

## **FREDERICK W. TAYLOR AND JOHN R. COMMONS: TWO VIEWS OF SCIENTIFIC MANAGEMENT**

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### **ABSTRACT**

Taylor conceived Scientific Management as a method of reforming the workplace and, thereby, both industrial organizations and industrial society. His utopianism, individualism and naive view of science led him to attack many social institutions, especially those important to management and the workforce. Taylorism, as a reform movement, failed because these institutions successfully resisted change. But as an innovative approach to the control of organizational activity, Taylorism succeeded in ways that Taylor himself might not have wished. His methods of cost accounting played a significant role in the institutional evolution of the US corporation and in the wider transition from employer capitalism to managerial capitalism. Commons, who understood the institutional fabric of the US workplace better, attempted to save more of Scientific Management's original program. His arguments, which have been little considered, clarify why particular parts of Taylorism survive and prosper in today's 'managerial enterprise' and others have disappeared.

### **INTRODUCTION**

In the first part of this paper we consider the context of Frederick Taylor's work. Many management texts suggest that while he was not the only engineer trying to bring order to the workplace, there was little but industrial disorder before his time. Economic historians such as Chandler (1977) and Laurie & Schmitz (1987) showed that, far from being without theories of organization and management, businessmen already had quite definite ideas. So had their workers. These were reflected in the pattern of social institutions which gave meaning to their work and lives. Taylor often rejected these, and sought to change others. So long as we ignore these institutions, we have difficulty understanding some of the contemporary, and even today's, violent reactions to Taylor's work.

The central sections of the paper consider Taylor's solutions, successes and failures. Here we argue that, contrary to popular belief, Taylor's principal legacy is not 'time and motion' study. Though its impact was undoubtedly considerable, it was probably less than that of Taylor's cost accounting methods. Through his work on the development of managerial accounting Taylor played a crucial

role in facilitating the evolution of the US corporate form and thereby the transition from employer capitalism to managerial capitalism.

In the final section we note John R. Commons's attempts to update Scientific Management beyond Taylor's initial concepts, adding an institutionally sensitive view which could yet produce some of the industrial harmony Taylor sought. We use Commons's arguments to draw greater attention to the significance of the institutional arrangements of the time, both in the workplace and the larger socio-economy, and to Taylor's evident inability to deal with them.

## SCIENTIFIC MANAGEMENT IN CONTEXT

The period from 1850 to 1920 was one of rapid economic growth in the US and in much of Europe. Typically economists ascribe the US growth to (a) new technology, the development of powered automatic machinery which would do the work previously done by craftsmen, so creating new economic opportunities for unskilled labor to mass produce standardized articles, (b) new labor, an influx of ill-educated and unskilled immigrants eager to do whatever industrial work was available, (c) new infrastructure, an expanding distribution and transportation system linking a growing domestic and international demand to aggressive entrepreneurs along the Eastern seaboard, and (d) a newly expanded capital market making new investment capital available to a new generation of entrepreneurs. Organization theorists, following Chandler, pointed to the pivotal role of new administrative techniques, and to the emergence of a new cadre of professional managers. The underlying institutional changes have seldom been considered crucial.

The management historian's problem is to identify Taylor's part in and contribution to these changes. Taylorism is often considered the intellectual root of the new engineering view of work which brought together the factors above (Whitsett & Yorks, 1983:3). We know that the new factory system was conceived by engineers rather than by capitalist owners or economic theoreticians (Calvert, 1967). These engineers argued that the production process should be analyzed into its smallest elements, rationalized around the new technologies, measured using time and motion study, and so brought under their professional control. Economic efficiency became the goal and purpose of the organization. The human factors and social purposes were subordinated (Rose, 1975:32; Rabinbach, 1990). Given such results, naive modern writers often charge Taylor with deliberately creating mind-numbing production line work for ox-like workers (e.g. Morgan, 1986:31).

Such over-simplification obscures both the work situation and Taylor's impact. First, American mass-production techniques were widely appreciated by the time of the 1851 Crystal Palace Exhibition in London. Indeed, mass-production became known as 'The American System of Production' (Rosenberg, 1972:90). The division of industrial labor was already common in Adam Smith's and Eli Whitney's times, and the results of its extremes understood well before Taylor's (Commons, 1904; Habbakuk, 1962; Braverman, 1974). As the Ford executive Charles Sorensen attested, Taylor had little impact on mass production - which later became known as 'Fordism' (Whitsett & Yorks, 1983:81; Wood, 1989).

Second, Scientific Management fitted into a technological and professional ideology of social change spelled out earlier by Babbage, Perronet and Vauban among others (Merkle 1980:81). At the same time, both European and US workers were well used to technologically induced changes in the workplace, and to resisting them when they undermined their interests.

Third, there were wide differences between different industries (Chandler, 1977). Laurie & Schmitz argued that the mass-production and deskilling thesis was applicable only to textiles, having originated in studies of the UK Industrial Revolution (1981:48). The differences between the US East Coast textile and metallurgy industries, where Taylor worked out his system, were illustrated in the Philadelphia Social History Project (PHSP) reported in Hershberg (1981). Despite extensive use of power machinery: "the machine tender, whom traditional historians demote to the ranks of the semi-skilled, emerges in recent scholarship as a skilled worker in new clothing, exercising judgement in his work and some control over output" (Hershberg, 1981:52). The foreman's role also differed in different industries. Nelson noted that where there was mass-production machinery the foreman's role was much reduced. In the metallurgical trades, however, the work varied and the foreman was more powerful (Nelson, 1975:36; Nelson, 1980:7).

Fourth, the main growth in the size of industrial manufacturing organizations came after World War I. The naive 'textile paradigm' leads us to think that firms and factories were already large in Taylor's time. But in 1880 few, other than the mass-producers, employed more than 2,000 workers. Bethlehem Iron, at 2,600, was amongst the largest US concerns, while outside the steel and textile industries only the Baldwin Locomotive Works, with 2,600, was comparable (Nelson, 1975:6). Just as small firms are vastly more numerous today, so the PHSP reveals the preponderance of small firms in Taylor's time. Most were in a state of perpetual crisis as their entrepreneurs struggled to overcome powerful diseconomies of scale. Indeed ownership was seldom as profitable as being employed as a foreman (Laurie, Hershberg & Alter, 1981:105; Haines, 1981: 246).

Finally, the institutional context of Taylor's time is typically overlooked. In the metallurgical industries management/worker relations were dominated by (a) 'the labor problem' and (b) the foreman. The labor problem was that growing unrest which was the impetus behind unionism, local and national politics and, eventually, vast social and political change. It arose because social relationships, particularly those relating capital, craft and family were being sundered by economic and technological change. A new social class was emerging, structured around educated middle-class professionals. Especially after the Russian Revolution, those Americans with political power, such as the owners of industrial capital, were much exercised by the 'labor problem' and how it could be solved.

Within the workplace the foreman was the symbol of an institutionalized craft-oriented power structure. His kingdom extended from the decisions to hire and fire to the determination of the worker's task, workplace and behavior - even outside the factory (Taylor, 1911:51). Owners and managers were seldom intimately involved in the shop floor activities. They relied on the foremen to organize production, focusing instead on the external arrangements of their businesses and markets (e.g. Gantt et al, 1911:17). These owner/managers were more interested in establishing market power and restraints of trade than in more efficient methods of production. Their influence over competing firms was determined by their size, politics and rapacity. Thus they often sought to expand the number of employees in spite of the evident diseconomies of scale (Hershberg, 1981:88).

These diseconomies are crucial to understanding Taylor's eventual impact - which was, and still is, considerable (Merkle 1980). But it is difficult to see the precise linkages. The Braverman thesis, even as diluted by Rose, is that Taylor provided owners with new means to defeat labor's interests. By separating planning from execution Scientific Management shifted the balance of power from craftsmen to management. A context was created in which the risks of large scale capital investment in machinery were reduced, so opening the way to huge economies of scale. But the weakness of the thesis is that the evidence does not support the existence of such economies (in Hershberg, 1981:76). The notion that owners and managers used new technology to pressurize and dehumanize the workplace to achieve these economies of scale, or even to simply open it up to a population of ox-like unskilled and lower paid workers, does not stand up to close statistical scrutiny. It seems insufficient to explain either the actual changes in organizational practice, or the extent to which labor could have resisted these changes.

Chandler's thesis, that firms were somehow able to accelerate their throughput, regularity and quality and so expand their volume, has more appeal (Chandler, 1977:242). He pointed out that certain industries were able to adopt mass-production methods and concentrate well before the emergence of Scientific Management. The manufacturing process changes wrought by American technological innovations, the application of powered production and the resultant deskilling had already taken place. For instance, by 1886 Singer Sewing were able to supply three quarters of the total world demand from just two plants (Chandler, 1987:66). Standard Oil had concentrated one quarter of the world's kerosene refining capacity in three plants. Similar concentration had occurred in the food processing, chemicals and metals industries, as well as in machinery and transportation equipment. The same also occurred elsewhere, in the UK, Germany and Japan.

#### SCIENTIFIC MANAGEMENT'S ADMINISTRATIVE CONTRIBUTION

Chandler rejected the conventional capital-intensive economy of scale thesis and offered, instead, a theory in which administrative innovations were industrial growth's primary causes (1987:69). Even if they co-evolved, it was new administrative methods rather than new technology or capital investment that enabled the firms perfecting 'managerial capitalism' to tie together the emerging systems of supply, production, distribution and marketing to achieve high volume and regular rapid throughput. Instead of producing efficiency and scale economies, there was an economy-wide shift to monopolistic competition and the trusts, with prices set by price leaders and competition focused on winning market share (Chandler 1987:73). Such firms would have found Scientific Management useful where it facilitated further administrative innovation, enabled them to expand their scope and so increase their power over their competitors. It would only have been useful as a means to reduce wage costs more where price remained the primary mode of competition.

Many commentators have stressed Taylor's desire to build a complete 'system' that would involve both management and workers, and so bring them into a new relationship (e.g. Nelson, 1980:ix; Wrege & Greenwood, 1991:253). Such a system implies a specific theory of the organization. In Taylor's case, this has yet to be spelled out. Many organizational writers simply assume a convergence between Scientific Management and the more familiar theory of bureaucracy, treating each as a variation in the politically motivated application of economic rationality to administrative affairs (Braverman, 1974:86; Morgan, 1986:29).

If Chandler's thesis is correct, such over-simplification hides crucial aspects of both Scientific Management and bureaucracy. It is clear that mass-production technology can be applied to change

and control the patterns of power within and without the firm. But there are other means of control. Administrative means, such as bureaucracy, can be adopted where purely technical means cannot be 'embedded' in the physical structure of the workplace (Edwards, 1979:20). Thus the appeal of Scientific Management would vary, diminishing where the firm was in an industry amenable to control by technology alone but increasing where such purely technological control was not available.

The industries in which Taylor worked lay on the cusp between these two types. On the one hand he conducted thousands of belting and machining experiments extending over a decade (Nelson, 1980:37). This kind of production situation is highly repetitive and closely determined by the technology. Taylor's first ASME paper in 1893 offered a new theory of belting, and his machining steel patents were eventually worth a fortune. He was also an inventor and machine builder e.g. the steam hammer (Wrege & Greenwood, 1991). Thus he understood well how to use machines to control the production process. But such 'Fordism' was not his strength. His machines were frequently over-elaborate, and far from novel. Merkle pointed out that Taylor's primary interest in the ASME was that it enabled him to keep up to date with the work of machine and process inventors elsewhere - especially in Europe (1980:83).

On the other hand Taylor spent much time investigating work which could not be technologically constrained, such as the shovelling of all manner of materials and the purely manual work of loading pig-iron ingots. This is Taylorism rather than Fordism. He always used these as the principal examples of Scientific Management's power. He seldom referred to work situations which could be determined by the technology in use. Finally, his eventual \$75,000 investment in, and employment by, the Manufacturing Investment Company (in papermaking) taught him a great deal about the difference between the technological and administrative methods of control and about what could really be transferred elsewhere from his initial 'laboratory' at Midvale (Nelson, 1980:53).

In general, we should differentiate those parts of Taylor's work that resulted in new production methods and changes in the embedded technology, and those parts that opened up new administrative possibilities. It seems clear that he saw beyond his own industrial era and into post-industrialism as he realized that control through administrative systems and knowledge was of far greater significance than control through technology and Fordist methods.

Taylor's most influential and longest lasting contribution to Scientific Management grew out of the 'differential piece rate' system which was so successful at both Midvale and Appleton. The 1895 piece rate paper was recognized immediately as a seminal contribution to the entire labor problem

(Nelson, 1980:59). Chen & Pan, in their study of the specifics of Taylor's cost accounting systems, also reveal the existence of several unpublished Taylor manuscripts dealing with cost accounting from 1893 onwards (1980:17). Nelson and Merkle both stressed Taylor's general impact on the professionalization of managerial practice, but Chandler is somewhat more specific. He pointed out that Taylor was hired to introduce new cost and control systems for three of the Du Pont Company's plants (1977:438). Taylor thereby provided the young and inexperienced du Pont cousins, Pierre, Coleman and Alfred, and Russell Dunham, their senior accounting executive, with a new method of securing control over their operations (Chandler, 1977:445). Chandler also suggested that General Electric learned factory accounting from Taylor (1977:430). While the railroads also contributed to the development of cost accounting, Taylor argued that their methods were, in fact, elementary by comparison with his own (Copley, 1923 II:375).

The administrative innovations worked out by General Electric, and perfected by the du Ponts, created the second revolution in American Business, that of the 'managerial enterprise' (Chandler 1977:450). Thus Taylor's work on production costing, especially in the areas where the work was not susceptible to control by technology alone, was possibly the seminal contribution to what later became the hallmark of the American management method - tight financial control. This offered a new solution to the diseconomies of scale which bedevilled owners in Taylor's time and its solution led directly to today's larger organizations.

In short, Taylor was probably instrumental in creating modern cost control and, as a direct result, modern corporate organization. It also seems that it was this costing work, rather than his work on production methods, that was his primary source of earned income in the halcyon years 1896-1901. At the same time these earnings became increasingly irrelevant given his highly successful investment speculations, often in industries far from machinery (Nelson 1980:105). These successes enabled him to 'retire' from paid consultancy work. Only then, after the return to Philadelphia and the retreat to Boxly, did he shift his emphasis to the total system of Scientific Management. He began by writing up his evolving administrative prescriptions for wider publication as *Shop Management* (Nelson, 1980:116).

Taylor's costing scheme grew naturally out of the piece rate system. There were many piece rate systems in use, mostly unsatisfactory and resented. Most exacerbated 'soldiering'. Taylor's own shop experience suggested that a satisfactory piece rate system could be founded on measurements accurate enough to nip shop-floor disputes in the bud. Between 1881 and 1883, while still a foreman, he began tinkering with stop-watches and their use in rate-fixing (Nelson, 1980:41; Wrege &

Greenwood, 1991:52). Further experimentation led him to separate the tasks into the fundamental work steps or elements which could be timed separately. As is well known, he also realized that this would enable him to render a whole range of different production tasks comparable. Rate-fixing could then be applied more generally, even, by synthesizing the necessary collection of elements, to tasks that had never been previously undertaken and measured. These initial forays matured over several years, though a piece rate system based on timed measurements was first applied in part of the Midvale machine shop in 1884. There Taylor devised a 'standard' production output target. Those operators meeting or exceeding it earned a substantial bonus. But Taylor added a novel twist, those failing to meet target suffered a penalty, and were probably fired (Nelson, 1980:42).

#### SCIENTIFIC MANAGEMENT: METHOD OR SYSTEM ?

Taylor's system of production measurement was a foundation of managerial control on which many different kinds of organization could be built. The total system which Taylor conceived had several parts; task analysis and measurement, further analysis to discover the optimum method, equipment and job redesign to further increase efficiency, a differential piece rate system to relate wages to output, and a functionally specialized form of shop-floor administration. As Taylor and his co-workers attempted to apply this total system, it became clear that it was itself poorly synthesized, its parts were separable and of variable relevance. Few clients tolerated functional foremen. Chandler suggested that this feature failed to pinpoint the authority and responsibility for getting the work done (1977:276). Writers as varied as Church and Fayol said that such division of command could not work. At Appleton Taylor demonstrated that the piece rate system could be successful without changing the production system, with only rough job measurements. At the same time, the Taylor system's cost accounting elements were widely adopted. Once such statistics existed they could be put to a wide variety of uses, often little to do with the new industrial order Taylor envisaged.

All piece rate systems are based on the assumptions (a) that work can be measured and (b) that the worker is motivated by immediate economic interest. Clearly the Taylor system could be used to 'speed up' production in the same way as any other piece rate system. The challenge for management is to balance the incentive system's benefits against its equally considerable power to disrupt the organization. Output is inevitably mediated by the degree of co-operation, even under technologically constrained circumstances. Thus output would be likely to fall as the burden of poor performance is shifted from an owner paying a fixed rate onto an operative whose wage is both highly leveraged and not under his or her immediate control.

As Nelson noted, maintaining co-operation under any piece rate system depends on two features: careful rate-fixing and a reliable guarantee against rate-cutting (1975:45). Every worker who has ever experienced piece-work knows this. They also know that trust is fragile and that many other institutional forces influence co-operation. By drawing so selectively from his own shop-floor experience and by treating workers as de-institutionalized individuals, Taylor elevated these two features into the guiding articles of a new faith - his mental revolution. This not only transformed a technological attitude into an ideology, it also identified Taylor with the long tradition of Utopian American authors who sought a world in which technological progress could be reconciled beneficially with Republican values (Kasson, 1977).

The essence of Taylor's reform was to resolve the conflict between owners and workers by changing the meaning of work for both - as they both adopted his new ideology. What happened was far from what he hoped for. His methodology for measuring industrial work was widely acclaimed and adopted. But few implemented those parts of his total system that went beyond what could be incorporated into a costing system. The methods of Scientific Management, as they supported close financial control, were highly successful. The 'total system' of Scientific Management, the implementation of Taylor's ideology and resulting novel theory of the organization, was a failure. The puzzle over Scientific Management is to understand why the fate of its individual parts was so different. This puzzle is abandoned if the historian or analyst simply rejects Scientific Management or adopts it wholly.

#### SOME INSTITUTIONAL ASPECTS

Rabinbach argued that Scientific Management generated much more debate than the extent of its application warranted (1990). This was because it helped focus the longer running discussion about how industrialization was changing European and American society. Taylorism was merely one of many influences on this process. Traditional social attitudes, such as the hegemony of craft production, the workers' class militancy, and the Dickensian approach of the monied patronat were being displaced. These attitudes were institutionalized in the relations between capital and labor; between owners, managers and workers. The older administrative systems, such as 'contracting', allocated the financial risks in ways similar to highly geared piece rate systems. But they left the control of the production rate and quality on the shop floor. There the master craftsmen commanded work groups with strict hierarchy, highly traditional rites de passage, enshrined with symbols of language and dress. In short, in the workplace there was an institutionalized way of being, of providing for each other, of taking one's place in the micro-society of the factory, of defining one's

traditional enemies, of allocating power and rewards, of giving meaning to life. This was obvious in the time of the Guilds and in the training of craft apprentices. But the Hawthorne studies show that such institutions continue to exist informally.

Many of the new apostles of efficiency, having embraced the new technological ideology, dismissed these institutions as anachronisms and simply equated the old order with disorder (Nelson 1975:49). For them science was a practical faith, in the tradition of Saint-Simon. It would lead to a new social order in which traditional factional interests would be subordinated to rationality. Of course, those they sought to enlist to their cause saw these changes as threatening to destroy the institutional systems which made life tolerable. Thus the real argument about Taylorism was focused on the social and economic changes it suggested, particularly in the institutions surrounding life on the shop floor. The most threatening change was not that capital achieved a sudden new advantage in its traditional conflict with labor. It was rather that an entirely new source of authority appeared, threatening the institutional fabric that reconciled owners and workers, albeit uneasily. The foremen too were to lose their traditional status and function. The authority of science provided the engineers, a new group who called for new institutional arrangements, with the power to dominate the work-place. This power was further legitimated by the rise of the engineering profession, a new institution in industrial society.

Fayolism, which focused its changes at the senior management level and left the pattern of workplace authority relatively unscathed, drew less reaction. Fayol's criticism of the system of functional foremen in his review of Shop Management, revealed that he had no truck with the ideology of Taylor's total system (Fayol, 1949:68). Gilbreth, who later worked more in Europe, also resisted the temptation to reform the systems of administration. Similarly, the Japanese adoption of Scientific Management was eventually successful and hugely influential because the managers co-opted rather than rejected the workers' institutional structures (Greenwood & Ross, 1982; Nakagawa, 1992).

Most of Taylor's debates, such as the House Testimony, and his disputes with the unions and other experts, concentrated on the ideological and institutional components of the system. To his opponents the Taylor System was simply yet another piece rate system (Nelson 1980:12). The debate about such incentives and their place in industrial society pre-dated Scientific Management. It was also familiar to European critics such as Cadbury and Lahy, who were quick to fault Scientific Management (Hobson, 1913; Cadbury, 1914; Rabinbach, 1990:249). They simply recalled the classic works of Vauban and La Mettrie, and their view of the worker as an economically motivated automaton in perpetual competition with the entrepreneur for an expanded share of the profits.

While Taylor and his fellows might have believed in the objectivity of their 'science', the workers had no such illusions. They saw the engineers as the owners' agents, assuming that the engineers would abandon their claimed independence and align themselves with the owners. In Alifas's debate with Taylor, the labor leader went to the heart of the matter: "We can't see that this system has the ingenuity to change employers sentiments . . .(our) principal objection is that in the past one means by which an employee has been able to keep his head above water and prevent being oppressed by the employer has been that the employer didn't know just exactly what the employee could do." (Taylor & Alifas, 1921:148). Taylor also often remarked that nine-tenths of the problems with implementing his system came from the management side (e.g. in the Testimony, Taylor, 1964:153). Scientific management dislocated the institutional structure that held both management and worker together in their uneasy workplace relationship. The novelty in Taylor's system was that the subjective judgments which inevitably underpinned the measurement system were no longer being made by the operatives' foremen or the managers, but instead by the annointed high priests of a new industrial order. This might seem a very significant change indeed, but the workers knew that they were as subject as ever to the judgments of other groups whose interests were different to their own.

Taylor believed that his idea of science, which comprised observation and induction, would bring something new to the labor problem. Thus the really important debate, both before and after Taylor's death, was that between Taylor and Gilbreth over micromotion study (Nelson, 1975:66; Kijne, 1992). Despite Gilbreth's considerable personal commitment to Taylor, his work struck at the heart of Taylor's methods, questioning the way he dealt with the relationship between scientific accuracy and the interpreter's judgments. If there were serious doubts about the scientific integrity of the new faith, the hoped-for institutional order would collapse. If there was no substantial difference between the old-style foremen's judgments, or those of the owner/manager, and those of the new cadre of Scientific Management professionals about what constituted a fair day's work, the engineers would have to abandon their new professional position and visibly align themselves with one or other of the traditional contenders. Thus Braverman charged that the Scientific Emperor had no clothes and that these engineers were inevitably in the service of the owners and managers.

Taylor's response to Gilbreth's work on micromotion suggested he understood the threat. He was forced to confront what has proved increasingly troubling as our society is increasingly structured by technology i.e. that technology itself is a social product, not a privileged communication with reality. Taylor became both malicious and muddled, so much so that he decided first that he had really invented motion study and then that micromotion study was too precise and expensive to be useful.

Yet photographic motion analysis had been pioneered years before in Europe by Marey and Fremont (Rabinbach 1990:117).

#### COMMONS'S ATTEMPT TO RECONSTRUCT SCIENTIFIC MANAGEMENT

John R. Commons, six years junior to Taylor, is now best known as one of the leading labor historians and the father of institutional economics - currently the most vigorous area of organizational analysis. Commons greatly influenced Barnard and, thereby, American management thought (Simon, 1991:87). He began his career as a printer and unionist, then moved into the analysis of US working conditions (Commons, 1950). He became a leading member of the US Commission on Industrial Relations (1913-1916) which was designed to report of the nation's labor problem. In this capacity he visited Taylor and toured Link-Belt (Nelson, 1980:192).

Like Taylor, Commons believed the key to solving the labor problem lay in creating a certain kind of harmony between management and workers. But his view of American society was far from utopian. Nor did he believe that shared values, culture and meaning were the cement of industrial society. He argued that society's institutions provided the context in which all forms of social life and meaning are fashioned. Thus economic activity is structured by the way economic features such as property, individual rights, work and welfare are defined. This applies especially to the way conflicts of interest dividing owners and workers are structured by labor law, trade associations, the articles of apprenticeship, factory practice and similar social institutions. Commons saw unions as an important part of any modern society's industrial structure, for society had to both protect the workers from those with economic power over them and provide them with a stable framework for their interactions with firms' owners.

Like Taylor, Commons understood the need to redefine the foreman's role. Since this is so symbolic, maybe more symbolic than functional, changing it is of enormous significance. Commons saw the foreman's part in recruitment as especially inappropriate. While his intimate knowledge of the work could be used to select good workers, it more often became a form of patronage designed to sustain the foreman's power to control. Taylor's measurements could provide management with the knowledge necessary for them to take control of selection and training. Nelson saw this change, like the development of company-run welfare systems which similarly eroded the foreman's power to grant or withhold personal favors, as a critical aspect of the movement towards a new factory system (1975:79).

Commons argued that the pursuit of efficiency through the systematic analysis of workplace practice would not work unless accompanied by changes to the institutional apparatus. Only this would treat the worker appropriately, as a social being in an institutionalized context whose capacity for change would thereby be channeled in particular directions (1950). Only then would change be adopted willingly, without the exercise of economic or political force. Recruitment was certainly a key issue. Commons wrote: "Scientific management, applied to labor, passed through two stages: the older engineering stage, which dealt with individuals, and the newer personnel stage, that deals with committees and unions ... Mr Taylor's great contributions to scientific management were begun more than twenty years ago. Scarcely five years ago did employers begin generally to install labor or personnel departments in their factories. The deciding cause was labor turnover, with its newly discovered enormous expense to the employer. The discovery of labor turnover begins the employer's scientific study of the laborer as a man, where the older 'scientific management' had begun to study him only as a producer" (Commons, 1921:x).

Politically naive and from a privileged background, Taylor had little sympathy for the changing institutional fabric of US society. His extreme individualism was Horatio Alger-like. All forms of combination were odious. "When workingmen are herded together in gangs, each man in the gang becomes far less efficient than when his personal ambition is being stimulated ... they are pulled down instead of being elevated" (Taylor, 1911:73). Profit sharing was equally flawed: "the inefficiency of profit sharing schemes had been that no form of co-operation has yet been devised in which each individual is allowed free scope for his personal ambition. Personal ambition always has been and will remain a more powerful incentive to exertion than a desire for the general welfare" (Taylor, 1911:95). He placed efficiency above friendship as a young gang boss (Taylor, 1911:49). He was often anti-union (Taylor, 1911:187; Copley, 1923:II,417). He was also highly critical of the educational establishment, and of politicians and humanitarian gestures (Nelson, 1980:187). Thus Taylor seemed to reject every social institution he could identify on the morally fallacious grounds that he, thinking himself like any other working man, had made it on his own. All he demanded from others was an uncritical commitment to his kind of science. Hence the paradox of his belief that he was a friend to the working man - who immediately intuited Taylor as the enemy.

Commons understood the naivete of this view, and the futility of abstracting work from its institutional context on the grounds of economic efficiency. He wrote: "The older scientific management, as applied to labor, achieved its success in the scientific study of work and compensation for work, but placed too much reliance upon science as a means of restraining greed in the conflict of capital and labor ... The newer scientific management, which deals more or less

collectively with labor, takes its new policy from trade unionism ... That trade unionism is not a fixed or simple affair, but is as changeable and diversified as the industrial and governmental conditions which it endeavors to control or regulate." (1921:x). He saw that changing conditions demanded constant re-examination of the institutional context within which Scientific Management must function. His belief in the workability of this expanded approach to Scientific Management, both to the labor question and that of workplace power, was based on field research, a nationwide search for 'best management practices'. Turner's piece on the Plimpton Press illustrated the new form of scientific management successfully applied within a union plant (Commons et al, 1921:158).

Commons's theory of society, and of the organization, was based on 'trust'. But a trust which differed significantly from the naive ideological consensus which appealed to Taylor, and appeals even now to modern Utopians. Commons saw that every organization, just as every society, comprises divergent interest groups. Society is stabilized by the social institutions which protect the rights of one group against the interests and actions of another. In this sense trust is itself a social institution, and is empty when the various parties have nothing to disagree about. Commons probably considered the Utopian consensus which Taylor sought as a kind of totalitarianism, the subordination of the very divergence of interests and stabilizing institutional arrangements which are part and parcel of democratic society. Democracy, and the capitalistic system, is based upon a 'security of expectations' which could only be created by institutional practices matched to the social circumstances and uncertainties of the time. Thus Commons attempted to extract more of the useful parts of Scientific Management from Taylor's dystopia and bring them into the modern industrial world. He wished to go beyond Taylor's methods of work measurement, which he saw had been adopted already, towards a more fundamental solution to the labor problem.

## CONCLUSION

In this paper we have reviewed Taylor's principal administrative contributions and failures. By considering Commons's views of Scientific Management, we have been able to locate Taylor's work in a more institutional framework. We see that the principal reason for Taylor's failures was his direct confrontation with most of the institutional fabric that gave meaning to life in the workplace. By seeking to change too much, he failed to produce the most important of the changes he hoped for. The transformation of the shopfloor from a place traditionally structured and ruled by the arbitrary power of the foreman into a place ruled cooperatively by rationality and the scientific method did not happen. The institutional fabric in which both the worker and the management were embedded held firm.

Notwithstanding the failure of Taylor's 'total system', two parts of his program proved immensely influential. First, as is well known, time and method study eventually found its way into the majority of organizations. But this only happened after the engineering profession and production technicians had become legitimate in the workplace and the technology of work study had been significantly advanced.

In the meantime a much more far-reaching change had taken place. Cost accounting had given management a new tool with which to control organizations. This enabled them to turn their attention from managing their firms' markets to managing hierarchical structures and processes. As Chandler has underlined, this was a crucial step in the evolution of the corporate form, eventually leading to the almost global dominance of American accounting-based methods of managerial control. Taylor's part in this has not been adequately researched.

There remains the interesting question about why these larger economy-wide changes were able to occur while the more local changes within the workplace were so effectively resisted. Here Commons's analysis is suggestive. The institutional fabric on the shop floor was strong, and neither managers nor workers trusted the world which Taylor envisaged. They effectively co-operated in resisting change. But the macro-social situation was clearly more fluid. By merging, operating trusts, closing down or combining individual plants, and keeping the whole under increasingly tight accounting control, a new generation of managers were able to assemble vast enterprises. At the same time the control of the shop floor eventually passed from the local to the national level as the unions grew and became vast enterprises in their own right. Eventually both these new institutions began to interact with the larger institutional fabric of the nation, and so set the stage for the struggle for control in the first half of our century.

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