Drawing on archival and textual materials, this paper challenges conventional views of scientific management by exploring its aesthetic implications through an analysis of the inspiration that the European modernist architects of the 1890–1930 period drew from the ideology and techniques associated with this organizational model. The historical and institutional conditions that surrounded such a revolutionary reinterpretation of scientific management are compared across countries. The common grounding of scientific management and modernist architecture in engineering is proposed as the key influence that shaped the professional reconstruction of the organizational field of architecture and the subsequent diffusion of modernist design. The implications for organizational studies are discussed in the context of the prevailing underestimation of scientific management’s qualities and impact on society.

Recent years have witnessed a flourishing interest in the social, political, and cultural origins of organizational studies as an area of inquiry (Yates, 1989; Barley and Kunda, 1992; Guillén, 1994; Shenhav, 1995; Abrahamson, 1997). Little attention, though, has been paid to the aesthetic message and impact of organizational theories, i.e., to notions of the beautiful that may be associated with specific ways of organizing. This paper explores the relationship between organization and aesthetics in one empirical instance of tremendous significance that has implications for our discipline and for society: the formulation by modernist artists of an aesthetic based on the beauty of the machine and on the new scientific management methods of the turn of the century.

Numerous studies have identified scientific management—Taylorism and Fordism in particular—with a highly constraining, overtly exploitative, and ideologically conservative model of organization. Scientific management has been portrayed as a paradigm of reckless deskilling, impersonal production, and mediocre quality (Braverman, 1974; Edwards, 1979; Piore and Sabel, 1984; Perrow, 1986; MacDuffie, 1991; Scott, 1995b). This conception of scientific management appears to be at odds with artistic creation and recreation. Besides, aesthetics have to do with emotions and sensations, however rationalized, while this organizational theory seems to underscore practical and utilitarian aspects alone.

Scientific management made an enormous impact on American industry, government, and nonprofit organizations. While a group of notorious engineers active at the turn of the century provided a set of methods and metaphors to make organizational practices more “systematic” and “scientific,” an equally prominent group of social and political reformers known as the Progressives extended the same set of principles to education, the government, and culture (Callahan, 1962; Haber, 1964; DiMaggio, 1991). Organizational studies has come to accept that our main theories—including scientific management—contain ideological as well as technical considerations (Bendix, 1974; Barley and Kunda, 1992; Kilduff, 1993; Guillén, 1994; Shenhav, 1995), but the aesthetic message of scientific management has received virtually no attention from organizational researchers, largely be-
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cause its theoretical elaboration did not take place in the United States but in Europe. The ideology and methods associated with Taylorism and Fordism captured the imagination of architects and other artists in France, Germany, Italy, and the Soviet Union, who were eager to create houses, public buildings, factories, artifacts, and durable consumer goods combining beauty with technical, economic, and social efficiency.

Among the various arts, architecture proved most receptive to the new methods and ideas emerging from industry at the turn of the century. Architecture and its associated activities—design of interiors, furniture, household objects—produced an aesthetic companion to the influential technical and ideological messages of scientific management. Like organizational theory, architecture has frequently entailed consequences for people’s lives at home and at work (Smith, 1993: 399). As Larson (1993: 16) noted, architecture is a peculiar “social art” because it contributes to the culture not only “discourse and codified practices . . . but also, and crucially, . . . artifacts that are useful and can be beautiful.” Architecture is “a public and useful art . . . that must convince a client, mobilize the complex enterprise of building, inspire the public (and not offend it), and work with the culture, visual skills, and symbolic vocabulary not of the client but of its time.”

This paper challenges familiar images of scientific management in two respects. First, by examining scientific management’s “lost” aesthetic, I expose a forgotten cultural implication of this organizational theory: European modernist architects found an aesthetic message in scientific management, producing an unlikely synthesis between art and the mechanical world. In America, engineering and architecture evolved separately (Smith, 1993; Brain, 1994), but the European architects succeed at combining technology with style, science with history, management with creativity, and functionality with aesthetic. Thus, the view held by many social scientists and organizational researchers that scientific management intrinsically leads to seamy, unpleasant, or stultifying outcomes needs to be reconsidered or at least qualified.

This paper also suggests that the impact of scientific management has been much more pervasive and enduring than previously assumed. The European architects’ sweeping reinterpretation of scientific management took place in the midst of the reconstruction of architecture as an organizational field along a new set of professional ideals and techniques. This new institutional blueprint facilitated the diffusion of modernist architectural practice throughout Europe, the Americas, and the developing countries after World War II. The result of this most consequential and lasting change was a drastic reconfiguration of the modern metropolis, a development that continues to affect the lives of millions.

As a study in the process of institutionalization of a new practice, this paper focuses on the historical period during which the modernist architectural aesthetic emerged in fits and starts and produced a new institutional template (1890–1930), rather than on the years that witnessed its triumphant diffusion throughout the capitalist world (1945–1965). Be—

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cause aesthetics should be studied not in splendid isolation but in their historical and institutional context, I compare architectural movements in six European countries between the turn of the century and the Great Depression to assess the importance of industrial development, sociopolitical upheaval, sponsorship, and professionalization in the rise of the modernist aesthetic.

MODERNISM IN CONSTRUCTION AND ARCHITECTURE: AMERICA VERSUS EUROPE

Between the middle of the eighteenth and the early twentieth centuries architecture suffered from the plagues of academic dogma, historicism, and stylistic confusion. Few if any new building methods or materials were incorporated into the architect’s repertory for almost two hundred years. An inordinate enthusiasm for revivalism and historical styles subsumed architecture into such a creative deadlock and chaos that reform and renewal were unlikely to emerge easily from within. Until modernism finally took shape in Continental Europe during the 1920s, architects failed to "achieve a general discipline of structure and of design in the terms of the day" (Hitchcock and Johnson, 1995: 34; Benevolo, 1977: 219–250; Banham, 1980). In the standard architectural history analyses, the origins of modernism are generally traced all the way back to the generalization of machine production during the nineteenth century and the availability of new construction materials such as steel, glass, cement, and plastics (Jencks, 1973; Benevolo, 1977; Banham, 1980). The revolutionary possibilities offered by such technical advancements were first realized in England with the impressive Crystal Palace at the London Universal Exhibition of 1851.

By the end of the 1880s American construction and engineering had surpassed the early European achievements. American engineers built massive factory buildings, silos, grain elevators, and other types of industrial structures emphasizing efficiency and functionality. The Chicago architects extended the new engineering techniques and construction materials to nonindustrial architecture, erecting the first skyscrapers. By and large, though, American architecture clung to the old-fashioned taste for superfluous ornamentation and fell short of producing an overarching theory of aesthetic design, a new vocabulary to guide the architect’s design work. Most importantly, the leaders of the Chicago Movement and their most distinguished disciple, Frank Lloyd Wright, failed to nurture a college of followers or to influence architectural education (Benevolo, 1977: 191–250, 629–683; Hitchcock and Johnson, 1995: 38–54). Even architect Albert Kahn—famous for his designs of Henry Ford’s factories—could not break with traditionalism, for he considered architecture "the art of building, adding to the mere structural elements distinction and beauty" (Smith, 1993: 81; Bucci, 1993). His buildings were functional but were not wholeheartedly modernist.

The European architects of the early twentieth century culminated the task initiated by the American engineers. They avidly learned from American industrial construction, applying engineering methods to all sorts of buildings and designs and carrying the new principles to their ultimate aesthetic
consequences without receiving direct influences from American architects (Banham, 1986: 103–104; Hitchcock and Johnson, 1995). In the United States, construction and building practices evolved to meet the requirements of mass production, while in Continental Europe—where industrialization was slower than in the land of Taylor and Ford—modernist architecture emerged much more unconstrained and played an independent role in shaping life at the factory, the home, and the public building (Smith, 1993: 92, 398). Modernist architecture in the relatively backward and politically troubled European countries was in a position to lead rather than follow, allowing the architect to exert a tremendous influence over social and industrial organization as the designer and planner of dwellings, cities, and workplaces. While the American architect of the turn of the century caught up with developments in industry as an individualist and marginal player, and the British architect reacted against the machine age altogether, the architect in the relatively backward Continental European countries actively advocated and planned for a transformation of society. Continental European architecture thus stood in sharp contrast to American architecture in that it was avant-garde, or revolutionary, moving at the forefront of social and economic change rather than following it.

European avant-garde modernism embraced scientific management in part because cost and efficiency were socially and politically constructed as important concerns, but the romance of modernism with scientific organizational ideas and methods went well beyond immediate economic considerations, leading to the formulation of an aesthetic based on the efficiency of the machine and of scientific management. By applying a mechanical metaphor to the design of houses, public buildings, schools, factories, and everyday objects, European modernism magnified the impact of scientific management, extending it into new realms. If scientific management argued that organizations and people in organizations worked, or were supposed to work, like machines (Morgan, 1986; Perrow, 1986; Schein, 1988; Scott, 1995b), European modernism insisted on the aesthetic potential of efficiency, precision, simplicity, regularity, and functionality; on producing useful and beautiful objects; on designing buildings and artifacts that would look like machines and be used like machines.

According to modernism, the trinity of “unity, order, purity” ought to guide any design, from the building itself to the furniture and paintings inside it. Clean shapes and clarity of form became paramount; “less is more,” declared one leading architect of the period, invoking a sort of economy of taste. The aesthetic order that emerged from European modernism in architecture can be defined by its three main principles: “Emphasis upon volume—space enclosed by thin planes or surfaces as opposed to the suggestion of mass and solidity; regularity as opposed to symmetry or other kinds of obvious balance; and, lastly, dependence on the intrinsic elegance of materials, technical perfection, and fine proportions, as opposed to applied ornament” (Barr, 1995: 29).
European modernism represented an apotheosis of the mechanical, planning, productivity, and efficiency (Maier, 1970). As an artistic movement, modernism was anti-traditional, anti-romantic, futurist (i.e., forward-looking), somewhat utopian, functional, and fundamentally rational (Poggioli, 1968; Tafuri, 1976). Moreover, modernism aspired to revolutionize the process of artistic creation itself by applying method and science to both the design and construction of buildings and other artifacts. Traditional building practices—performed by a small number of craftsmen—were to be replaced by modern construction methods involving hundreds of specialized subcontractors working independently, as in automobile manufacturing. The modernists also took education seriously, creating a new model of professional training in architecture that combined art and technology. Modernism, consistent with its emphasis on the technical rather than the humanistic or the social-psychological, aimed at democratizing good artistic taste (DiMaggio, 1987: 448), making it available to the population at large, especially through housing projects, urban planning, and everyday objects for use in the home, the office, and the factory. In the end, modernism produced an aesthetic companion to scientific management’s rationalized machine world, a Taylorized sense of the beautiful.

Precursors and Founders of Modernism

"The engineer is the hero of our age," stated the German architect and product designer Peter Behrens in the early 1900s. Behrens was one of the forerunners of modernism. Upon being appointed chief architect and designer at the large electrical appliances firm AEG, he promised to work toward the "most intimate union possible between art and industry" (Buddensieg, 1984: 207–208, 213, 219). Together with other leading German architects of the time, he took part in the Federation of Artistic Workshops—the German version of the English Arts and Crafts—founded in 1907 to "introduce the idea of standardization as a virtue, and of abstract form as the basis of the aesthetics of product design" (Campbell, 1978; Banham, 1980: 72; Buddensieg, 1984: 46; Whitford, 1984: 20–21; Kirsch, 1989). Behrens seems to have influenced Kahn’s design for the Ford Highland Park factory (Biggs, 1996: 98–100). In France, Auguste Choisy, Auguste Perret, and Tony Garnier revolted against the eclecticism of nineteenth-century architectural practice, proposing instead to apply classical geometry and clarity to the new building materials so as to achieve structural coherence. French architects were the world pioneers in the use of reinforced concrete made with cement—a new compound patented in 1824 and industrially produced after 1845 (Be-nevolo, 1977: 320–342; Banham, 1980: 23–43; Jullian, 1989). Other similar ideas, trends, and suggestions to follow the new spirit of technology and engineering were also emerging elsewhere in Europe at this time.

European modernism did not arrive at an entirely novel approach to architecture and design until the 1920s, with the Bauhaus in Germany, Constructivism in the Soviet Union, Rationalism in Italy, and Purism in France. It was at this point that European architects made their revolutionary reinterpretation of scientific management in aesthetic terms. Walter Gropius, the founder of the Bauhaus school of art
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and architecture in Germany, was a firm believer in scientific management methods and became one of the most influential architects of the twentieth century. He wished to formulate a new theory of architecture and to develop "practical designs for present-day goods" that could be mass-produced (Buddensieg, 1984: 18; Droste, 1990; Nerdinger, 1990). As director, Gropius managed to attract a dream team of artists to the school, including Mies van der Rohe, Kandinsky, and Klee, among others. He and his colleagues designed industrial and nonindustrial buildings, decorated interiors, and collaborated with many German manufacturing firms on product design.

As a result of German influence, the Russian arts and crafts movement had been toying with the artistic possibilities of mass production since the turn of the century (Lodder, 1983: 74). While the Bolshevik Revolution spurred a myriad of competing avant-garde artistic movements, Constructivism quickly gained sway over its alternatives, absorbing such important artistic trends as Productional Art, Projectionism, and Rationalism (Bowlt, 1988: 204–261). The First Working Group of Constructivists was created in 1921 within the Institute of Artistic Culture. The institute’s role was to study the practical aspects of artistic activity in production. Engineers lectured there regularly. The constructivists proposed the ideals of the "artist-constructor" and the "artist-engineer," arguing for a functional and engineering-oriented approach to design, prefabricated housing, standardization, modular coordination, efficient building methods, new materials, and industrial production. As in Germany, the Soviet modernists created a state-sponsored school of art to realize their dreams, the Higher State Artistic-Technical Workshops, founded in 1920 to train "highly qualified master artists for industry" (Kahn, 1982; Lodder, 1983: 109–144).

In 1909 Italian Futurism was launched as a literary movement by F. T. Marinetti, who entertained a political agenda of nationalism, violence, war, and destruction (Bowler, 1991). In that same year Mario Morasso published his novel, The World’s New Mechanical Aspect, in which the automobile is the protagonist. Futurism later invaded other artistic areas such as music and, above all, architecture (Banham, 1980: 98–137). A new, modernist style came into being with architect Antonio Sant’Elia (Banham, 1980: 127–137; Etlin, 1991: 53–100). His ideas were developed and put into practice by the "rationalist" architects of the 1920s and 1930s, who were interested in low-cost housing and furniture design, urban planning, prefabricated construction, factory architecture, and standardization (Zevi, 1980; Savi, 1990; Etlin, 1991; Schumacher, 1992).

Meanwhile, French architecture was revolutionized by Le Corbusier—a staunch advocate of scientific management influenced by German, Russian, and Italian modernism. He co-founded the Purist movement in 1919, editing the influential review L’Esprit Nouveau, which attracted much attention. In the early 1920s he published what many regarded as the best modernist manifestoes on architecture and city planning (Le Corbusier, 1986, 1987). Drawing on his experiences with manufacturers and his reading of Taylor and Ford, Le Corbusier developed and popularized the concepts of the "ma-

The European architects and designers turned the mechanical into a metaphor for beauty and form as well as function. As a volume created by simple lines and plain surfaces, with seamless and unadorned shapes, the machine was raised to the status of symbol and muse. The Italian architect Antonio Sant’Elia put it concisely in 1914: "Just as the ancients drew their inspiration in art from the elements of the natural world, so we ... must find our inspiration in the new mechanical world we have created, of which architecture must be the fairest expression, the fullest synthesis, the most effective artistic integration" (Banham, 1980: 130). After World War I, the German, Russian, Italian, and French architects played a central role in the reception of American engineering ideas on industrial production.

EUROPEAN AVANT-GARDE MODERNISM MEETS AMERICAN SCIENTIFIC MANAGEMENT

This paper’s evidence on the relationship between scientific management and modernism in Europe is based on the writings and works of the 60 most influential architects during the 1890–1930 period, ten in each of the six largest countries: France, Germany, Great Britain, Italy, Russia/Soviet Union, and Spain. I relied on two canonical studies of architectural theory and practice during this period to generate the country lists of architects: Benevolo’s History of Modern Architecture (1977) and Banham’s Theory and Design in the First Machine Age (1980). I used more specialized sources for each country to complete the list of the ten most influential architects and to verify the judgments made by Benevolo and Banham. The Appendix shows the names, life spans, and educational backgrounds of the selected architects classified by country, as well as the main architectural movements and organizations that they founded or took part in. Biographical information came from The Macmillan Encyclopedia of Architects (Placzek, 1982) or from specialized country sources. Drawing on the above sources and primary research at several archives, I assigned each architect a code on a four-point scale depending on whether he welcomed or opposed mechanization and standardization in art and architecture and whether he explicitly accepted or rejected scientific management.¹

Some may find it surprising, even disquieting, that many of the early twentieth century avant-garde architects in Europe—who were artists, after all—took sides with the proponents of such an individualistic, mechanistic, and engineering-based model of organization as scientific management. Their enthusiasm for Taylorism and Fordism surfaced at three levels. First, they exhibited a technocratic ideological approach to problem solving that highlighted neutrality, efficiency, and planning. Second, they endorsed and used the most important scientific management techniques in their architectural projects and took part in organizations promoting the diffusion of scientific management. And third, they reinterpreted scientific management in aesthetic terms. I have organized the evidence on the relationship between

¹ The archives were the Bauhaus-Archiv, Museum für Gestaltung, Berlin; Busch-Reisinger Museum, Harvard University, Cambridge, Mass.; Biblioteca Nacional, Madrid; and Fundació Joan Miró, Barcelona.
scientific management and modernism analytically rather than chronologically so that the aesthetic inspiration that the modernist architects drew from scientific management will be readily apparent from a comparison of their ideological and technical inclinations. Table 1 summarizes the key characteristics of scientific management (Guillén, 1994: 8–11) and describes why they appealed to European modernism.

The affinities between modernism and scientific management begin with their assessments of the problem of chaos as one requiring system and organization. Le Corbusier first read Taylor’s *Principles of Scientific Management* in 1917. At first, Taylorism struck him as a “horrifying and inevitable path towards the future,” but it did not take him long to find

<table>
<thead>
<tr>
<th>Table 1: Key Features of Scientific Management and Why They Appealed to the European Avant-Garde Modernists</th>
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<tr>
<td><strong>Scientific management:</strong></td>
</tr>
<tr>
<td><strong>A. General features</strong></td>
</tr>
<tr>
<td>1. Perceived problem: Workers’ soldiering, waste, disorder, management’s arbitrariness and greed,</td>
</tr>
<tr>
<td>lack of control.</td>
</tr>
<tr>
<td>2. Basic units of analysis: Individuals and tasks.</td>
</tr>
<tr>
<td>4. Formal knowledge bases: Engineering, psychology, ergonomics, physiology.</td>
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<tr>
<td><strong>B. Ideological features</strong></td>
</tr>
<tr>
<td>1. Rationality assumptions: All actors can behave rationally.</td>
</tr>
<tr>
<td>3. View of industrial conflict: Avoidable, increased surplus benefits workers, managers, and society at</td>
</tr>
<tr>
<td>large.</td>
</tr>
<tr>
<td>5. How to manage workers: Tell them what to do and supervise them.</td>
</tr>
<tr>
<td>6. Social and intellectual agenda: Futurism, human mastering of nature; material advance; the engineer</td>
</tr>
<tr>
<td>as visionary.</td>
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<tr>
<td><strong>C. Technical features</strong></td>
</tr>
<tr>
<td>2. Methodology: Experimentation, time and motion studies, job analysis.</td>
</tr>
<tr>
<td>4. Distribution of tasks: Task conception and execution separated; division of labor among individual</td>
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<td>workers, specialization.</td>
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<tr>
<td>5. Authority structures: Simple managerial hierarchy.</td>
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<tr>
<td>6. Concentration of authority: Unity of command, control of supervisory authority.</td>
</tr>
<tr>
<td>7. Organization of the process of work: Work simplification, mechanization, assembly-line work.</td>
</tr>
<tr>
<td>8. Preferred rewards: Piece-work wages, bonuses.</td>
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<tr>
<td><strong>D. Evoked imagery</strong></td>
</tr>
<tr>
<td>1. Imagery: Order, system, objectivity, machinery, mass production.</td>
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</table>
in the new engineering approach a possible "return to order," by applying the "scientific principles of analysis, organization, and classification" (CGP, 1987: 191, 398). Scientific management promised to reduce waste and cut costs and glorified regularity and standardization, aspects that were in line with the concerns of the avant-garde modernists (Larson, 1993: 32–33). According to scientific management, chaos, disorder, waste, and soldiering by workers, coupled with management's arbitrariness, greed, and lack of control, seriously constrained production and social welfare (item A1 in table 1). A "mental revolution" was proposed to tackle such evils. The modernists believed that traditional modes of thought (i.e., "orthodox intellectual activity" and "academic design") limited rationalization and social liberation (Tafuri, 1976: 50–57). Le Corbusier argued that architects were "enslaved to the past" and mounted a blistering attack on "the narrowness of commonplace conceptions" in architecture (Le Corbusier, 1986: 103). One manifesto of the Russian modernists started by reaffirming the goal of the "factual rationalization of artistic labor" (Bowlt, 1988: 241) and of a utilitarian conception of art and scientific research into art (Kopp, 1985: 10). In general, modernism reasserted the principle of form as an organizing device to avoid disorder (Tafuri, 1976: 93). Other general features are also shared by both groups. The scientific managers focused on the analysis of tasks and individual performance, and so did the modernists (A2 in table 1). In addition, both groups believed in hierarchy and shared an admiration for method and calculation. They thought that society at large—not just engineering or architecture—could benefit from the new ideas and methods (A3 and A4 in table 1).

Ideological Affinities between Scientific Management and Modernism

The scientific managers and the modernists agreed in their technocratic approach to industrial and social problems (see panel B of table 1): everybody can behave rationally (item B1); technical improvements and "social engineering" will solve social problems, including class conflict (B2 and B3); and a new "ideology of work" needs to be inculcated into workers (B4 and B5; Tafuri, 1976: 57). The famous dictum by Le Corbusier (1986: 289) on social problems illustrates this ideological agenda: "Architecture or revolution. Revolution can be avoided." In his writings Le Corbusier (1987) championed the belief in the capacity of rational planning to improve efficiency, welfare, and standards of living in the city (Brooks, 1987: 206). Like the scientific managers, the modernist architects claimed the right to organize life at the factory as well as the home. The Russian architect El Lissitzky explained: "As a result of the precise allotment of time and work rhythms and by giving each individual an important role of responsibility, the factory has become the true home of education. . . . The factory has become the melting pot of the socialization of the urban population; its architecture is not merely the wrapping for a group of machines but something completely new and different." (Kopp, 1985: 103).

The modernist architects saw themselves as much more than mere designers of good-looking buildings. For Hannes
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Meyer, the architect “was an artist and is becoming a specialist in organization; ... building is only organization: social, technical, economic, mental organization” (Whitford, 1984: 180). Moisei Ginzburg argued that the “architect will no longer think of himself as the decorator of life but as its organizer” and ought to find “types of housing that will help develop a way of life for the workers that is of a socially superior type.” Houses and buildings became “social condensers,” which would instill in its dwellers new social habits (Kopp, 1985: 22, 64). These views of the role of the architect in shaping life at home and at the factory developed in the midst of rapid economic and social change, as noted by the Hungarian-born Bauhaus teacher, László Moholy-Nagy: “This is our century: technology—machine—socialism. Come to terms with it, and shoulder the tasks of the century” (Winger, 1983: 28). In this context, a break with the old role of the architect as the caterer to the tastes of the monarch or the upper class paralleled the scientific manager’s desire to make mass consumption widely available and to fix social problems by increasing the size of the pie. As Hannes Meyer stated in 1926, “The new artwork is a collective work and intended for all; it is neither a prize for the collector nor an individual’s private privilege.” He suggested that in the new architectural era, “the artist’s atelier becomes a scientific laboratory” (Kaes, Jay, and Dimendberg, 1994: 445–449).

As early as 1911, Walter Gropius realized the potential contribution of a modernist architecture to the rationalization of industry: “A worker will find that a room well thought out by an artist, which responds to the innate sense of beauty we all possess, will relieve the monotony of the daily task and he will be more willing to join in the common enterprise. If the worker is happy, he will take more pleasure in his duties, and the productivity of the firm will increase” (Banham, 1986: 201).

Some of the modernists, like the scientific managers, went even further. As true technocrats, they assumed that workers shared their proposals: “These millions of workers must unquestionably be considered supporters of modern architecture” (Ginzburg, quoted by Starr, 1976: 206). Following the classic Fordist logic, however, they thought of workers not only as producers but also as consumers. For the Russian architect Yakov Chernikhov, the new modernism “can, and must, take into consideration all the concrete needs of contemporary life and must answer in full the needs of the mass consumer, the collective ‘customer’—the people” (Bowlt, 1988: 260–261). The agenda of the avant-garde modernists promised great improvements in the quality of life (e.g., Soria y Mata, 1894: 11; Behrens, as quoted in Buddensieg, 1984: 208; Cooke, 1995). The modernists and the scientific managers clearly viewed themselves as visionaries equipped with a “futurist,” forward-looking agenda focused on achieving change (B6 in table 1).

The Technical Parallels

One could argue that it was not surprising that these radical avant-garde modernists would engage in colorful rhetoric so as to liberate themselves from the chains of tradition, bolster
their creativity, and attract attention, but there was much more than creative thirst or rhetorical fluff in modernism. The avant-garde modernists not only glorified the beauty of industry and the mechanical in their writings and architectural works but also endorsed and used the new scientific methods of labor management and organization originally developed in the United States at the turn of the century. The similarities between the techniques used by the scientific managers and by the avant-garde modernists are stunning—and troubling.

Normative solutions (item C1 in table 1) were favored by both groups, and the “one best way” of producing, building or designing was believed to be both feasible and attainable (Nerdinger, 1985: 11). Many modernists endorsed and personally used the scientific management methodology of experimentation, time and motion studies, and even work flow charts à la Gantt (C2). Thus, in 1927 Gropius recommended the “determination of the expenditure of time and energy for each individual part of the production process during manufacture and assembly of the buildings” and the “preparation of flow charts of work on the site according to scientific business principles” (Wingler, 1983: 127; Nerdinger, 1985: 18, 20). Following the archetypal Taylorist logic, he further observed: “Precise numerical records by the famous American scientific managers Taylor and Gilbreth, show that the average American bricklayer is not more productive than the German bricklayer. Rather, the reason for the astonishing double efficiency in the United States lies in the adoption of appropriate building methods” (Gropius, 1927).

Gropius and his collaborators introduced time and motion study at the Dessau and Praunheim housing projects using photo cameras and stopwatches (Bauhaus-Archiv Berlin, Schrank 34, Inv.-Nr. 9153/1–12; RFG, 1929; RFGVFW, 1929: 92–130). Other German architects had long been in favor of applying scientific management. Max Mayer lectured in 1914 on “Taylor’s Suggestions for the Construction Business,” while Martin Wagner edited during the 1920s a journal that published many reports on Taylorism and Gilbreth’s motion studies (Nerdinger, 1985: 11–12). In Spain, the urban planner and industrialist Arturo Soria advocated and actually implemented methods of scientific management in the tramway shops at Madrid’s Ciudad Lineal (“Linear City”), his chief contribution to design (Soria y Mata, 1894, 1907; Collins and Flores, 1968; Benevolo, 1977: 358–361; García Hernández and Calvo Barrios, 1981; Maure Rubio, 1991: 302–304).

The modernist architects sometimes got carried away by the promises of scientific management techniques. At the International Congress for Modern Architecture of 1928, Gropius, May, and Le Corbusier each presented papers discussing how to use time and motion studies to arrive at the so-called “minimum existence housing unit,” i.e., the smallest possible apartment that an average family could comfortably inhabit (CIAM, 1979). Similar proposals were put forward by Ginzburg in the Soviet Union and by Bottoni and Griffini in Italy (Kopp, 1989: 64; Etlin, 1991: 227–228). German and Russian architects even delved into the “question of getting some order into the kitchen” with the aid of time and motion study (Kaes, Jay, and Dimendberg, 1994: 461–465;
Cooke, 1995: 115). These utopian ideas found their way into the design of apartment units, bathrooms and kitchens, and remain influential to this day (Giedion, 1969; Nolan, 1994: 206–226).

Heavily influenced by the modernist architects, other artists also found in Taylorism a source of inspiration and creative techniques. The Russian art theoretician Nikolai Chuzhak used time and motion studies to improve drama performance skills through the elimination of redundant or inefficient motions, gestures, and expressions (Lodder, 1983: 170–180). His compatriot Vsevelod Meyerhold arrived at a science of “biomechanics” or application of Taylorism to the theater. In his view, research could help “discover those movements in work which facilitate the maximum use of work time,” so as to improve acting skills and reduce play duration from four hours to one “without lessening aesthetic content or form” (Stites, 1989: 161).

Scientific management stressed the careful selection of the most adequate worker for each task, and so did the modernist architects (C3 in table 1). They believed in a talent-based selection of apprentices to bring forth artistic excellence and channel good design to industry (Bayer, Gropius, and Gropius, 1975: 22). Le Corbusier (1986: 274–275) extended the principle to the workers who were to perform the tasks of production:

Industry has brought us to the mass-produced article; machinery is at work in close collaboration with man; the right man for the right job is coldly selected; laborers, workmen, foremen, engineers, managers, administrators—each in his proper place. . . . Specialization ties man to his machine; an absolute precision is demanded of every worker, for the article passed on to the next man cannot be snatched back in order to be corrected and fitted; it must be exact in order . . . to fit automatically into the assembling of the whole; . . . a strange foreman directs severely and precisely the restrained and circumscribed tasks.

Some avant-garde architects even adopted the scientific methods of modern psychology. In 1926 the architect Nikolai Ladovsky created a psychotechnical laboratory at the Higher State Artistic-Technical Workshops, borrowing from the theories of the father of industrial psychology, Hugo Münsterberg. The laboratory was initially used to select the best students, do research on the amount of energy required to perceive different architectural forms, and experiment with devices to measure various dimensions of human visual capacity. The key recommendation to architects was to handle complexity with discipline and restraint, because more regular and simple forms were found to be easier to perceive and therefore to produce more satisfaction. As Ladovsky observed, “Psychotechnics cannot create artists . . . but it can give them all a solid starting point from which they can achieve the aims to which they aspire by the most scientifically correct means” (Ginzburg, 1982: 97; Kopp, 1985: 136; Senkevitch, 1983; Cooke, 1995: 98, 184–185).

The avant-garde architects also subscribed to scientific management’s proposal to separate totally task conception from task execution (C4 in table 1). Le Corbusier’s block quotation above is explicit in this respect. The case of Gropius is particularly relevant here, because early in his career he had cel-
ebrated craftsmanship (Junghanns, 1982: 171). By 1916, however, he was arguing strongly in favor of replacing “all the factors of the old, individual work” (Whitford, 1984: 36). Gropius’s master, Peter Behrens, had also warned against the “imitation of handicraftsmanship” on the occasion of his appointment as chief designer of the AEG company in 1907 (Buddensieg, 1984: 207). In the early Soviet Union, the art historian Boris Arvatov, echoing the beliefs of the constructivist architects, rejected the “individual craft method” in favor of the “scientifically organized,” “collective artistic work” (Lodder, 1983: 106–107). Ginzburg carried the idea of the division of labor to its most extreme consequences when arguing that the job of the architect should be decomposed into its constituent tasks to remove individual discretion and intuition. He used functional flow diagrams in an attempt to achieve that goal (Ginzburg, 1982: 114; Lodder, 1983: 118; Cooke, 1995: 121, 127).

Hierarchy and unity of command constituted central ideas in scientific management, and the modernist architects defended them, especially when addressing the problem of urban planning (Le Corbusier, 1986: 274–275; 1987: C5 and C6 in table 1). The modernist housing projects in Germany during the 1920s speak to the belief in unified artistic management as well as in technocratic planning. The postwar housing shortage generated much artistic activity in Germany thanks to the ambitious building programs of several regional and city governments run by the Social Democratic Party and often supported by a wide spectrum of political forces. Rapid industrialization and urbanization had expanded the demand for affordable housing, while the years of war and rampant inflation had prevented cities from tackling the problem before 1924. The challenge was to build large-scale, low-cost housing settlements as quickly and efficiently as possible. In fact, the tight budgetary constraints forced architects to experiment with new forms, materials, and techniques, including scientific management and assembly methods. The large-scale housing projects in Frankfurt, with architect Ernst May as head of Municipal Housing, and in Berlin, under the direction of Martin Wagner, paved the way for numerous other projects throughout Germany after 1927 (RFGWBB, 1929: 92–130; Wingler, 1969: 126–127; NGBK, 1977: 41–108; Lane, 1985: 87–124; Kaes, Jay, and Dimendorf, 1994: 454–473).

Simplification and standardization of designs and tasks, including a division of labor, were a cornerstone of both scientific management and modernism (C7 in table 1). The designer Theodor Fischer made it clear at the first session of the German Federation of Artistic Workshops in 1907 that “mass production and division of labor must be made to produce quality” (Bayer, Gropius, and M. Gropius, 1975: 11; Campbell, 1978: 51 n. 66; Buddensieg, 1984: 16). In a 1910 memorandum to AEG’s top management, Gropius wrote: “To implement the concept of the industrialization of house construction, the company will repeat individual components in all of its designs and hence facilitate mass production, promising low costs and easy rentability” (Wingler, 1969: 20). In 1925 the Bauhaus adopted the famous industrial standards, DIN (Deutsche Industrie-Normen). Standardization
was also a priority for other German architects like Hilberseimer and May (Hays, 1992; Hilberseimer, 1927: 21–26, 97–98; Lane, 1985: 90–103).

Standardization also captured the imagination of designers working in related artistic fields. Standardized textiles and clothing by Varvara Stepanova, Lyubov’ Popova, and Vladimir Tatlin were massively produced at the First State Textile Print Factory in Moscow. In fact, clothing became an important area of research in the early Soviet Union, a development underscored by the creation in 1925 of the Committee on Standard Clothing at the Decorative Institute in Leningrad (Lodder, 1983: 145–155, 181–204; Kopp, 1985: 10–11; Andel, 1990). At the Bauhaus theater, Oskar Schlemmer standardized the characters through costume and mask (Droste, 1990: 158–162). Gropius went beyond most modernists to suggest that standardization was not only desirable from a technical point of view but something far more momentous: “Standardization is not an impediment to the development of civilization, but, on the contrary, one of its immediate prerequisites” (Gropius, 1965: 34).

Avant-garde architects showed a boundless enthusiasm for the assembly line and Fordism. Gropius, Meyer, Wagner, and Le Corbusier proposed to make houses “by machine tools in a factory, assembled as Ford assemblies cars” (Banham, 1980: 222). The leaders of the German prefabricated housing movement, Gropius and Konrad Wachsmann, refined construction methods and collaborated with several industrial firms (Herbert, 1984: 52, 70–71, 81, 87–103, 107–159; Kaes, Jay, and Dimendberg, 1994: 439–449), as did the French pioneers in this area, Sauvage and Hennebique. Architects May and Wagner founded the “New Economy of Building” movement (Nerdinger, 1985: 11–14). Another German architect, Hilberseimer, used Ford’s ideas about the spatial decentralization of cities to further his views about modern city planning and suburbanization (Pommer, Spaeth, and Harrington, 1988: 92–93), while Wagner wrote about “The teachings of the Automobile-King Henry Ford” (Nerdinger, 1985: 16–17). In Russia, Ginzburg read and often quoted from Ford’s autobiography, published in Russian in 1924. The Russian modernists predicted that “millions of producers will be making normalized objects for everyday life” (Bowlt, 1988: 240, 254–261), and Lissitzky even proposed that “building norms and construction times must be worked out, so that building can be transferred to mass-production factories and houses ordered from a catalogue” (Lissitzky-Küppers, 1967: 374).

The possibility of economizing on labor through new organizational methods and incentives has already become evident in several of the excerpts quoted above. As early as 1894 the Spanish architect Soria was observing the “daily economy of time and labor” that could be realized from improved methods and design (Soria y Mata, 1894: 7). The German architect Erich Mendelsohn wrote: “For each challenge demands efficiency, clarity, simplicity. Each must be efficient because all labor is too valuable to be wasted senselessly” (Kaes, Jay, and Dimendberg, 1994: 452). Perhaps Behrens was most clear about this cardinal scientific management idea (C8 in table 1) when looking for solutions
to the housing shortage after World War I: “The Taylor System, therefore, means a most intensive use of individual labor power, which . . . will significantly reduce the number of workers or the length of working time” (Behrens and de Fries, 1918: 60). This quote could have been extracted from one of Gilbreth’s landmark treatises on bricklaying, yet it comes from an important book in the development of European modernism.

The modernist architects actively campaigned for the diffusion of scientific management in the construction industry and beyond. In so doing, they became effective propagators of the new ideas and methods of production. In Germany, such leading architects as Behrens, Gropius, Hilberseimer, May, Mendelsohn, Taut, and Wagner collaborated with, and held important positions in, scientific management organizations like the National Society for Research into Efficiency in Construction and Housing, the Research Society for Economical Construction Business, the German Committee for Economical Construction, or the Committee for the Promotion of Clay and Building Methods (Behrens and de Fries, 1918: 60–61; Wingler, 1969: 126–127; Conrans, 1970: 29, 96; Bayer, Gropius, and Gropius, 1975; Buddensieg, 1984: 18, 124–137, 207–208, 213, 219; Whitford, 1984: 20–21, 36, 143–146, 181; Nerdinger, 1985: 11–14; Pommer, Spaeth, and Harrington, 1988: 83, 92–93; Kaes, Jay, and Dimenberg, 1994: 452, 457, 461).

Many of the Soviet architects and designers endorsed scientific management or applied its principles and techniques. The modernist poet Alexei Gastev—dubbed the "Ovid of engineers, miners, and metal workers," and a key supporter of modern architecture—was the founding director of the Central Institute of Labor, an organization created by the Soviet state in 1920 to promote the implementation of scientific management in both industry and building. In 1924 Gastev proclaimed his trinity of heroes as follows: "Taylor was an inventor, Gilbreth was an inventor, Ford was an inventor" (Bailes, 1977: 384). Many architects and designers collaborated with the institute. Architect Vladimir Krinsky joined the Time League, another scientific management organization in early Soviet Russia. Such architects as Ginzburg and the Vesnin brothers also endorsed or used scientific management in their projects (Lodder, 1983: 93, 254; Kopp, 1985: 136; Bowlt, 1988: 43; Senkevitch, 1990).

In France, Le Corbusier urged architects to Taylorize and standardize construction methods. He founded three scientific management organizations: the Society of Industrial Enterprises and Studies (SEIE), the Builders’ Workshop (ATBAT), which had a "works management" section, and the International Congress of Modern Architecture or CIAM (Brooks, 1987: 117–118; CGP, 1987). A French movement of "municipal Taylorism" in town planning developed during the 1920s with Georges Benoit-Lévy and Maxim Leroy as its leaders and with the participation of Louis Renault, the automobile manufacturer (Banham, 1980: 220–263; McLeod, 1983; Le Corbusier, 1986).

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The “Lost” Message: From Ideology and Techniques to Aesthetics

The preceding analysis of the ideological and technical affinities between scientific management and modernism sets the stage for an understanding of the aesthetic elements that the European architects and designers perceived in the new realities created by Taylorism and Fordism. Their taste for the machine as a metaphor for aesthetic theory seems to have blended handsomely with an enthusiasm for the new organizational methods pioneered by American engineers. Thus, the European avant-garde architects saw both beautiful things and possibilities for artistic expression in the rationalized world of machine production. They found in scientific management a lost sense of the beautiful that has escaped the attention of the field of organizational studies. In so doing, they reinterpreted one of our discipline’s main theories in aesthetic terms.

This fascination with the regularity, continuity, and speed of technology and mass production represents, therefore, the last affinity between modernism and scientific management, one that only the European modernists were able to articulate (item D1 in table 1). The Italian futurist F. T. Marinetti’s most powerful and famous line went as follows: “We declare that the splendor of the world has been enriched by a new beauty—the beauty of speed. . . . A roaring racing car . . . is more beautiful than the winged Victory of Samothrace,” in a reference to the imposing Greek sculpture at the Louvre Museum in Paris (Banham, 1980: 103). In appropriately less adorned prose, the most accomplished Italian modernist architect, Giuseppe Terragni, made it clear in 1928 what his main source of inspiration was and why: “The house can in a certain way be compared to a machine and must be constructed so that every one of its parts serves a precise purpose. There should be nothing there that is useless or superfluous, because like a machine, this will end up hindering its functioning” (Etlin, 1991: 265).

The formulation of a modernist aesthetic meant that the architect could learn from engineers not only forms but a new set of principles, a new vocabulary to approach the process of artistic creation. It is important to realize that modernists found in scientific management much more than new formal and technological possibilities. The “mechanization” of architecture was supposed to go beyond making building methods more efficient and rationalizing the job of the architect. Yakov Chernikhov, an architect and professor of geometry at the Leningrad Institute of Railroad Transport Engineers and the Institute of Engineering Economy, explained in an influential 1928 book: “We are gradually uniting artistic construction and machine construction; the boundary dividing them is being erased. A new conception of the beautiful, a new beauty, is being born—the aesthetics of industrial constructivism [which] is indebted for the concrete definition of its principles mainly to the artistic and technological research of the last decades” (Bowlit, 1988: 260–261; emphasis added).

European modernism went beyond American scientific management to formulate an aesthetic drawing on a similar ideology and set of techniques. Thus, Ladovsky thought of
modernism as the creation of “a scientific statement of architectural principles on the basis of rationalist aesthetics.” He further observed:

Architectural rationality is founded on the principle of economy just as technical rationality is. The difference lies in the fact that technical rationality is an economy of labor and material in the creation of a suitable and convenient building, but architectural rationality is the economy of psychic energy in the perception of the spatial and functional properties of the building. It is a synthesis of these two forms of rationality into one building (Cooke, 1995: 98, 178; emphasis added).

As one of the creators of architectural modernism, Gropius made it clear in 1926 that the new architecture, by merging scientific method and aesthetics, added value above and beyond what either engineering or art had achieved separately:

The new construction procedures must be affirmed from an artistic point of view. The assumption that the industrialization of housing construction entails a decline in aesthetic values is erroneous. On the contrary, the standardization of structural elements will have the wholesome result of lending a common character to new residential buildings and neighborhoods. Monotony is not to be feared as long as the basic demand is met that only the structural elements are standardized while the contours of the building so built will vary. Well-manufactured materials and clear, simple design of these mass-produced elements will guarantee the unified ‘beauty’ of the resulting buildings. (Kaes, Jay, and Dimendberg, 1994: 441, 442)

Le Corbusier was perhaps the most thoroughly Taylorist of the modernist architects. In 1923, he was lamenting that “the Engineer’s Aesthetic, and Architecture, are two things that march together and follow one from the other: the one being now at its full height, the other in an unhappy state of retrogression.” He was quick to realize that architecture could borrow creatively from engineering so as to revitalize artistic design. “The purpose of construction is TO MAKE THINGS HOLD TOGETHER; of architecture TO MOVE US.” “A house is a machine for living in. . . . An armchair is a machine for sitting in, and so on.” Le Corbusier longed for a “House-Machine”, the mass-production house, healthy (and morally so too) and beautiful in the same way that the working tools and instruments which accompany our existence are beautiful.” As a source of aesthetic inspiration, the machine was a “factor of economy, which makes for selection,” thus promoting good taste by overcoming the eclecticism of the traditional architectural styles (Le Corbusier, 1986: 1, 4, 19, 95; capitals in original). He proposed that “in order to BUILD: STANDARDIZE to be able to INDUSTRIALIZE AND TAYLORIZE” (McLeod, 1983: 143; Nerding, 1985: 15; capitals in original).

Le Corbusier and the other members of architectural modernism in Europe found their inspiration not in nature but in the rationalized or Taylorized world of machine production. They showed us that scientific management contained an aesthetic message emphasizing regularity, continuity, and speed at the expense of symmetry, ornamentation, and solidity. In their eyes, monotony and standardization had become beautiful. This finding makes it certainly impossible to think about modernism in architecture without taking scientific management into account. Moreover, modernism’s
revolutionary reinterpretation of scientific management suggests that the field of organization studies has formed an incomplete understanding of scientific management, one that neglects its aesthetic implications.

THE MODERNIST RECONSTRUCTION OF THE ORGANIZATIONAL FIELD OF ARCHITECTURE

The pioneering modernist architects not only formulated a new aesthetic order but also provided the institutional template for the reconstruction of the organizational field of architecture in their respective home countries and beyond. The rise of modernism occurred first and most decisively in Germany, the Soviet Union, and Italy, with France being an intermediate case, as documented in the Appendix. In Britain, Spain, and the United States, modernism only diffused after its major postulates and institutional blueprints had been developed in Continental Europe. The fact that by 1930 modernism had flourished after reinterpreting scientific management only in some European countries invites a comparative neoinstitutional analysis of the architecture fields in each society to better grasp the emergence of the modernist aesthetic and its subsequent diffusion. In doing such an analysis, I follow the recommendation of most histories of architecture to study the rise of modernism in the context of industrial development and sociopolitical upheaval (Jencks, 1973; Benevolo, 1977; Banham, 1980). I begin with the ambiguous effects of industrialization on architecture.

The Historical Context of Modernism: Economic Development and Sociopolitical Upheaval

It seems clear that modernism did not necessarily emerge from the most developed countries in Europe. The British case is critical, for it was the most advanced industrial country until World War II. For example, throughout the interwar period Great Britain produced far more motor vehicles per capita than either France, Germany, Italy or the Soviet Union (Mitchell, 1980), and yet modernism unfolded in those countries but not in Britain. Among countries with a low output of automobiles, modernism developed in Italy and the Soviet Union, but not in Spain. Modernism flourished in France only after much push and shove, in spite of the fact that industrial development was among the highest in the world.

Reviewing the British case is instructive. Ironically, the English Arts and Crafts movement, which inspired the German and Russian modernists, favored “the production of unique specimens of artistic workmanship,” thus limiting its impact on modernist architecture. The leader of the Arts and Crafts, William Morris, was a typical product of the Victorian era, with his disdain for technological progress in the face of it. Morris opposed the principle of the division of labor, arguing that “mechanized work implied grave psychological hazards and was inherently oppressive” (Guillén, 1994: 216). Preservationism and “village values” triumphed over the modern (Read, 1954: 79–80, 219–225; Sussman, 1968: 104–134). One of the most gifted British architects of this period, W. R. Lethaby, made it clear in 1910 that he was no fan of the machine-age approach to work: “Human work, I say, not machine-grinding. Machining is no more real work than hand-
organ noises are real music” (Benevolo, 1977: 186–187; Banham, 1980: 46). A most influential architecture critic, Geoffrey Scott, was overtly traditionalist in his writings and defended the orthodoxy of the academic style unashamedly (Banham, 1980: 48, 65–67). This traditionalism was apparent in the works of architects Walter Crane and Richard Shaw (Benevolo, 1977: 278–284). Likewise, the Garden City movement, led by Sir Ebenezer Howard, was essentially ruralist and shared with John Ruskin a distaste for the modern metropolis. Among leading British architects of this period, only Charles Ashbee, Charles Voysey, and initially Rennie Mackintosh timidly departed from the traditional theory and practices of the past, but without ever embracing modernism wholeheartedly (Benevolo, 1977: 181–187, 351–358; Banham, 1980: 48, 65–67). The initially vigorous movement of prefabricated housing collapsed in the 1920s under pressure from the trades unions and the general distaste for industrialized construction methods (Klingender, 1970; Herbert, 1984: 20–21, 29–30).

Industrial development had an ambiguous effect on modernism as a movement. Economic advancement and technological breakthroughs certainly offered architects new possibilities for artistic expression. Oftentimes, however, it was relative backwardness rather than progress that spurred architects to find a lost aesthetic in machinery, Taylorism, and Fordism, in an attempt to modernize their countries. For example, Behrens and Gropius hoped their work would enhance the competitiveness of German firms (Gropius, 1965: 30–32; Buddensieg, 1984), and the Soviet leadership believed that modernist design would improve product quality and the USSR’s position on the “international exchange market” (Lodder, 1983: 113; Kopp, 1985: 27–28, 70–71).

The economically backward case of Spain, though, exemplifies that industrial retardation per se was no guarantee of the rise of a modernist aesthetic. Catalonia and, to a lesser extent, other parts of Spain fostered an arts and crafts movement similar to the English and German ones of the late nineteenth century. The movement’s greatest achievements were the architectural works of Antoni Gaudí and Lluís Domènec. As in England, however, Catalan and Spanish architects created a revivalist, nostalgic, and baroque movement during the 1910s that was the antithesis of the modernism developing elsewhere in Continental Europe. Their style consisted of an eclectic Gothic revival, a panoply of decorative arts elements, a conservative social revisionism, and a mild aversion toward the machine (Boigas, 1973; Freixa, 1986: 38–39; Solà-Morales, 1992). For example, the architect and politician Josep Puig i Cadafalch was quite skeptical of the value and beauty of architectural engineering (Jardí, 1975: 39).

Not surprisingly, the Catalan artistic workshops never replaced the principles of craftsmanship with mass production techniques (Mackay, 1989: 32, 34). After World War I, Catalan and Spanish industrial architecture failed to join the European modernist mainstream (Mackay, 1989: 58–59). One architect, Félix Cardellach, wrote that the new “technical architecture” aroused in him a “strange sensation which is not . . . the feeling of admiration evoked by the usual archi-
tectural style” (Cardellach i Avilés, 1916: 108). Another influential architect, Josep Domènech i Estapà, thought that mechanical forms should be adorned to make them more beautiful (Freixa, 1986: 76–77), a proposal implying the rejection of modernism’s new taste for the “intrinsic elegance” of materials. The few noteworthy exceptions to this general Spanish trend—García Mercadal, Flórez, Muncunil—failed to reverse the dominant traditionalism until the 1930s, when a short-lived outburst of modernism took place until the Civil War of 1936–39 brought it to a halt (Collins and Flores, 1968; Benevolo, 1977: 358–361; García Hernández and Calvo Barrios, 1981; Freixa, 1986: 99, 120; Flores, 1989: 111–213; Maure Rubio, 1991).

A crucial factor that set Germany, Italy, and the Soviet Union apart from other European countries during the late nineteen teens and early twenties was the occurrence of sociopolitical upheaval on a large scale. Germany, Italy, and Russia emerged weakened from World War I, while Britain and France were clear victors and Spain remained neutral. Germany experienced military defeat, revolution, counterrevolution, and monetary and economic crises, a level of commotion and change that allowed artists to challenge traditional conceptions and practices (Herf, 1984; Kaes, Jay, and Dimendberg, 1994). Though part of the winning coalition in World War I, Italy was also reaching a critical juncture in the late nineteen teens. The fascist March on Rome in 1922 provided the Italian avant-garde architects with a chance to influence industry, politics, and official artistic policies (Bowler, 1991). In the Soviet Union, the October Revolution removed the entrenched traditional power structures in the arts that were preventing a variety of avant-garde movements from flourishing. Revolution and civil war offered architects and other artists an exposure to revolutionary ideology as well as experience in political agitation and in the management of artistic enterprises (Lodder, 1983). In Germany, Russia, and Italy, sociopolitical turmoil created ample opportunities for the renewal of architectural practice. Modernism was obliter- ated in the most stable countries—the U.S., Britain, and Spain—while in the intermediate case of France the modernist movement was slow to develop.

A Neoinstitutional Account Based on Sponsorship and Professionalization

An explanation solely relying on such macro forces as industrialization and sociopolitical upheaval, however, skirts the crucial issues of interest and agency in the spread of new practices (DiMaggio, 1988). Following neoinstitutional theory (Scott, 1995a: 92–112), it is germane to outline how the actors operating within the organizational field of architecture varied across countries and changed over time. In his pioneering study of the institutionalization of different models of the art museum, DiMaggio (1991) pointed out sponsorship and professionalization as the critical variables in the construction and reconstruction of fields of organized cultural activity. For modernism, the changing roles of the state, industrial firms, and professional architects were the most critical institutional agents transforming the field after the turn of the century.

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Architecture became a separate profession late in the nineteenth century or early in the twentieth century, depending on the country, and always after engineering had consolidated itself as a profession linked to the world of industry and to public works. Until then, most builders were artisans or craftsmen with no formal training in their trade, while master architects tended to be educated in the fine arts tradition and have little, if any, contact with industry or knowledge about building methods and the construction business. The professionalization of architecture took place in the midst of a great debate about whether it was a decorative art or an application of technology and science and whether the architect should remain an individualist, bohemian, and detached artist or become involved in all aspects of the construction industry. Furthermore, the old conception of architecture as a decorative art assumed that only the state, the upper class, and perhaps the church were legitimate patrons, while industry was derogated as an unworthy source of architectural commissions.

**New roles in sponsorship.** While changes in sponsorship for architectural projects were crucial to the development of modernism, no single type of sponsor predominated in all countries in which modernist architecture succeeded after reinterpreting scientific management. Considering the state as the key actor in the emerging field of modernist architecture yields mixed results. In Germany and the Soviet Union modernism developed during a period of rising state involvement in industry and art. In Italy and France, by contrast, state support for modernist projects and artistic experimentation was far less sustained, but modernism nonetheless developed. This argument, however, helps to explain the failed modernist cases of Spain and Britain, where the state played no role as a sponsor of architecture prior to 1945.

The German case lends strong support to the thesis that state patronage is important to the development of modernism. The Bauhaus itself—perhaps the single most important seedbed of modernist ideas—was a state school. The state-funded agency to promote industrial rationalization and scientific management (RKW) became the biggest and most active of any country (Merkle, 1980; Guillén, 1994). As documented above, during the 1920s many German modernist architects collaborated with scientific management organizations affiliated to the RKW, and they benefited disproportionately from public funds for housing projects because they were willing to experiment with new concepts as well as money-saving ideas and techniques.

The influence of state economic planning and patronage on modernism in the early Soviet Union appears to be even more straightforward. State interventionism grew steadily from the “transitional state capitalism” stage immediately following the October Revolution to the output and price controls of 1921 and the First Five-Year Plan of 1928–32 (Parkins, 1953). The Union of Contemporary Architects, a group that included Ginzburg and the Vesnin brothers, collaborated with the state economic planning agencies (Starr, 1976). In particular, Ginzburg prepared housing projects for the Central Planning Agency, the Gosplan. Several architects and designers collaborated with the Council of the Scientific
Organization of Labor (SovNOT), another state agency, or worked for the new state enterprises like the New Lessner Factory in Petrograd and the First State Textile Print Factory in Moscow (Lodder, 1983; Senkevitch, 1990). Following the German example, the state created a new school of architecture and design—the Higher State Artistic-Technical Workshops—where many of the Russian modernist architects taught or received their training (Lodder, 1983: 109–144).

It is important to note that modernism was suppressed during the 1930s by the Nazi and Stalinist totalitarian regimes precisely at a time when economic and artistic planning intensified in scale and scope (Milward, 1976). During the 1930s the Nazis attacked modernism for being "degenerate art" (entartete Kunst), accusing the members of the avant-garde of being communists or un-German and promoting, instead, a return to classicism in architecture. In the Soviet Union the party leadership began to favor "socialist realism" in art after suppressing the avant-garde because of its alleged elitism and bourgeois character, sending many architects and designers to the Gulag. Ironically, the effect of such repression was to facilitate the adoption of modernist architecture beyond Continental Europe after 1935, as many of the prosecuted architects migrated to America and were able to capitalize on the visibility awarded by making such conspicuous enemies in their home countries (Herf, 1984; Kopp, 1985: 154–157; Lane, 1985; Golomstock, 1990; Barron, 1991; Bowler, 1991; Etlin, 1991). The Italian fascists refused to adopt Futurism as part of their ideological credo, but they did endorse and sponsor modernist architecture during the 1930s. While the fascist corporatist structures for industry and art encouraged some Italian artists to get involved in artistic policy, they rarely led to a close collaboration between art and industry (Bowler, 1991: 786–788).

The impact of state sponsorship should not be overestimated because, except in the Soviet Union, industrialists were also important patrons of modernism in architecture and design. For example, the achievements of Behrens are unthinkable without the patronage of AEG, a firm that also employed Gropius and Mies van der Rohe. The German Federation of Artistic Workshops collaborated with such industrial powerhouses as AEG, Daimler, Krupp, Mannesmann, and Robert Bosch (Junghanns, 1982: 24, 37). Gropius and his assistants did work for a variety of industrial firms: Fagus, Waggonfabrik of the Prussian State Railways, Hannoversche Papierfabriken, I-G Farben, Adler-Automobilwerke, Junkers, Mannesmann, AEG, and Siemens, among others. In 1925 Gropius created a limited liability company to attract consulting and design contracts, the Bauhaus GmbH, although revenues were lower than expected (Bauhaus-Archiv Berlin, Schrank 58, GS 9/6–7; Bayer, Gropius, and Gropius, 1975: 134–139; Wingler, 1983: 46–49; Neumann, 1993: 105).

In France, Le Corbusier established myriad contacts with, and worked for, many industrial firms. The two most important links were with Aeroplanes Voisin, the world's largest aircraft manufacturer at the turn of the century, and with industrialist Ernest Mercier, the managing director of large utility and oil companies (McLeod, 1983: 141–142; CGP, 1987).

In Italy, Luigi Figinì and Gino Pollini designed several factory
and office buildings for the electrical-machinery firm Olivetti
(Savi, 1990), while architect and engineer Giacomo Matte-
Trucco worked primarily for the FIAT auto company. He
designed its Lingotto Factory in Turin (1916–23), a landmark
futurist building topped with a racing test-track on the roof
(Pozzetto, 1975). In Britain, by contrast, the leaders of indus-
try were largely indifferent to modernist design.2

Engineering and the professionalization of architecture.
What the new sponsorship roles of the state and industry
clearly achieved was to place architects in close touch with
the world of machines. The reconstruction of the architec-
tural field along modernist lines was primarily undertaken by
artists and architects trained in, or at least exposed to, en-
gineering. Modernism first flourished after reinterpreting sci-
cientific management in countries in which the emerging archi-
tecture profession developed linkages to engineering early
on that were strong enough to allow for the creation of a
differentiated body of technical and aesthetic knowledge
about building but stopping short of subsuming architecture
as an engineering specialty. The rivalry between a trium-
phant and powerful engineering profession and a troubled
and less dynamic architectural profession in the making re-
sulted in the older generation of architects entrenching itself
in tradition and history. By contrast, the younger generation
saw in engineering not a threat but an opportunity to revital-
ize and eventually revolutionize architectural theory and prac-
tice. In so doing, they welcomed engineering and scientific
management, making it very clear that design had to rule
technology and building methods. That younger generations
proved more receptive to modernism than older ones is re-
lected in the average year of birth of the leading architects
listed in the Appendix. Architects in Britain (mean year of
birth is 1853), France (1864), and Spain (1868) were the old-
est, on average, while those in Germany (1881), Russia
(1888), and Italy (1895) were the youngest.

Engineers were much more numerous during the nineteen
teens and twenties in the countries where modernism first
emerged: Germany, Italy, the Soviet Union, and France. Fig-
ure 1 shows the most comparable and complete cross-na-
tional data on engineers available for the period. Beyond the
sheer numbers, a common experience among many French,
German, Italian, and Russian/Soviet avant-garde architects
was their early exposure to technology and engineering.
Many of the architects listed in the Appendix studied engi-
neering in addition to architecture or art: Choisy in France;
Behrens, Gropius, May, Mies van der Rohe, Muthesius, and
Wagner in Germany; Matté-Trucco and Pollini in Italy (Libera
and Terragni studied mathematics); Ginzburg, Lissitzky, A.
 Vesnin, and V. Vesnin in the Soviet Union. Other leading ar-
d Architects included in the Appendix, short of receiving a formal
training in engineering, avidly learned about new technolo-
gies and looked for the connections among mechanization,
standardization, scientific management, and architecture. In
Spain, several of the ten leading architects studied engineer-
ing or mathematics, but only Soria among them showed an
admiration for scientific management. In Britain none of the
ten most influential architects studied engineering or techni-
cal subjects (see the Appendix).

2 See the following British management
journals: System 41 (1922): 270–271, 54
92, 113. Industry Illustrated 1 (4/1933):
(9/1934): 13, 14 (3/1946): 11; British
Modernism in architecture represented a reaction against the traditional training received at the fine arts academies throughout Europe, which were largely modeled after the École des Beaux-Arts in Paris. The impetus for change emerged not from the heritage of academic architecture but from abstract painting and, most decisively, engineering (Gabetti and Marconi, 1968). French builders and engineers pioneered the use of cement and reinforced concrete, later translated into a new theory of architecture in Germany, Italy, the Soviet Union, and subsequently in France, with Le Corbusier. In some European countries, engineering schools started to offer courses in building and architecture, and some of them even created specialized sections to train architects. During the second half of the nineteenth century, German and Italian architects were often educated at engineering schools. In Italy there was a "mixture of types of training [that persisted] for a long time, and it would lead to the virtual inability to distinguish the training of architects..."
from the training of engineers” until well into the 1920s (Gabetti and Marconi, 1968; Bugarini, 1987; Etlin, 1991: 8–9; Krause, 1996: 197). In Germany, architects and engineers frequently attended the same technical schools and were members of the same professional association until 1903 (Gaber, 1966). In the early Soviet Union, the architects trained at Leningrad’s Institution of Civil Engineers, Moscow’s Higher Technical College, Riga’s Polytechnic Institute, and other similar institutions throughout the country became the leaders of the avant-garde movement (Cooke, 1995: 160–177; Lodder, 1983: 107, 122). The training, certification, and professional organization of architects and engineers in Germany, Italy, and the Soviet Union overlapped so much prior to the early 1900s that it should be no surprise that modernism first took shape there after the turn of the century. Moreover, the modernist architects invested their energies in developing a new model of architectural education, as exemplified by the Bauhaus in Germany and the Higher State Artistic-Technical Workshops in the Soviet Union.

In Spain, by contrast, not only were engineers less common and engineering schools relatively small, but industrial architecture was not taught at engineering schools until the late 1900s, while architectural instruction remained anchored in the fine-arts tradition, with only a limited exposure to mathematics and engineering. An integration of technology and architecture faced enormous resistance even after the curriculum was reformed in 1914 (Cardellach i Avilés, 1910; Fernández Alba, 1975: 46–65; Freixa, 1986: 75). In Britain, the teaching of architecture was “chaotic and underfunded,” while engineering education was based on the apprenticeship system rather than formal training in technology and science at the universities (Powers, 1993: 34; Buchanan, 1989). At the turn of the century, there was only one full-time course in architecture being taught in the entire country, at Liverpool University (Powers, 1993). Instead of joining the modernist trend, the traditional educational model of the Beaux-Arts was brought in from France during the 1920s (Kaye, 1960: 159–160).

Like architects in Britain, few American architects appreciated the aesthetic potential offered by the methods of scientific management or by the revolutionary buildings that engineers were erecting throughout the industrial heartland. Skyscrapers continued to be designed according to pre-modernist tastes, forms, and motifs until well into the 1930s. Frank Lloyd Wright, the most important exponent of early American modernism, remained isolated and failed to realize the critical importance of promoting a professional reconstruction of architecture along engineering lines. In fact, the majority of the most prominent American architects continued to receive their training in the Beaux-Arts tradition either in France or in the United States, as the Parisian model was being transplanted during the nineteen teens and twenties (Brain, 1989). Even Progressivism—the powerful advocate of scientific management in other walks of American life—sponsored a revival of the forms of colonial architecture. The so-called “modern colonial” style in housing continued to rely on naturalistic and organic themes rather than industrial, widening the rift between an historicist approach to form

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and an efficient approach to function (May, 1991; Brain, 1994). Meanwhile, the Progressive movement in city planning and urban space management—heavily influenced by Taylorism—not only failed to bear fruit until the early 1930s but seemed to be concerned with purely technical issues to the exclusion of aesthetic ones (Fairfield, 1994).

American architecture proved receptive to modernism only after 1930 through the European rendition of the principles of building and organizing that had been originally pioneered by American engineers but that only the European architects succeeded in blending with aesthetic theory and practice. Modernism was encouraged by such new organizations as the Museum of Modern Art in New York, the efforts of younger architects exposed to European modernism (Hitchcock and Johnson, 1995), the alignment of American architectural education with the Bauhaus model after the arrival of such exiled European architects as Mies van der Rohe and Gropius, the public housing projects of the New Deal (Brain, 1994), and the enthusiastic sponsorship of key industrial companies (Giedion, 1952; Mumford, 1963; Wingler, 1972; Allen, 1983; Jordy, 1986; Larson, 1993; Harris, 1996).

The rise of the modernist aesthetic came hand in hand with a reconfiguration of architecture as an organizational field, a development that was to facilitate the diffusion of the new practices and enhance their impact in society. As DiMaggio (1991) observed, the rearrangement of organizational fields affects both practices and actors. The modernist reconstruction of architecture entailed the adoption not only of a new set of practices having to do with aesthetic design and construction methods, but also of a new category of authorized actors. The legitimate architect was no longer a decorator of buildings but an organizer of life, an expert versed in both technology and art (Larson, 1993; Brain, 1994). The modernist architect became the center of gravity of a revamped and more complex organizational field that included professional schools of architecture teaching a unified curriculum in design and technology; separate professional associations for architects; industrial companies and the state as sponsors; a great variety of manufacturing firms supplying such materials as steel, glass, and cement or providing specialized subsystems like elevators or lighting; construction subcontractors doing work under the coordination of the lead contractor; and the public, both as spectator and user of the resulting buildings. The new ideology, methods, and aesthetic of architectural modernism diffused triumphantly after World War II thanks to the institutional blueprint for the reconstruction of the organizational field that had been produced in Continental Europe during the 1920s under the influence of American engineering and scientific management.

DISCUSSION AND CONCLUSION

The founders of modernist architecture contributed decisively to the legitimate application of scientific management techniques to the construction industry. Moreover, the industrialization, mechanization, and Taylorization of architecture spearheaded by European modernism came together with the formulation of a modernist aesthetic whose impact transcended the organization of the building activity itself.
The scientific management content underlying modernist architecture has exerted a widespread, profound, and lasting effect on the people living, studying, or working in the myriad of Taylorized, machine-looking buildings that were erected during the booming 1945–1965 period on both sides of the Atlantic and that still dominate the configuration of the modern city, the industrial complex, and the university campus. The modernist architect pursued the ideas of regularity, continuity, and speed by applying the scientific principles of experimentation, analysis, standardization, and planning. Thus, scientific management unobtrusively invaded our homes and workplaces and, most importantly, the culture. Although the most utopian proposals of the European modernist architects were not realized, they succeeded at turning many of our buildings into efficient—and arguably beautiful—machines to live or work in. If architecture is a ubiquitous fact of life, then scientific management became truly rampant after the spread of modernist architectural design. Therefore, the impact of scientific management in contemporary society and industry cannot be thoroughly assessed without taking the modernist architectural revolution into consideration.

While formulating a theory of architecture centered around the Taylorized beauty of the mechanical, the European modernist architects made yet another unique contribution. They exposed scientific management’s aesthetic side in addition to its technical and ideological aspects. This organizational model has not ceased to arouse extreme passions ever since its inception almost a century ago. Its most zealous supporters and detractors may find it startling—or bizarre—that scientific management evoked a new aesthetic order. It is important to realize that scientific management is much richer and more complex as an organizational theory than either the cold proponents of its technical postulates or its unwavering critics generally admit. To be sure, scientific management has served as a draconian instrument of power and condemned many people to dreadful working conditions. The goal of this paper was not to extol scientific management but, first, to show how its impact in society has been more widespread than previously assumed by organizational researchers and, second, to demonstrate that an aesthetic message may be derived even from the most improbable of organizational theories. If the prevailing images of scientific management’s qualities and impact need to be revised, what are the wider implications for organizational research down the road?

A most tantalizing question for future research is whether one can expect other of our organizational theories to harbor the same potential for aesthetic reinterpretation as scientific management. Recent work has underlined that our discipline seems to oscillate between rational and normative approaches to work and organization (Barley and Kunda, 1992). In this view, scientific management belongs to a class of theories heralding rational, futuristic, and mechanical themes. Accordingly, the rise of human relations in the 1930s and 1940s could be further explored by reference to the naturalistic, nostalgic, and organic motifs expounded by architects and artists as well as management intellectuals in...
England, Spain, and some segments of the artistic community in the United States (Guillén, 1994). Some of the issues raised by the industrial welfare movement in the United States or in Great Britain could be reinterpreted in aesthetic terms, as could the Hawthorne investigations, which often addressed aspects having to do with the arrangement of physical space at the workplace (Biggs, 1996: 59–61). In the late 1960s and early 1970s a movement of “office landscaping” developed both in America and Europe in an attempt to make life at work more productive and satisfactory. The corporate culture trend of the 1980s may lend itself to a similar analysis. While the postmodern architecture of the 1960s through the 1980s entertained naturalistic and organic motifs, the linkage to such organizational approaches as human relations or corporate culture seems to have been rather weak. Whether other organizational theories correlate with different aesthetic conceptions in architecture deserves further empirical investigation.

One promising area for future research lies in the influence of electrical engineering and computer science on art and on organizational theory, beginning with the work of Herbert Simon. The “informational aesthetic” developed at the Ulm School of Design in Germany during the 1950s and 1960s and at Carnegie Mellon University’s Design Research Center during the 1970s has been traced back to operations research, systems analysis, and Simon’s theory of programmed design (March, 1981; Simon, 1981: 150–159; Lindinger, 1991; Demes et al., 1993; Kilduff, 1993; Selle, 1994: 290–300). More recently, electronic and cybernetic metaphors have become legal tender both in the field of organizations—the networked organization, the learning organization, the virtual organization, and so on—and in the visual arts with the new expressive possibilities offered by the electronic media, as evidenced by such developments as Silicon Alley in New York City or artistic production and consumption on the World Wide Web. Nowadays, both organizational theory and art seem to be emphasizing virtuality and networks, ideas that share in common their origin in electrical engineering and computer science. These emerging affinities between organization and art in the context of a revolutionary electronic age are intriguing enough to merit future empirical research, especially because the linkage between scientific management and avant-garde modernism was forged in the midst of an equally sweeping mechanical age. In either case, engineering seems to be the common denominator.

In general, the evidence and analysis presented in this paper opens a new area of discussion and research in the field of organizational studies. We have long neglected the aesthetic context of organizational behavior. Are job performance and satisfaction influenced by aesthetic factors, as Gropius suggested back in 1911? Are different authority structures consistent with specific aesthetic orders? Is decision making in organizations affected by aesthetic considerations in addition to ideological and instrumental ones? Do organizational cultures and occupational communities contain aesthetic elements? Research on organizational design, decision making, occupations, conflict, and leadership can benefit from an ex-
plicit consideration of the aesthetic dimension as a cultural variable, a possibility occasionally noted by some management theorists and organizational researchers (Ackoff, 1981: 39–45, 117–119; Strati, 1992; Darr, 1997: 25) but rarely brought to fruition. Future organizational studies on these topics could explore the impact of aesthetics not only with comparative-historical methods similar to the ones used in this paper but also with other approaches, such as survey research or ethnography.

Perhaps this paper will help to make one proposition about the field of organizational studies more widely accepted. It is the notion that organizational theories may have aesthetic as well as technical and ideological implications. This paper has rescued the modernist aesthetic message of scientific management from oblivion. An aesthetic is not necessarily a rational element, but it is a rationalized one, and it is as intuitive and emotional as it is pervasive in human character. People seem to yearn for beauty as intensely as they pursue instrumental methods and morally acceptable conditions. Our understanding of the inner logic of organizational theories, as well as of their effectiveness and impact, is likely to be enhanced by taking the aesthetic dimension into account.

REFERENCES

Abrahamson, Eric

Ackoff, Russell L.

Ahlström, Göran
1982 Engineers and Industrial Growth. London: Croom Helm.

Allen, James Sloan

Andel, Jaroslav

Baiies, Kendall E.

Banham, Reyner

Barley, Stephen R., and Gideon Kunda

Barr, Alfred H., Jr.

Barron, Stephanie (ed.)

Bayer, Herbert, Walter Gropius, and Ise Gropius (eds.)

Behrens, Peter, and H. de Fries
1918 Vom sparsamen Bauen. Berlin: Verlag der Bauwelt.

Bendix, Reinhard

Benevolo, Leonardo

Biggs, Lindy

Bohigas, Oriol

Boltanski, Luc

Bowler, Anne

Bowlt, John E. (ed.)

Brain, David

Braverman, Harry

Brooks, H. Allen (ed.)

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Hilberseimer, Ludwig  

Hitchcock, Henry-Russell, and Philip Johnson  

Jarausch, Konrad  

Jardi, Enric  

Jencks, Charles  

Jordy, William H.  

Julian, René  

Junghanns, Kurt  

Kaes, Anton, Martin Jay, and Edward Dimendberg (eds.)  

Kahn, Selin O.  

Kaye, Barrington  

Kidd, Martin  

Kisch, Karin  

Klingender, Francis D.  

Kopp, Anotole  
1965 Constructivist Architecture in the USSR. New York: St. Martin’s.

Krause, Elliott A.  

Lane, Barbara Miller  

Larson, Magali Sarfatti  

Le Corbusier, (Charles Edouard Jeanneret)  

Lindung, Hervert (ed.)  

Lissitzky-Küppers, Sophie (ed.)  

Lodder, Christina  

MacDuffie, John Paul  

Mackay, David  

Maier, Charles S.  

March, Lionel  

Markert, Werner (ed.)  

Maure Rubio, Miguel Ángel  

May, Bridget A.  

McLeod, Mary  

Merkle, Judith A.  

Milward, Alan S.  

Mitchell, B. R.  

Morgan, Gareth  

Mumford, Lewis  

Nerding, Winfried  

Nerding, Winfried (ed.)  

Neumann, Eckhard  

NGBK (ed.)  

Nolan, Mary  

Parkins, Maurice Frank  

Perrow, Charles  
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Schein, Edgar H.

Schumacher, Thomas

Scott, W. Richard

Selle, Gert

Senkevitch, Anatole, Jr.


Shenhay, Yehouda

Simon, Herbert A.

Smith, Terry

Solá-Morales, Ignasi de

Soria y Mata, Arturo
1894 Conferencia dada en el Ateneo Científico y Literario de Madrid. Madrid: Sucesores de Rivadeneyra.

1907 Buen Negocio. Madrid: Compañía Madrileña de Urbanización.

Starr, S. Frederick

Stites, Richard

Strati, Antonio

Sussman, Herbert L.

Tafuri, Manfredo

Whitford, Frank

Wingler, Hans M. (ed.)


Yates, JoAnne

Zevi, Bruno

Pevsner, Nikolaus

Plore, Michael J., and Charles F. Sabel

Placzek, Adolf K. (ed.)

Poggioli, Renato

Pommer, Richard, David Spaeth, and Kevin Harrington

Powers, Alan

Pozzetto, Marco

Read, Herbert

RFG (Reichsforschungsgesellschaft)

RFGWBW (Reichsforschungsgesellschaft für Wirtschaftlichkeit im Bau- und Wohnungswesen)
1929 Bericht über die Versuchsleidung in Dessau. Berlin: RFGWBW.

Savi, Vittorio
APPENDIX: Architects, Movements, and Organizations in the Six Largest European Countries

This appendix lists the ten most influential architects in France, Germany, Great Britain, Italy, Russia/Soviet Union, and Spain/Catalonia between 1890 and 1930. The country lists were generated from Benevolo (1977) and Banham (1980), two canonical studies of architecture during this period. Occasionally, urban planners or architectural critics were included among the ten most influential architects if their projects or writings significantly shaped architectural theory and practice in their country. I also used more specialized sources for each country to verify the judgments made by Benevolo (1977) and Banham (1980) or to complete the list of the ten most influential architects, as follows: France (McLeod, 1983); Germany (Lane, 1985); Great Britain (Pevsner, 1937); Italy (Etting, 1991); Russia/Soviet Union (Kopp, 1986; Bowlt, 1988; Cooke, 1995); and Spain/Catalonia (Freixa, 1986; Flores, 1989).

I assigned each architect a code depending on whether he welcomed or opposed mechanization and standardization in art and architecture and whether he explicitly accepted or rejected scientific management, under the assumption that endorsing the latter implied acceptance of the former. The resulting four-point scale is as follows:

- - Rejected against scientific management
- - Rejected against mechanization and standardization
+ Reacted favorably to mechanization and standardization
++ Reacted favorably to scientific management

Notes: *Cited by Benevolo (1977), bCited by Banham (1980); *Biographical entry in Placzek (1982).

France
++ Georges Benoît-Lévy (1880–1971), urban planner*  
+ Auguste Choisy (1841–1910), architect, engineer*  
++ Le Corbusier (Charles Édouard Jeanneret) (1887–1965), Swiss-born architect*  
+ Anatole de Baudoit (1834–1915), architect*  
+ Tony Garnier (1869–1948), architect*  
- Héctor Guimard (1867–1942), architect, designer*  
+ François Hennebique (1842–1921), architect*  
++ Maxim Leroy (1873–?), university professor, urban planner  
+ Auguste Perret (1874–1954), architect*  
+ Henri Sauvage (1873–1932), architect*  

Movements: Effort Moderne; Puisme (L’Esprit Nouveau); Cubisme; Dadaisme; Municipal Taylorism.

Organizations: French Garden Cities Association (1903); Société d’Entreprises Industrielles et Études (SEIE); Atelier des Bâtisseurs (ATBAT); Redressament Français (1925); Congrès Internationaux d’Architecture Moderne (CIAM, 1928).

Germany
++ Peter Behrens (1869–1940), architect, designer*  
++ Walter Gropius (1883–1969), architect, engineer, designer*  
++ Ludwig Hilberseimer (1865–1967), architect*  
++ Ernst May (1886–1970), architect, doctor in engineering*  
+ Erich Mendelsohn (1887–1953), architect*  
+ Hannes Meyer (1889–1954) Swiss-born architect*  
+ Ludwig Mies van der Rohe (1886–1969), architect, doctor in engineering*  
+ Hermann Muthesius (1861–1927), architect, doctor in engineering*  
++ Bruno Taut (1880–1938), architect*  
++ Martin Wagner (1885–1957), architect, doctor in engineering, professor*  

Movements: Modernismus; Internationale Architektur; Neue Bauwirtschaft; Magische Realismus; Neue Sachlichkeit.

Organizations: Deutsche Werkstätten (1906); Deutsche Werkbund (1907); Staatliche Bauhaus (1919); Research Society for Economical Construction Business (1920); German Committee for Economical Construction (1920); Committee for the Promotion of Clay Building Methods (1920); National Research Institute for Economy in Construction and Housing (1927).

Great Britain
+ Charles Robert Ashbee (1863–1942), architect, decorator  
- Walter Crane (1845–1915), architect, designer  
- Sir Ebenezer Howard (1850–1928), city planner*  

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- William Richard Lethaby (1857–1931), architect
- Charles Rennie Mackintosh (1889–1928), architect, designer
- William Morris (1834–1896), architect, painter, poet, writer
- John Ruskin (1819–1900), professor of art, architectural theorist
- Geoffrey Scott (1885–1929), art and architecture critic
- Richard Norman Shaw (1831–1912), architect, designer
- Charles F. Annesley Voysey (1857–1941), architect

Movements: Arts and Crafts; the Glasgow Movement; Preservationism; Garden City Movement.

Organizations: Arts and Crafts Exhibition Society (1887); Central School of Arts and Crafts (1892); Modern Architectural Research Group (1931); Council for Art and Industry (1934).

Italy

- Piero Bottone (1903–1973), architect
- Mario Chiattone (1891–1957), Swiss-born architect and painter
- Luigi Figini, (1903–1984), architect
- Enrico Griffini (1887–1952), architect
- Adalberto Libera (1903–1963), architect, diploma in mathematics
- Virgilio Marchi (1895–1960), architect, scenographer
- Giacomo Matte-Trucco (1869–1934), architect, engineer
- Gino Pollini (1903–1985), architect, studied engineering
- Antonio Sant’ Elia (1888–1916), architect
- Giuseppe Terragni (1904–1943), architect, diploma in physics and mathematics

Movements: Nuove Tendenze; Futurismo; Architettura Razionale.

Organizations: Fascist-Futurist Clubs; Partito Politico Futurista; Higher School of Architecture (1920); Gruppo 7 (1926); Movimento Italiano per l’Architettura Razionale (MIAR, 1928).

Russia/Soviet Union

- Yakov Chernikhov (1889–1951), architect
- Alexei Gan (1889–1942), architect, designer
- Mojsej Yakovlevič Ginsburg (1892–1946), architect, professor of engineering
- Vladimir Fedorovič Krinsky (1890–1971), architect
- Nikolai Aleksandrovich Ladosky (1881–1941), architect
- Ivan Leonidov (1902–1959), architect
- El Lissitzky (1890–1941), architect, studied engineering
- Leonid A. Vesnin (1880–1933), architect
- Viktor A. Vesnin (1882–1950), architect, engineer
- Alexander A. Vesnin (1883–1959), architect, engineer

Movements: Leftist Art; Rationalism; Constructivism; Productionism (Production Art); Projectionism.

Organizations: Narkompros (People’s Commissariat for Enlightenment, 1917); Proletkult (Proletarian Culture, 1917); Construction Committee of the Russian Republic (Stroikom RSFSR); Komiat (Communists and Futurists, 1919); Central Institute of Labor (TsIT, 1920); Higher State Artistic-Technical Workshops (VKhUTEMAS, 1920); Institute of Artistic Culture (INKhUK, 1921); Association of New Architects (ASNOVA, 1923); Left Front of the Arts (journal Lef, 1923); Union of Contemporary Architects (OSA, 1925).

Spain/Catalonia

- Félix Cardells i Avilés (1875–1919), architect, engineer
- Josep Domènech i Estapà (1858–1917), architect, Ph.D. in mathematics
- Lluís Domènech i Montaner (1850–1923), architect, politician
- Antoni Flórez (1877–1941), architect
- Anton Gaudí (1852–1926), architect
- Lluís Muncunill i Parellada (1868–1931), architect
- Josep Puig i Cadafalch (1867–1956), architect, physicist, mathematician, politician
- Antoni Puig i Giralt (1889–1935), architect
- Arturo Soria y Mata (1844–1920), writer, urban planner, engineer, entrepreneur
- Fernando García Mercadal (1896–1982), architect

Movements: Modernisme català; Noucentisme; Modernismo español.

Organizations: Company of the Urbanization of Madrid (1894); Civic Society of the Garden (1912); Grupo de Arquitectos y Técnicos Españoles para el Progreso de la Arquitectura Contemporánea (GATEPAC, 1930).