced him to close the school. Both he and Gropius were among many Bauhaus designers who moved to the United States. After World War II, the Bauhaus philosophy of finding a balance among art, science, and mass production received



significant support from leading art and design critics in the US. The Bauhaus immigrants formed several branches and influenced design across the American landscape, and indeed their school became one of the most influential design movements in the world.

Walter Gropius taught architecture and planning at Harvard,

and Mies van der Rohe went to the architecture school at the Illinois Institute of Technology (IIT) in Chicago, while other disciples, including Lazlo Moholy Nagy and Josef Albers, founded new programs. Josef and Annie Albers eventually went to Yale, and Moholy Nagy founded the New Bauhaus in Chicago, eventually merging with IIT's architecture

program to form the Institute of Design. Herbert Bayer became head of design for Container Corporation. Each Bauhaus disciple brought from Germany a variation of Behren's core argument that he or she further developed in the US, continuing the struggle to balance art, science, and mass production in their work and teaching. Attempts to achieve this balance are exemplified by Mies van der Rohe's glass and steel architecture and furniture designs. For example, in Chicago's Lake Shore Drive Apartments, Mies expresses his curtain wall exterior with an elegantly proportioned glass and steel façade. The structural support and mechanical core are the consequence of the new systematic and efficient approach to the construction of modern skyscrapers. Mies's theories and students influenced the design and construction of skyscrapers around the world for several decades.

Corporate and consulting design in the US

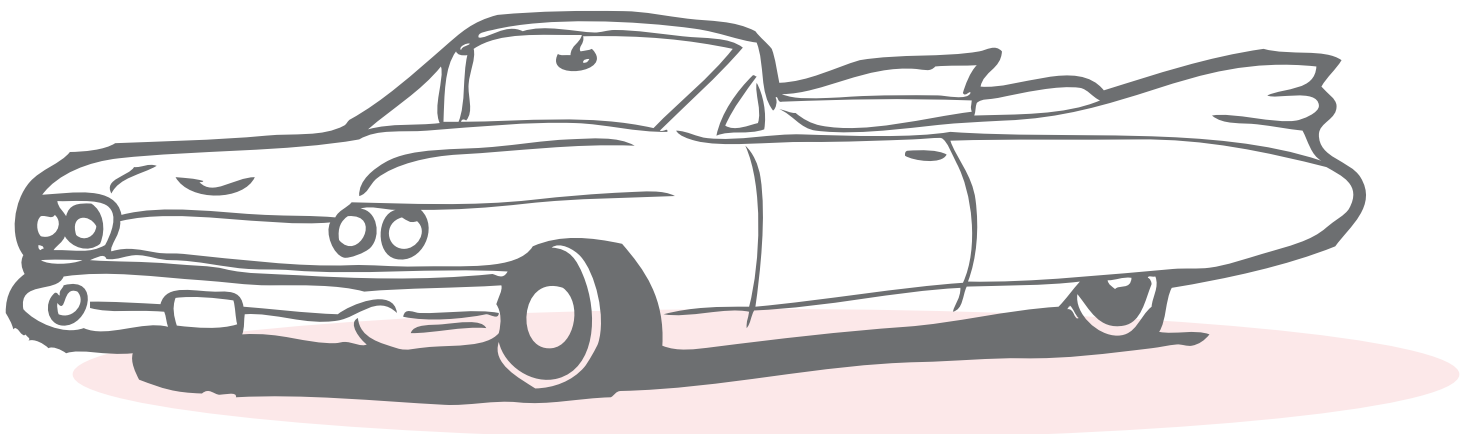
In contrast to the design thinking that started with Behrens and the Bauhaus, there is an equally influential argument represented by the founders of American industrial and graphic design who worked in corporate and consulting firms during the 1920s and '30s. These designers include Harley Earl, Henry Dreyfuss, Walter Dorwin Teague, and Donald Desky (all born in the United States), and Raymond Loewy (a French immigrant who came to the US in 1919). Their contribution lay in developing methods by which design thinking began to serve the needs of emerging US corporations. Where the influence of the Bauhaus in America originated primarily in education and then moved into practice, the success of these designers influenced the content of the curriculum of American design programs, which

began to graduate practitioners who could fill the demand for corporate and consulting designers. Pratt Institute, Art Center College of Design, the Center for Creative Studies, the Cleveland Institute of Art, the Rhode Island School of Design, Carnegie Tech (now Carnegie Mellon), and the University of Cincinnati all developed distinct variations on the approach to graphic and industrial education.

Harley Earl and General Motors: Market segmentation in the auto industry

Harley Earl, GM's head of color and trim from 1927 to 1959, was the first designer in the United States to apply market segmentation in a strategic way to the design of cars.

By the mid 1920s, the Ford Model T had dominated the automobile market for nearly two decades. (The Model T famously came in only one color: black.) Earl's cars were



designed to meet the diverse needs of the US market segments that were emerging and growing during the Roaring '20s. Earl, working with the support of GM president Alfred E. Sloan, designed five distinct brands, ranging from the low-end Chevrolet to the high-end Cadillac. The strategy worked immediately; in 1927 Ford was forced to close its River Rouge plant and retool for the Model A. Harley Earl, one of the most influential designers of the twentieth century, capped his career during the 1950s with designs for Chevy and Cadillac that became icons of American culture for that period. He introduced and perfected clay modeling and the idea of concept cars. GM maintained its market segment approach until the reduction of car sales in recent years forced the closing of the Oldsmobile brand. (By then, consumers had realized that GM was using common platforms across all brands, thus reducing the perceived value of the high-end variants.)

Ford has, in contrast, always used styling on a limited range of vehicles under the Ford, Mercury (always a distant second), and Lincoln brands. In essence, Sloan at GM empowered Harley Earl in the same way Emil Rathenau empowered Peter Behrens at AEG. Consider that, in 1927, GM used the same strategy to compete

with Ford that Target uses today to compete with Wal-Mart: Only one company in a market can be the *cheapest*; the rest need design.

Raymond Loewy, design consultant: Updating existing technology

Raymond Loewy's 1934 refrigerator redesign for Sears and Roebuck is another story that should be mandatory for design, as well as business, students. Loewy merged aesthetics, materials, and manufacturing to transform the loud and ugly electric refrigerator of the 1920s into a modern kitchen appliance. The consumer response was immediate. In one year, sales of the Sears' Cold Spot



increased from 65,000 to 250,000 units—without any significant change in core technology.

The Cold Spot is an indicator of how design thinking at the product level can transform a product category. Loewy integrated contemporary aesthetics and human factors into a product that incorporated sheet metal stamping technology from the auto industry with an ergonomic door handle, and a systematic organization of interior storage that used no-rust aluminum shelves. Loewy became the design consultant recognized as having the most skill at marrying business strategy with design. He is the only industrial designer to ever grace the cover of *Time* magazine (October 31, 1949). He also developed and managed one of the largest design consultancies in the world for more than three decades.

Henry Dreyfuss: Integrating human factors as a core component of product design

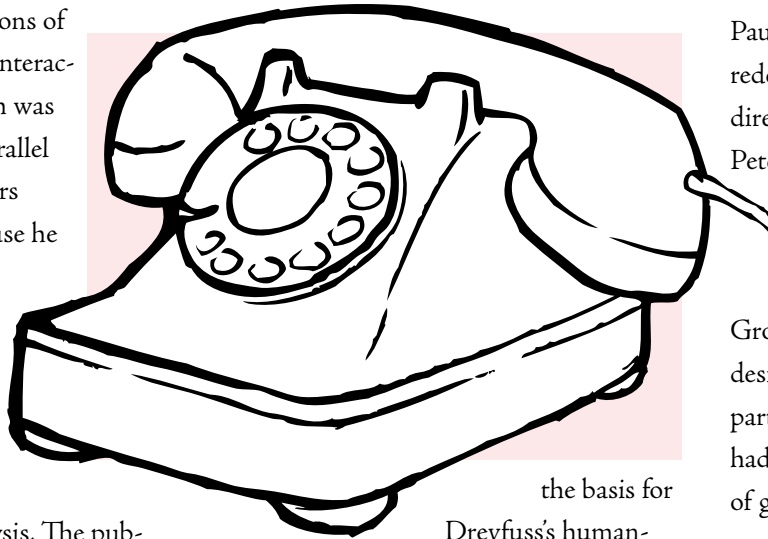
The work and thinking of Henry Dreyfuss overlaps with that of Loewy but needs to be differentiated in a significant respect. Dreyfuss developed a more scientific approach to human factors and integrated that perspective with product aesthetics. The Dreyfuss phone for AT&T was the first attempt to integrate human factors into the

integrated speaker/receiver. The resulting design, combining ergonomics with streamlining, fit the hand as well as the ear and mouth of the average (fiftieth percentile) head.

Dreyfuss made a significant contribution to the modern field of anthropometrics when he applied statistical data of human dimensions to the development of products and to considerations of human/machine interaction. His approach was distinct from a parallel field, human factors engineering, because he always integrated human factors with appropriate aesthetics rather than depend solely on statistical analysis. The publication, in 1960, of *The Measure of Man* (now *The Measure of Man and Woman*) and its revised versions have been used by industrial designers as the definitive reference and baseline for human factors in product and machine interface design ever since. His work formed a unique argument within the emerging field of human factors/ergonomics by always emphasizing the need for logical approaches that produced elegant solutions.

Dreyfuss, whose aesthetic phi-

losophy was influenced by product design pioneer and set designer Norman Bel Geddes, received his moral education at the progressive School for Ethical Culture in New York. The motto of the school's founder, Felix Adler, was "... to develop individuals who will be competent to change their environment to greater conformity with moral ideals." This became

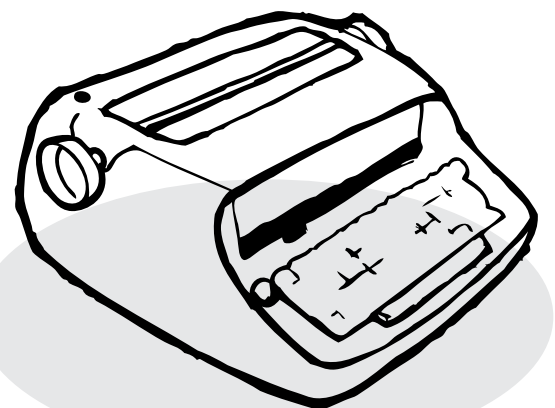


the basis for Dreyfuss's human-centered approach. He expressed those ideas in his 1955 book, *Designing for People*.

Dreyfuss was a more articulate practitioner of human-centered design than was Loewy. His ideas and research were expressed in his writing and in the publications for which his firm is most noted. Although Loewy was a dynamic salesman and understood the business of design, his writing and personal philosophy was less focused on human factors research.

Paul Rand and Elliot Noyes: Corporate identity and the international movement

In the years after World War II, Elliot Noyes became one of the most influential designer/architects in the United States. However, his work with large corporations often involved collaboration with the more famous corporate identity designer, Paul Rand. Their comprehensive redesign of IBM and Westinghouse directly descends from the approach Peter Behrens took with AEG—not surprising, given that Noyes was educated as an architect at Harvard and studied under Gropius and Bauhaus furniture designer Marcel Breuer. Rand, for his part, was heavily influenced by what had come to be called the Swiss Style of graphic design and helped to build a relationship between Switzerland's Basel School of Design and Yale University. The strategic redesigns carried out by Rand and Noyes for IBM and



Westinghouse became a blueprint for modern global corporate identity systems and spearheaded what came to be known as International Style.

One of the first strategic design decisions Rand and Noyes conceived for International Business Machines was to reduce its long and awkward name to IBM. Modern identities, they believed, needed to be easy to read and pronounce in all applications and all languages. The new logo and identity system was integrated with an approach to curtain wall architecture that was applied to the new buildings at IBM, as well as to the outer panel construction design of mainframe computer systems.

Both IBM and Westinghouse developed large design centers for product, identity, and graphic design while also maintaining a relationship with international design consultants. As for Rand's and Noyes's work, it persists to this day. (For example, IBM's nickname, Big Blue, derives from the color Rand used for the original logo.) Their work continued the design principles defined by Behrens and taught by the Bauhaus, and introduced the principles of the Basel School of Design to corporate America.

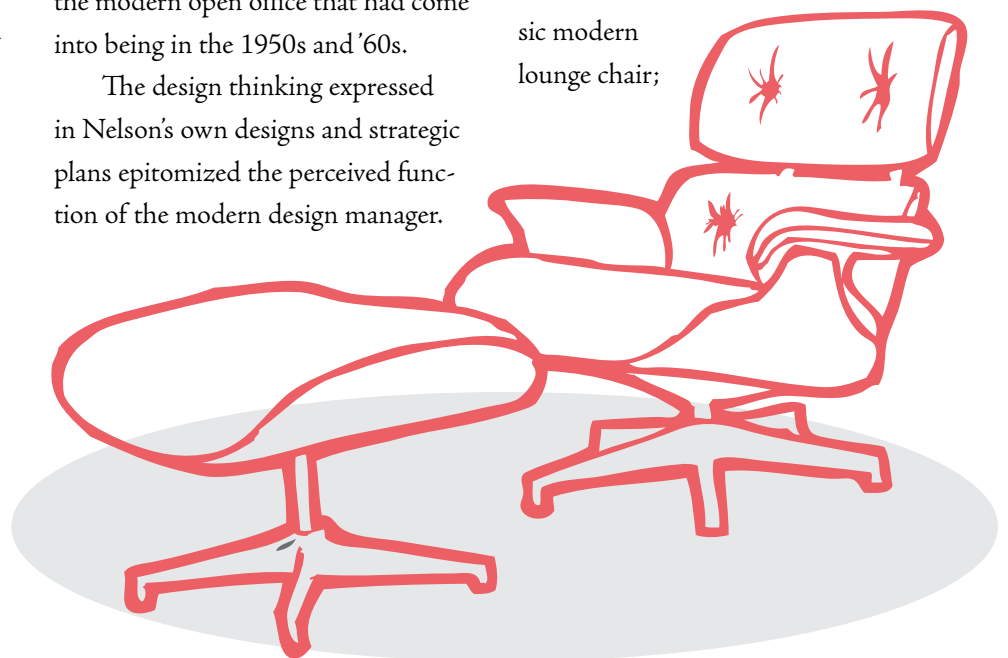
George Nelson and Charles and Ray Eames: Systems design for home and work

When George Nelson was appointed design director for Herman Miller in 1945, he brought a new level of design thinking to the concept of furniture design for the home and office. Working with a number of designers, he redirected the strategy of Herman Miller and made it the leader in systems design for the modern office. Modern office buildings were being designed using a systematic approach, and Nelson saw the interior office landscape similarly—as a potential opportunity for the application of modular design systems. Each individual piece of furniture would act as one in a series of flexible parts with multiple configurations that would fit the modern open office that had come into being in the 1950s and '60s.

The design thinking expressed in Nelson's own designs and strategic plans epitomized the perceived function of the modern design manager.

As well, Nelson was able to take the goals of the company and inspire a team of designers to creatively interpret them.

The husband-and-wife team of Charles and Ray Eames contributed some of their most important designs under this new strategy. Both of them studied at Michigan's Cranbrook Academy of Art, and both were influenced by Finnish architect Eliel Saarinen, who had designed buildings for the Cranbrook Educational Community and who also became the president of and a professor at the Cranbrook Academy. The Eames lounge chair and airport seating solution, for Herman Miller, are two of the most influential design projects of the twentieth century. The lounge chair was designed for the home and is the classic modern lounge chair;



however, the systematic design approach taken by the Eameses contained all the elements that also made it a prototypical example of the modern office chair. The design integrated three structural shell components with soft leather pillow interface modules, a star-shaped base with a structural pivot center post, and knock-down capability, which reduced shipping volume and allowed for easy assembly upon delivery. The airport seating design is a case study in maximizing use of materials while meeting all customer, end user, and stakeholder needs. Originally designed for Dulles Airport, it is still in use in airports around the world and has stood the test of time as the best all-around solution for modern public interior seating.

The ideas and work of Charles and Ray Eames represent a unique and vital branch of design thinking. Their work is as powerful and influential as that of Frank Lloyd Wright; yet they are virtually unknown outside of the fields of design and architecture.

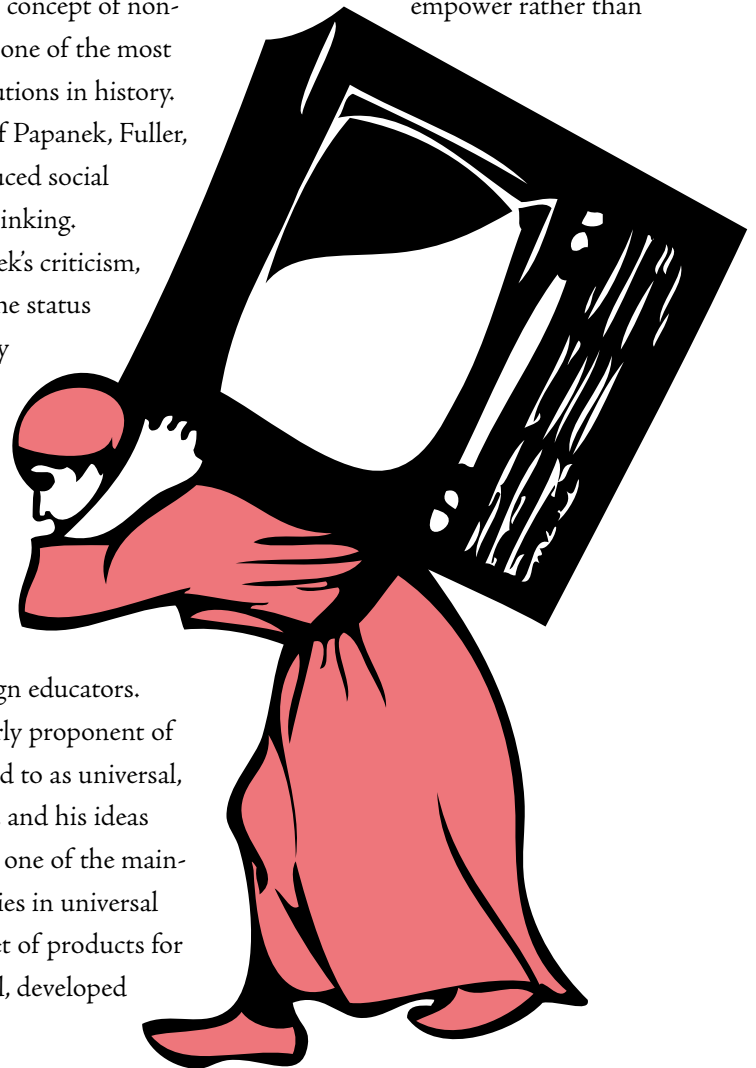
From product to environment and social change

In 1976, Victor Papanek published his *Design for the Real World*, asking designers to see the potential of design thinking for social and

environmental responsibility. He accused designers of catering to the small percentage of consumers who have everything, while ignoring those in lower income levels and emerging economies, as well as people with disabilities. Papanek was an early proponent, along with Buckminster Fuller, of the belief that design could be an effective tool to use for environmental and social improvement. In 1982, Ralph Caplan wrote in *By Design* that Mahatma Gandhi's concept of non-violent protest was one of the most effective design solutions in history. The philosophies of Papanek, Fuller, and Caplan introduced social change to design thinking.

At first, Papanek's criticism, which challenged the status quo, was rejected by most industrial design practitioners in the United States. His thinking received greater acceptance by European and American design educators. Papanek was an early proponent of what is now referred to as universal, or inclusive, design, and his ideas undoubtedly led to one of the mainstream success stories in universal design—the first set of products for OXO International, developed

during a collaboration between Sam Farber and Smart Design in 1990. Using the concept of universal design, OXO has now developed more than 500 low-tech, high-touch product solutions that improve the way we hold everyday objects. The only real technological breakthrough the company realized was the use of neoprene; the rest came about from the thoughtful integration of ergonomics and aesthetics to create assistive devices that empower rather than



stigmatize the person using them.

The concept of design for social responsibility is now a growing argument in all fields of design. Corporations are trying to build a kinder, more humane brand message that connects to the social value systems of their customers, by integrating universal design, multicultural design for emerging economies, and environmental responsibility into their products. Bruce Mau, one of the leaders in this movement, echoed a contemporary version of Papanek's ideas in his manifesto, *Massive Change*, and Papanek would surely have recognized an extension of his ideas in C.K. Prahalad's 2005 book *The Fortune at the Bottom of the Pyramid*. Emily Pilloton's nonprofit firm, Project H Design, is an example of how an empowered individual can address global problems with a humanitarian design strategy.

William McDonough and Michael Braungart have argued for a more proactive approach to design in their book *Cradle to Cradle*. McDonough believes it is possible to have a responsible consumer society if we stop thinking in terms of cradle to grave. He believes the concept of throwing things away is over and that everything must be continuously reused or recycled: thus cradle to cradle. McDonough and Braungart have created a method for analyzing materials and processes and have developed new methods and materials for minimizing environmental impact. Herman Miller's Mira Chair, designed by Studio 7.6, was built using the cradle to cradle approach.

The Nobel laureate Herb Simon stated that there are really two types of science. One concerns the world humans are responsible for producing (the science of the artificial), and the

other concerns the world in which humans evolved (the science of the natural). The science of the artificial is still relatively young and ineffective, especially in its attempts during the last two centuries to change existing situations into preferred ones on a large scale. The fields of industrial, interior, graphic, and interface design, as well as architecture, have emerged as one branch of the science of the artificial. Although interest in the practice of design grows, research, graduate, and doctoral programs in design fields must grow with it to pull even with the more established branches of engineering, applied science, and business.

The global economy we face today is as strange to us as the one confronted by designers in the early twentieth century. Environmental responsibility and universal design were once an option; now they are be-

Corporations are trying to build a kinder, more humane brand message that connects to the social value systems of their customers, by integrating universal design, multicultural design for emerging economies, and environmental responsibility into their products.

coming a virtual mandate. Experience design, interaction design, and service design are new domains for designers. We live in an era in which the world is “flat” and countries in every continent are contributing ideas to emerging trends, creating new global hybrids at an unprecedented rate. P&G and Apple are today’s AEG, and we need a new educational model in the spirit of the Bauhaus, a model that emphasizes equally both education and research.

Design thinking is always most effective when it successfully connects strategic planning with execution of products, services, and communication. Behrens was able to work with AEG to find a way to make consumers understand how to integrate electrical power into their lives. Currently, A.G. Lafley, the recently retired CEO of Procter & Gamble, is one of the biggest proponents of design thinking and implementation throughout a corporation. His ability to strategically redirect P&G into almost a decade of meeting expectations of shareholder value makes him an excellent example of Herb Simon’s definition of design as “changing existing situations into preferred ones.” In his book *Game Changer*, Lafley describes the various experiments in innovation P&G has used to main-

tain its competitive advantage. He has championed design thinking by growing internal design capability, but he has also connected with design and business innovators and with outside consulting firms.

Lafley transformed P&G from a chemical company into an “experience” company, and design played a significant role in that transition. P&G thinks globally and in terms of billions. The company has successfully found a way to make products in several categories that consumers can personalize into their own patterns of use. This is a unique twist on the concept of mass customization.

Science, engineering, and technology factor shifts have occurred in each decade in the last century, opening new opportunities for designers. The key ingredient for business success is the presence of both an innovative CEO who sees design as an investment, not a cost, and a strategic design director or consultant who can place the value of the design at the center of the company. If either one leaves, the value of design is jeopardized. The rise and fall of the role of design in corporate America is directly related to a change in this relationship more than any other factor in the economy.

Suggested Reading

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