

***TAYLORISM RECONSIDERED:
THE IMPACT OF SCIENTIFIC MANAGEMENT
WITHIN THE AUSTRALIAN WORKPLACE***

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June 1992

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Working Paper no. 90
ISSN 1031-492X

Introduction

The dominance of Taylorism or scientific management in capitalist work has become an article of faith within academic literature. Despite significant debate amongst labour process writers over this issue, the new wave of post-Fordist thinking has once again reasserted the traditional primacy of Taylorism as a counter to new forms of work organisation which are claimed to be developing. Subsumed under a broader rubric entitled "Fordism", the principles of scientific management are said to have informed all types of modern work organisation. The overthrow of Taylorism has become a principal aim of post-Fordist advocates who foresee an alternative future of increased employee discretion, high skill and career paths for all (Carmichael, 1989; Mathews, 1989).

However how accurate is such a view? This paper argues that much of the post-Fordist literature relies upon an idealised reading of the past. Hence like Braverman (1974), post-Fordists view Taylorism as a universal strategy of deskilling in which craft control of the labour process was subsumed by managerial control. From an Australian perspective this argument appears based upon an uncritical adoption of overseas analyses of the history of scientific management and mass production. In Australia it is far from clear that scientific management ever assumed dominance as a general form of work organisation. The implications of this scenario would then seem to place the possibility of a universal transformation to a post-Fordist future into doubt.

This paper seeks to rectify some of the neglect in the study of the historical organisation of work in Australian industry. In particular it highlights the limited impact of scientific management practice as a dominant or general management strategy within the workplace. The paper begins by outlining some of the definitional problems of Taylorism, and briefly reassesses its relationship to broader changes in the organisation of capitalist production. The paper then goes on to outline the historical development of this concept as practice in Australian industry. Rather than becoming a universal strategy of management control, scientific management techniques enjoyed a relatively short-lived vogue, faced a variety of limiting factors and only attained a long-term impact in a minority of industries. The paper concludes by outlining the implications of these findings for current debates on work organisation and the need for a broader understanding of the management function.

Scientific Management: Some Problems of Definition

Few elements of management thinking have received as much attention from the academic community as scientific management. Since the rediscovery of Taylorism by Braverman in 1974, a mass of literature has evolved debating the relative importance of scientific management.¹ A significant reason underlying such debate, was Braverman's claim that the principles of Taylorism captured the essence of capitalist production and became the quintessential form of managerial control under monopoly capitalism. Other elements of labour management, particularly personnel and industrial relations practices were, Braverman argued, ancillary to the real control managers exercised over workers through scientific management. Hence quoting the management consultant Drucker, scientific management was viewed as "the most powerful as well as the most lasting contribution America has made to Western thought since the Federalist Papers" (cited in Braverman, 1974, 88).

Braverman's claim of scientific management dominance has been both criticised and supported by writers from a variety of backgrounds. A principal issue within this debate has been what is actually meant by the terms "scientific management" and "Taylorism".

Critics of Braverman, particularly from within the burgeoning "labour process" school, argued that he had confused management advocacy for scientific management with its actual implementation. Hence, Burawoy (1978) and Edwards (1979) argued that the impact of Taylorist techniques on the American shopfloor had been overstated, with Edwards going so far as to term scientific management a "failed experiment" (Edwards, 1979, 104). Similarly Stark (1980, 102–3) has argued that Taylorism should be seen "as the articulation of an *engineer's ideology* rather than as simply a development of capitalist management thought".

Earlier research by labour historians tended to support such a critical re-assessment. Hence, Palmer (1975, 32) argued that Braverman had "focussed too explicitly upon Taylorism, without appreciating the extent to which it was a movement limited in applicability and impact". Constraints on the application of Taylorism he argued included "idiosyncratic" employers, the ability of craft workers to maintain control over their work and production processes unsuited to systematic control. Similarly, Nelson (1975, 68–77) in a review of the activities of Frederick Taylor and his associates between 1901 and 1917, found only 46 firms which had introduced some form of scientific management practice, with the degree of implementation within these firms varying widely. Further support for a more limited view of the historical impact of scientific management was provided by Littler (1982, 99–145), in his

¹ A good review of the literature in this area can be found in Thompson, 1989, pp.126–132.

review of labour process developments in early twentieth century British industry. Far from being a dominant and general form of shopfloor control, Taylorism, he argued, was limited in its impact by the nature of industry structure, as well as worker and management resistance.

However, other writers criticised this more minimalist vision of Taylorism. Writing in defence of Braverman, Clawson (1980, 31–3) argued critics such as Edwards had misinterpreted the meaning of scientific management, concentrating on its "specific mechanics" and ignoring how it "marked a fundamental change in the control of the labour process". Rather than being a failure, Clawson argued, scientific management had had a far reaching influence within industry and could be seen within many features of contemporary management practice. Other writers such as Merkle (1980), Kelly (1982), Meiksins (1984) and Nyland (1987a, 1989), have supported the view of Taylorism as all pervasive within modern industry, linking it to a broader shift in capitalist work ideology. Indeed, Nyland has gone so far as to argue that not only was scientific management central to work organisation, but that its influence extended well beyond the workplace, encompassing more general concepts of management rationalisation and state economic planning. Hence Taylorism held the potential to not only benefit management but also workers (Nyland, 1987a, 69–81). Such a broadening of Taylorism has been supported by other writers who have argued such a concept is equally applicable in the home (Deacon, 1985) and through the dissemination of a unitarist workplace culture (Taksa, 1991).

Clearly these differing interpretations of the impact of scientific management relate to how such a concept is defined. Nor is this simply a question of semantics. In order to understand the history and indeed the contemporary nature of work, a clearer understanding of concepts such as Taylorism and their shopfloor impact is necessary. By adopting a broad definition which includes all forms of management planning or ideology, it is relatively easy to argue for the pervasiveness of Taylorism. In contrast if the definition is limited to the techniques and practices actually implemented, the impact of scientific management becomes far more problematic (Wood & Kelly, 1982, 74). In a review of this debate, Thompson (1989, 126–132) reasserts the argument that Taylorism in *general* terms has had an important impact upon management. However, as he notes there has been a failure by many writers to assess how such practice has been implemented, the variety of forms it can take and the relative importance of alternative or supplementary control strategies.

Despite these provisos, the recent post-Fordist literature has tended to uncritically accept the broader view of scientific management. For writers such as Kern & Schumann (1984), Piore & Sabel (1984) and in Australia, Mathews (1989), the claim that all forms of modern work are innately Taylorist provides the basis for their argument that new, "post-Fordist" forms of

work organisation are now emerging.² Like Braverman before them, post-Fordist writers define Taylorism in its broadest sense, equating it to all forms of deskilling and fragmentation of work. Hence, Mathews (1989, 22-3 & 89) argues that Taylorism provided not only an ideology that justified the expropriation of skill from the craftsman to a management bureaucracy, but that it also includes such features as external design control, job division, technological control, repetitive work, deskilling, work measurement, individualised control and minimal social interaction. Nor has such a view been limited to the halls of academia. Practical application of this debate in Australia has been apparent in the award restructuring process and the strategies of senior trade unionists who have equated Taylorism with all that is wrong with modern industry (Carmichael, 1989; Campbell, 1990, Toohey, 1991).

There are however a number of problems in adopting such a broad definition.

First, it becomes increasingly difficult to determine where scientific management begins and ends. At the extreme, all forms of management practice become sub-sets of Taylorism, and the concept loses all cogency. Such a limitation becomes particularly important when attempting, as the post-Fordists have, to delineate changes in work organisation from one form to another. If Taylorism equates to the division of the conception and execution of work, does this imply that any form of management hierarchy is a form of Taylorism?

A second problem in adopting the broad view is the danger of historical determinism. As was the case with much of the early labour process research, the adoption of broad concepts such as Taylorism, Fordism or monopoly capitalism, generalises and implies a uniformity that ignores the complexity of more detailed historical scholarship.³ As Whipp (1987) notes, the development of capitalism has been highly uneven, lacking the simple evolution from craft to factory to mass production that writers such as Braverman have professed. Business cycles and periodic crises of productivity have led firms to innovate, as well as revert and modify their methods of production and hence labour control. Further, there has been significant variation both between and also within different industry sectors. Hence:

"...any one sector may contain, at the same time, specialist and mass-market producers: firms therefore using craft techniques adjacent to those employing batch or more tightly synchronised mechanised production methods." (Whipp, 1987, 220)

² Some are more guilty than others in this respect. Piore & Sabel (1984, 46 & 141-2) in particular are far more circumspect in attributing a major role to Taylorism as the principal theory underlying modern work organisation. For example in discussing the rationalisation of French industry they note the importance of alternative management practices such as Fayolism.

³ For a recent and detailed critique of the limitations of such broad-brush economic history see Brenner & Glick, 1991.

This point has also been noted by Pollert (1988). Quoting Woodward's (1969) earlier research, she points out that production systems and hence labour processes may vary significantly from firm to firm, independent of size, industry or even types of technology. However, the broad vision of Taylorism allows no room for such diversity. Such an assumption of the generality of scientific management not only leads to the possibility of over-emphasising the extent of its importance, but also ignoring different forms of workplace control.

A third limitation of the broad vision of Taylorism is the cultural determinism implicit within such a concept. The vast majority of the work on scientific management (and mass production more generally) concentrates on the experience of American industry, which Regulationist theorists such as Aglietta (1976) view as an exemplary case of capitalist development. However there is much about the US economy (particularly its size, scale and dynamism) that from an overseas perspective emphasise its exceptionalism. As Littler (1982, 50) has argued, much of the literature on the history of work organisation has tended to merge the cultures and histories of different countries and assumed that practices dominant in one country are replicated in an unproblematic fashion in others. Not only does such thinking ignore different institutional and social settings, but it also assumes the process of dissemination to be unproblematic.

Given these problems, if one is to meaningfully trace the impact of Taylorism as a form of management *practice*, a reassessment of the concept is required.

The Practice of Scientific Management

As an initial starting point it seems clear that Taylorism did not simply equate to the division of the conception and execution of work, job fragmentation or deskilling. As Braverman himself argues in his review of the work of Adam Smith and Charles Babbage, these trends had been apparent in factory production well before Frederick Taylor appeared on the scene (Braverman, 1974, 70–84).

Increasing mechanisation of factory production enabled employers to take such sub-division and deskilling of work even further. As Nelson (1980, 5–6) notes such mechanisation had begun in American industry in cotton and woollen textiles and by the latter half of the nineteenth century had had a major impact in iron and steel, glass and machinery manufacture. Much mechanisation led to a reduction in the reliance upon craft skills. In

machinery manufacture this occurred through the use of increasingly specialised machinery and interchangeable components, beginning in firearms production during the first half of the nineteenth century and spreading in subsequent years to the manufacture of clocks, sewing machines, agricultural implements, locomotives, locks, ammunition, typewriters and bicycles (Rosenberg, 1972, 87–116). Technical innovation and mechanisation also played a significant role in job fragmentation. For example, as early as 1860 Cincinnati slaughter-houses were using overhead conveyors and an advanced sub-division of labour in the "disassembly" of pigs (Rosenberg, 1972, 109; Edwards, 1978, 115–6). Similarly, in the steel industry of the late nineteenth century, extensive mechanical innovation led to the demise of skilled workers in favour of semi-skilled machine operatives (Brody, 1960, 31–2). By the 1870s, Nelson (1980, 6–7) notes that the proportions of skilled workers in American industry varied from between 25 to 60 per cent in machinery manufacture, 20 to 25 per cent in iron and steel production, and 10 to 15 per cent in cotton textile factories. As a result, while the deskilling process was far from total in these industries, the trend towards the sub-division and fragmentation of work clearly preceded Taylor's innovations.

Nor was Taylor the first to attempt to systematise and organise production. As Litterer (1963) and Nelson (1975, 48–78) note, by the 1880s the development of administrative systems, production and cost control, and centralisation of decision-making were well under way in American industry. Systematic managers such as Henry Towne, Horace Arnold, Frederick Halsey and Henry Metcalfe introduced cost accounting systems, production and inventory control plans and various wage payment plans that sought to bureaucratise and impose "method" within large and increasingly complex enterprises (Urwick, 1956, 25–6, 29–30, 68–70). Similar processes of systematic management were also occurring independently in Europe, through the work of industrialists such as Henri Fayol and Hans Renold (Urwick, 1956, 21–4 & 48–50).

What then distinguished Taylor's system from this more general rationalisation of industry? Like other systematic managers, Taylor advocated the need for the engineer-manager to assume more control over the production process, to replace the "rule-of-thumb" with a management system. However, while he supported innovations in broader production control, Taylor's main emphasis focussed upon *worker* inefficiency. Taylor's fame rested on his claim of having devised a scientific method for determining a fair day's work and the "one best way" of performing a task. The distinguishing feature of such a system was the development of time study based work measurement and job analysis techniques through which work could be reassessed by management (Taylor, 1947, 46–60; Nelson, 1980, 38–44 & 58–61). Hence unlike engineers in the American steel and automotive industries who emphasised mechanisation as the major source of productive efficiency, Taylor tended to take

the broader production process as given and aimed to improve productivity by making workers behave in a more consistent and machine-like fashion.⁴

Following the work of Littler (1978, 189–192), the practical implications of Taylorism can be divided into four basic elements:

- (i) the principle of *task control*, that is the creation of a planning department to co-ordinate and standardise the production process;
- (ii) *functional organisation*, whereby supervisory roles were relieved of production planning duties;
- (iii) *time study* and the creation of a monitoring system;
- (iv) the development of *incentive payment systems* to motivate the workforce and gain acceptance of the new effort norms established through planning and time measurement.

Taking these features together Taylorism represented a new technique of *worker* control, based upon a bureaucratisation of the shopfloor.

However it is important to note that this framework represented an ideal. As a number of writers have noted of the early use of Taylorism in American industry, in only a few cases was Taylor's system of work rationalisation introduced in entirety (Nelson, 1975, 70–77; Edwards, 1979, 101). While Taylor in his later years went to great lengths to emphasise that the principles of scientific management amounted to a broader "mental revolution" in the process of management (Urwick, 1956, 75–6), employers tended to adopt a far more pragmatic approach, introducing those parts of the Taylor system which they felt were of most benefit and least cost. Hence, in the evolution of scientific management practice in the decades following Taylor, it was the techniques of time and motion study and wage incentives which engineers, consultants and managers emphasised in preference to the broader features of workplace control such as functional foremanship or planning departments (Nelson, 1980, 199–200). The popularisation of scientific management

⁴ Hounshell (1984, 225) emphasises this point in his comparison of Fordism and Taylorism. Hence in the famous anecdote of Schmidt the labourer, Taylor outlined how he had been able to dramatically increase output in the loading of pig iron through time study and wage incentives. By contrast, Ford's production experts saw the problem entirely differently and argued greater efficiency could be achieved by mechanising the entire process and doing away with manual labour altogether. Taylor did however have a major impact on machine shop production methods through a variety of technical innovations including high-speed tool steel (Clawson, 243–5; Nelson, 1980, 36–8).

techniques in later years by consultants such as Bedaux reinforced this trend (Layton, 1974, 382–3; Littler, 1982, 105–115).

While many writers have spent significant effort analysing Taylor's publications and personal experiences, relatively little attention has been paid to the subsequent evolution of these techniques and their international dissemination.⁵ As Wood & Kelly (1982, 80–1) highlight, in practice the relative importance accorded to each of the elements of Taylorism has varied considerably within different national frameworks. The following section examines the dissemination of these practices in Australian industry. How pervasive has this form of control been in this country and what factors have affected its implementation?

The Historical Development of Taylorism in Australian Industry

The first point to emphasise in discussing the impact of Taylorism in Australia, is that local industry lagged significantly behind its overseas counterparts in applying scientific management practices. In American industry, scientific work measurement based upon time study was applied in a broad cross-section of industry by the late 1920s (Baron et. al., 1986, 356 & 360–1) and had made a significant inroads into British industry by the mid 1930s (Littler, 1982, 99–116; Tisdall, 1982, 35–6). In contrast, few Australian firms in this period used time study and systematic job analysis, despite advances in the sub-division of labour in industries such as agricultural machinery manufacture, boot-making, clothing, and steel production (*AM*, 1/5/1926, 16–8; Frances, 1988, Wright, 1988).

Early innovators in Taylorist practices included the clothing manufacturer Pearson Law and the New South Wales Railways (Frances, 1986, 101; Patmore, 1987, 312–5). By the later 1920s, multinational subsidiaries in the automobile, rubber and electrical appliance industries had also developed such techniques. These included firms such as General Motors, Goodyear and Standard Telephones and Cables (Wright, 1990, 36–9). "Efficiency experts" provided another means through which scientific management techniques could be disseminated and during the early 1930s, Bedaux consultants introduced time study based incentives in several Australian firms (Wright, 1990, 39–41). However these examples of scientific management use were very much exceptions to the general industry rule. While management literature reproduced overseas articles on the use of time study and the Taylor system (*AM*, 21/10/1916,

⁵ While Merkle (1980) and Nyland (1989) pay particular attention to the international spread of Taylor's *ideas*, they tend to overlook the practical *shopfloor* implementation of scientific management. For a review of the development of Taylorism in the Soviet Union see Kossler & Muchie (1990). Examination of the practical application of scientific management in inter-war Britain is provided by Littler (1982, 99–145). See also Humphreys (1986) on early attempts to introduce Taylorism into French industry and Webster (1985) on the use of scientific management practices in the South African metal industry of the 1950s and 1960s.

10-12 & 12/1/1918, 22), and the state (through the arbitration system) acted as a strong advocate for such techniques (Nyland, 1987b, 34-6; 28 *CAR* 923), prior to the Second World War, the discussion of scientific management far outweighed its actual use.

Following the Second World War a variety of factors aided the broader spread of scientific management practices. The war itself led to a rapid modernisation of manufacturing industry, as new skills and techniques of quantity production were disseminated. Early innovators in mass production such as the automobile industry provided examples to industry at large of the benefits of systematic planning, job lay-out and production control (Hartnett, 1964, 130-154; GMH, 1945). This provided an environment more amenable for the use of Taylorist practices.

Changes in the post-war economy also aided the broader application of scientific management techniques. A sustained post-war economic boom and pent-up demand for consumer durables stimulated industrial management to adopt quantity production methods. Growing managerial professionalism also assisted the dissemination of more modern management practice. This was evident in the formation of professional management bodies such as the Australian Institute of Management (AIM), the publication of management journals, and the establishment of various forms of management education (Cochrane, 1985, 54; Rogers, 1965).

Further, the post-war period was marked by the greater role of multinational corporations and management consultants as agents for the dissemination of scientific management practices. Companies with overseas links such as GM-H, Ford, Chrysler, ICIANZ, Goodyear, Dunlop, Standard Telephones & Cables and Unilever developed extensive methods engineering and work study departments during this period. This provided a training ground for a growing group of Australian scientific management experts. A similar role was provided by the consultants, with firms such as W.D. Scott and PA Consultants developing direct links to the overseas scientific management movement and importing and applying work measurement and related wage incentive practices in industries such as textiles, clothing, footwear, paper, white goods, pharmaceutical and metal manufacturing (Wright, 1989; Wright, 1990, 108-113). By 1950, Australia had attained the dubious distinction of being only the second country outside the United States to have used the latest time and motion technique, Methods-Time-Measurement (MTM) (Porter, 1964). By the mid 1950s in industries such as textiles, methods engineers and work study officers had become the new elite of the management hierarchy. The use of such techniques was accepted slavishly by other companies eager to keep up with the latest management trend. In 1954 in an attempt by scientific management exponents to establish a professional standing, an Australian Methods

Engineers Association was established (later to become the Institute of Industrial Engineers) (AME, Dec. 1955, 14–17).

During the 1960s, the extent of use of scientific work measurement and incentive wage schemes broadened and a plethora of new techniques were introduced by consultants and multinationals (Smith, 1963; Fitzgerald, 1966). Attempts were made to extend time study to industries beyond manufacturing, such as road transport and mining (Bray & Rimmer, 1986, 446–7; Tsokhas, 1986, 143–8 & 173–193). Management consultants also disseminated Taylorist techniques for office and clerical work into banking, insurance and various government departments (Wright, 1989, 235; Pullen, 1964). By the later 1960s large organisations such as Qantas, the Commonwealth Department of Supply and the electricity commissions in South Australia and Victoria had developed scientific management functions (Kelly, 1984; Wright, 1990, 233–5).

The decades of the 1950s and 1960s then were boom years for the application of Taylorist techniques in Australian industry. Indeed, Cochrane (1985, 54) has argued that the scientific management movement in Australia at this time aimed to provide "complete control of the labour process and the total dispossession of labour's autonomy, mental and manual, at the point of production". However, despite the developments outlined above, it remains questionable whether Taylorism generally became a dominant form of management control on the shopfloor. A critique of Taylorist dominance in Australian industry can be based on several grounds.

The Extent of Application

Empirical data on the extent of use of scientific management practice is scarce. Surveys of production techniques in Australian industry have been rare and when conducted failed to examine the workplace implications of different production technologies.⁶ However, what quantitative data that does exist highlights the limited and variable impact of Taylorist techniques.

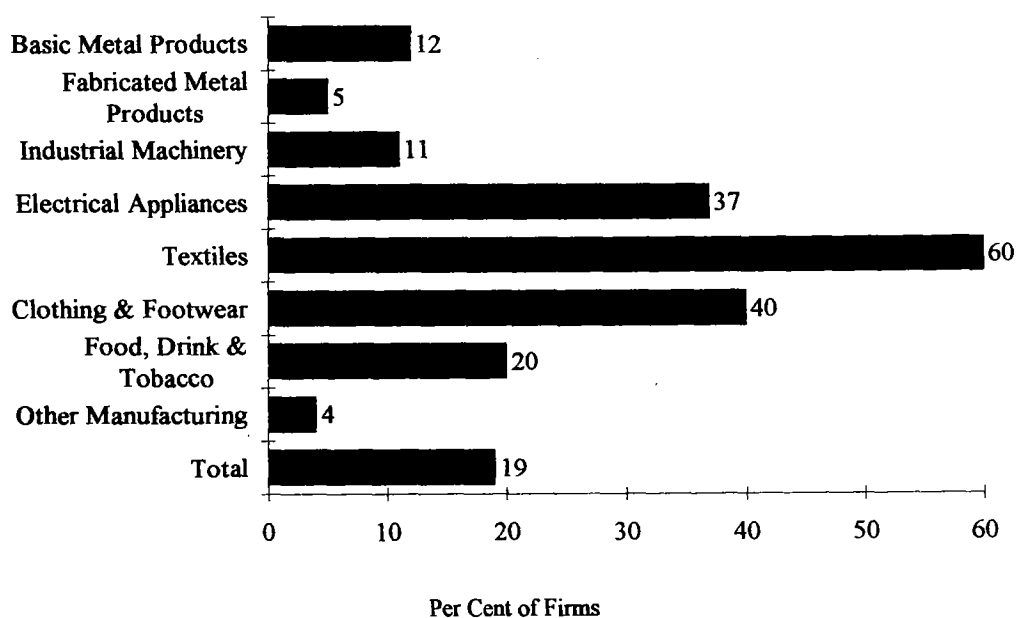
First, far from being a general strategy of labour control, Taylorist practices were used by only a minority of Australian firms and tended to be concentrated in particular industries. A survey by the AIM's Work Study Section during the early 1950s estimated no more than ten

⁶ An early exception to this is Mauldon, F. (1938) *Mechanisation in Australian Industries*, University of Tasmania, which provides some quantitative data on the capital intensity of various manufacturing industries.

per cent of companies used such practices (Scanlen, 1958). Such figures are supported by unpublished Department of Labour reports of labour management practice during the period 1948–1954. Compilation of this data suggests that as few as twenty per cent of enterprises used some form of scientific management practice (AA, SP 146).⁷ As can be seen from Figure 1 these techniques were most commonly found in labour intensive, semi-skilled manufacturing activities such as the textiles, clothing & footwear and electrical appliance industries. Outside these areas, far fewer manufacturers adopted systematic work measurement or job analysis.

Figure 1

Extent of Use of Time Study and Related Wage Incentive Payments, 1946-1954 - By Manufacturing Industry Sector



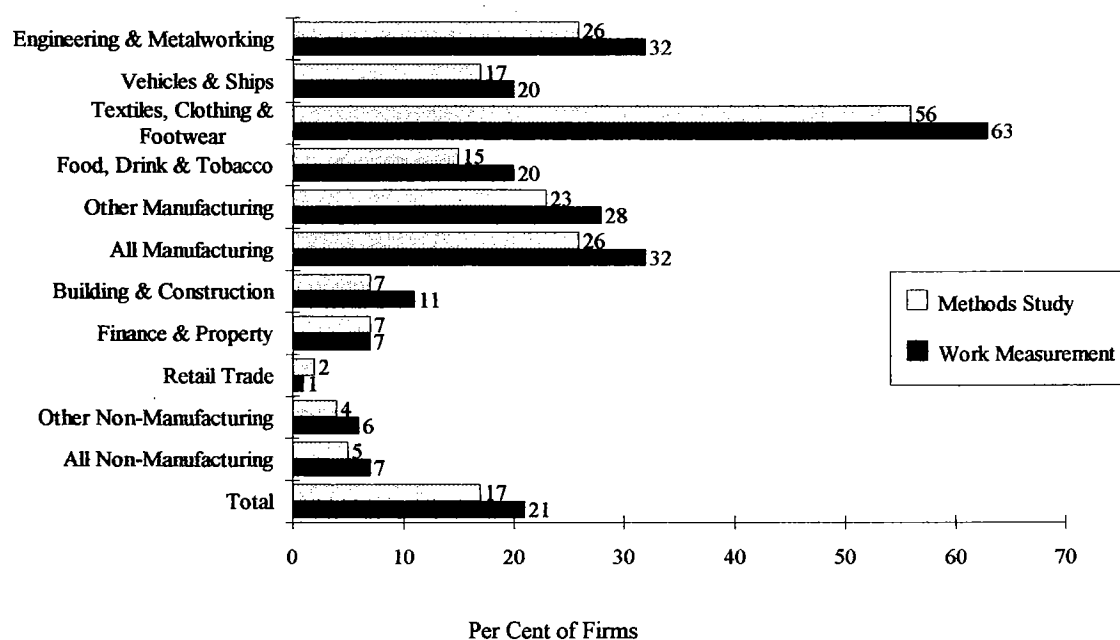
SOURCE: Records of the Commonwealth Department of Labour & National Service, (Australian Archives, Series SP 146, "Research Contact and Advisory Service Files").

⁷ Department of Labour & National Service researchers undertook detailed examinations of the labour management practices in over 200 manufacturing firms during this period. This estimate is based on the findings of 144 surviving reports held in the Australian Archives. These reports covered a wide selection of firms of different sizes and industries. Twenty-nine of these firms were found to use time study usually in association with a wage incentive scheme. Given that the survey concentrated upon known personnel innovators the figure of twenty per cent is likely to be an over-estimate.

Nor was such a situation limited to the early post-war decades. While there is little doubt the extent of application of scientific management practices such as work measurement and wage incentives increased during the 1960s, the impact of these techniques was highly uneven. Hence while one management journal in a survey of its readers in 1961 claimed widespread application of systematic work measurement practices,⁸ other more rigorous survey data suggests the shopfloor application of scientific management was far from universal. This is demonstrated in Figure 2, which is based upon Gunzburg's (1969, 1970) survey work on the use of wage incentives in Australian industry.⁹ As was the case with earlier years, these techniques were most common in the textiles, clothing and footwear industries. Outside this industry group however, scientific management practice was more limited in application.

Figure 2

Extent of Use of Various Scientific Management Practices, 1969 - By Industry Group



SOURCE: Gunzburg (1969) *op. cit.*, p.276; Gunzburg, (1970), *op. cit.*, p.16.

⁸ In a questionnaire survey of its readership, the journal *Australian Factory* estimating that as many as 50 per cent of its 300 respondents used some form of scientific work measurement (*AF*, 1/12/1961, 29-35). However the highly biased nature of the survey and the fact that the Journal was itself a strong advocate of such techniques, places the general applicability of such an estimate into doubt.

⁹ The survey sample consisted of over 1,300 private firms from a variety of manufacturing and non-manufacturing industries. While the study focussed primarily on the use of wage incentive schemes in Australian industry, it also considered the extent of use of various forms of measuring employee performance necessary in administering such schemes (Gunzburg, 1970, 15-7). While it is possible for management to use Taylorist techniques of work measurement and planning independantly of wage incentives, during the post-war decades the vast majority of Australian firms which used scientific management practices did so as a basis for such payment systems.

This was particularly pronounced in the non-manufacturing sector, with very few firms using these techniques in the building, finance and retail industries. While management consultants did expand the use of scientific management techniques into "white-collar" areas such as routine clerical work in banks and insurance companies, this was far from a general trend. In the public service for example, of far greater influence were bureaucratic concepts of administration developed well before the arrival of Taylorist forms of rationalisation (McCallum, 1984, 212-6).

Indeed, scientific management advocates were well aware of the limited nature of their influence. Articles in management journals criticised the failure of Australian industry to use their services more extensively. By 1959, one observer estimated there were about 1000 work study engineers in Australia, or one for every 800 factory employees. As he noted, this compared unfavourably with overseas examples such as West Germany which had 70,000 such engineers or one for every 110 workers (Hoch, 1959).

There were a variety of reasons underlying the far from universal impact of Taylorism in Australian industry.

Clearly, cost was an important factor for many firms. The hiring of consultants, employment of work study specialists, training of existing managers in the new techniques and establishment of a large administrative function to oversee the running of work measurement, methods study and related wage incentives was a privilege initially only larger companies could afford. As a result, these techniques were generally limited to the core producers in each industry, with dissemination to the smaller firms occurring gradually if at all.

The clothing industry provides a good example of this trend. Given the highly labour intensive nature of production and the fact that many producers had by the 1930s begun to sub-divide assembly operations, this was an industry that appeared ideally suited to the general use of Taylorist techniques. However only a few of the larger firms such as David Jones and Jantzen pursued this route (Ellem, 1989, 163 & 171; AA Series SP146, item 598/4/2). During the post-war decades the extent of use of work measurement, methods study and wage incentives in the industry increased. However the predominance of small firms (by 1946-7, over 75 per cent of clothing establishments employed twenty or less workers) and the competitive nature of the industry acted as powerful limiting factors on the wholesale use of such techniques (AA SP146, 575/1/10). The less than widespread use of time study in the clothing industry up to the early 1960s was demonstrated by the fact that in 1949 the Commonwealth Arbitration Court placed a ban on the use of stop-watches upon the basis that such new techniques caused serious irritation to workers and the clothing union (64

CAR 240). Indeed it was not until the 1960s that such practices started to become more generally applied in the industry and the ban on stop-watches was lifted (95 CAR 549 at 566; CATU Records; Ellem, 1989, 256 & 283).

Amongst the vast majority of small and medium sized firms, management continued to rely on the simple, personal control of the foremen or supervisor over production and worker output. For example even in the textile industry in which Taylorist techniques were most pronounced, while the consultants during the 1950s and 1960s made rapid inroads into the large manufacturers such as Bonds, Bradford Cotton and Davies Coop, most small textile mills continued to rely upon traditional supervisor control and piece-rates ("Sydney Woollen Mills P/L" AA, Series SP146, 575/6/7).

Nor were Taylorist practices universally applicable. While the consultants emphasised the wide range of work situations in which their techniques could be introduced (Fletcher, 1960), there were practical limitations upon the use of scientific work measurement in all industrial settings. In particular, detailed work measurement was less practical in highly capital intensive industries or those whose products were produced over longer periods of time. An early example of this was the Australian steel producer BHP, which in 1915 established a modern integrated steelworks at Newcastle based upon imported American expertise (Wright, 1988). While the production process of steel-making utilised advanced mechanisation and the best of systematic management practice (including a premium bonus scheme), the capital intensity of the works, team nature of many tasks, and long production lead times made detailed work measurement and job analysis less practical.¹⁰ During the post-war period, this situation contrasted with enterprises further down-stream in the industry involved in the fabrication and manufacture of specific steel products. Here labour intensive, sub-divided and repetitious work, did become the subject of time study, methods analysis and individualised wage incentives (interview Col Wass; Tubemakers Records.)

Labour resistance also played a role in limiting the impact of scientific management techniques in some sections of industry. In particular in metal engineering, unions such as the AEU strongly opposed the introduction of work measurement and wage incentives. Such resistance extended into the maintenance sections of large manufacturing operations. In firms such as Australian Paper Manufacturers and some of the factories of the Commonwealth Department of Supply, metal trade opposition to work measurement eventually resulted in

¹⁰ Time study in the form of a Bedaux system was used by BHP during the 1930s, but was limited to the machine shop (AEU/MJ, Aug. 1933, p.14 & Nov. 1938, p.18). While Stone (1974, 70-2) emphasises the role of Taylor in the rationalisation of the American steel industry through the use of wage incentive schemes, she tends to confuse premium bonuses based upon past production levels and the newer scientific schemes which used time study as the basis for setting new work norms. The limited use of time study has also been noted by Heron & Storey (1986, 219) in their analysis of the Canadian steel industry.

management backing down on the use of such performance monitoring for tradesmen (AEU/MJ Nov. 1952, 31, Oct. 1955, 6, Feb. 1958, 26; Kelly, 1984). While such opposition was largely limited to the metal trades and many production unions generally accepted time study and wage incentives, the extent of use of Taylorist work measurement was clearly lessened through such opposition (Wright, 1990, 195–221).

Degrees of Taylorism

Even within those firms that did establish scientific management functions there was significant variation in the degree to which such practices had a meaningful impact upon work organisation. As a result far from being an homogenous entity, Taylorism in Australian industry equated to a range of practices that had varying effects on the shopfloor.

At its most extreme Taylorism involved:

- a detailed re-examination of job methods in order to find the "one best way" of doing a job (methods study);
- measurement of the time taken in the completion of the job in order to establish new effort norms (work measurement);
- the training of workers in the new technique; and
- the establishment of a wage incentive scheme to act as an inducement for workers to achieve the new output targets established.

In a number of firms the successful introduction of this total package was achieved. For example, at the electrical appliance manufacturer STC, a motion study laboratory was established, where methods engineers filmed workers in order to analyse and redesign their assembly methods. Once the desired result had been achieved, a separate training "school" disseminated the new job method to the rest of the workforce, and work quotas for bonus payments were adjusted. In many cases this resulted in the reduction of work tasks to simple, repetitious motions and the worker to the role of automaton (Linton, 1947; STC Records).

However, such "full-blown" examples of Taylorism were far from typical. Here it is important to distinguish between what the advocates of scientific management said and what they actually did. Hence while one such practitioner wrote of the need "to bring the great

bulk of industrial operations within the range of the largest possible number of people with normal sensory-motor equipment" (quoted in Cochrane, 1985, 57-8) such a broad-based reorganisation of the labour process failed to be achieved. There were a number of reasons for this.

First, the attitude of employers themselves had a pivotal impact on the way in which Taylorist practices were introduced. While scientific management advocates emphasised their role as architects of job design (Harrison, 1962), post-war employers viewed their contribution far more narrowly. Most firms saw methods engineering and work study as tools for the introduction and administration of *wage incentives*, rather than a broader means of work rationalisation (Wright, 1991a). As a result while consultants would initially conduct methods studies and reorganise job layouts these tended to be one-off changes. In many cases firms failed to establish on-going reviews of job methods and the role of methods engineer reverted to the maintenance of time standards as a basis for the incentive scheme, and to placate worker disputes over alleged bonus inequities (interviews Allan Villiers, Bill Clews, Bob Rowland).

A second factor impeding the impact of Taylorist practice within the firm was the response of line managers. The rapid growth in popularity for scientific management techniques such as methods engineering and work study in post-war Australian industry, also resulted in significant resentment from production managers and foremen, who viewed such techniques as threats to their autonomy. One common response was for line management to attempt to undermine or sabotage changes introduced by consultants or methods engineers, for example by stirring up union or workforce conflict (Wright, 1989, 239).

Third, as noted above, Taylorist practices were generally limited to particular types of factory work. As Littler (1982, 114-5) has noted of British industry, scientific management in Australian industry failed to be applied as a form of craft deskilling. Within the firm this meant the application of scientific work measurement, job analysis and wage incentives were most commonly applied to labour-intensive, semi-skilled work which had *already* undergone significant job fragmentation or was originally organised upon a semi-skilled basis. While it is clear that methods engineers and work study analysts accentuated the deskilling process in these situations (Wright, 1989, 243-4), they were far less successful in their attempts to rationalise the work of skilled tradesmen. In the area of maintenance work for example, the spasmodic and varied nature of the work, made detailed work measurement and method study far more difficult and costly to apply. Further, as has already been noted, trades employees tended to be well organised on the shopfloor and ever alert to management attempts to dilute their work. Hence, while scientific managers did succeed in time studying

trades such as engineers, boilermakers and blacksmiths, further attempts at reorganising job methods usually met with strong and well organised resistance (interviews Col Wass, Hal Porter, Doug MacLeod).¹¹

A similar process occurred in "white-collar" work. While the management consultants successfully introduced such techniques in industries such as banking, insurance and various government instrumentalities, and the development of Organisation and Methods departments became relatively commonplace in such organisations (Grainger, 1956), detailed work measurement and methods analysis were limited to particular areas of the clerical workforce such as typing pools. Strategies of deskilling and fragmentation became less tenable in areas where managers relied upon employee discretion, and in these areas the scientific managers were left to oversee more generalised efficiency plans, such as Work Simplification techniques (Layton, 1960).

The variable impact of scientific management practices within Australian enterprises is demonstrated in Figure 3, which sets out the extent of application of time study based incentive schemes for various occupational groups. As can be seen, such techniques were most commonly applied to direct production workers and far more limited amongst maintenance, supervisory, technical, clerical and sales employees.

Finally, it is important to emphasise that Taylorism was not the only means by which Australian employers sought to gain greater control over their workforces. As the labour process literature has emphasised, managers can utilise a variety of strategies in order to maximise the production of surplus value (Friedman, 1977; Edwards, 1979). At the level of work relations in the majority of Australian firms, control continued to be exercised directly via line management, supervisors and foremen. The limitations of Taylorism were even more pronounced in the areas of employment and industrial relations. Principles of personnel management owed much more to the theories of human relations and the pervasive influence of welfarism (Patmore, 1991, 144-5, 149-50 & 153-4). Hence issues of employment, selection, training and communications remained relatively unaffected by scientific management practice.¹² Similarly, while consultants and methods engineers endeavoured to involve union representatives and workers in the implementation of work reorganisation in a number of firms (Wright, 1989, 240-1), the techniques of scientific management had little real effect on the pattern of management-union relations. Rather than being tied to a

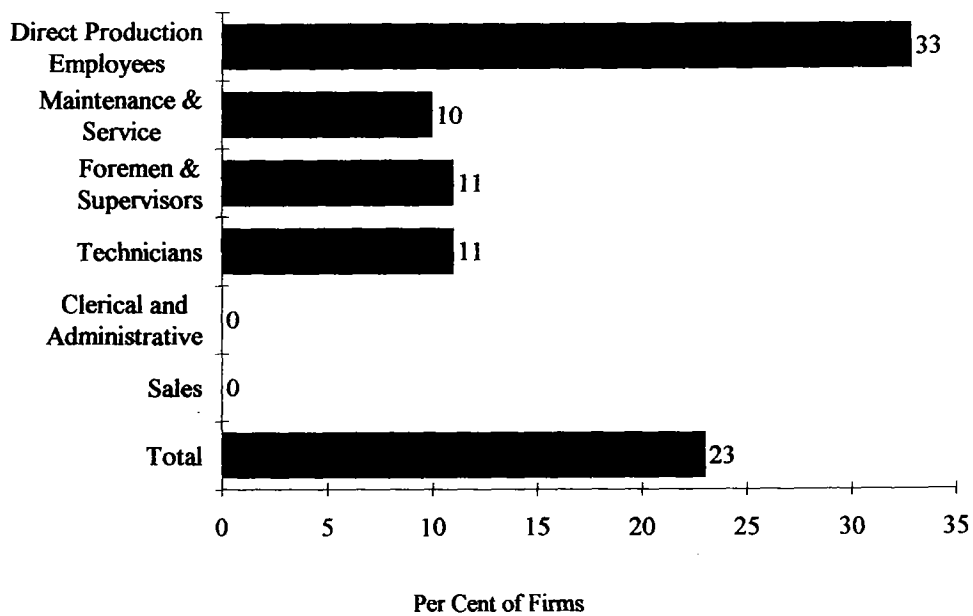
¹¹ A similar pattern of metal trades resistance to scientific management techniques occurred in South African industry during the post-war period (Webster, 1985, 71-93)

¹² Some manufacturing firms involved in semi-skilled assembly work did alter training practices in line with methods study and wage incentive practice (Wright, 1991b, 192-4).

particular management style, instances of scientific management application could be found equally within firms that adopted an authoritarian and unitarist approach as well as those with paternalist or even consultative styles (*SMW*, Feb. 1958, p.7; "Johnson & Johnson Pty. Ltd.", AA, SP666, item 54/695).

Figure 3

Extent of Use of Time Study Based Incentive Schemes, 1969 - By Occupational Group



SOURCE: Gunzburg (1970), *op. cit.*, p.11.

The Historical Specificity of Taylorism

Nor was the development of scientific management practice in the Australian workplace a static phenomenon. By the 1970s, firms which had been at the forefront of the introduction of Taylorist work practices were experiencing increasing problems with such bureaucratic shopfloor control.

Such limitations were particularly apparent in the operation of wage incentive systems based on detailed work measurement. A principal factor underlying the successful operation of such wage incentive schemes was the need to maintain the accuracy of time standards. Changes in production methods, the introduction of new technologies, improvements in worker performance due to increased experience, or even errors of calculation could result in time standards becoming "loose" or "tight". Such trends could result in industrial conflict or significant increases in labour costs. Evidence of these problems was demonstrated in one 1969 survey of wage incentive use, which found as many as 28 per cent of firms reporting industrial disputation as a result of such schemes (Gunzburg, 1970, 89).

Changes in production technology highlighted the demise of Taylorist practices in many industries. Originally conceived so as to make workers in labour-intensive production behave in a more machine-like way, mechanisation of production did away with the need for such "labour automatons" in many manufacturing processes.¹³ This trend was demonstrated in industries as varied as textiles, pharmaceuticals and chemical production. For example in the chemical firm ICIANZ, attempting to measure the work of employees in increasingly capital-intensive and discretionary work situations proved difficult. Attempts by the Company's work study officers to measure the work content of chemical process control room operators for the purposes of bonus payments met with practical difficulties. Unsuccessful attempts were made to measure the "mental effort" of these employees, before specific work measurement was abandoned and wage incentives based on more general criteria such as the overall efficiency of the plant, housekeeping and attention to log sheets (interview Ted Pahlow; Barrow & Cawley, 1975).

Changes in employee attitudes also had an impact here. While many semi-skilled manufacturing workers during the 1950s and 1960s had come to accept time study and work intensification as the price paid for weekly bonus payments, by the 1970s a new generation of workers with improved levels of education and heightened expectations had begun to reassess whether bonus payments adequately compensated them for the increases in effort involved.

¹³ The demise of Taylorist control techniques in favour of mechanisation and technical control has also been noted in the South African metal industry (Webster, 1985, 88-90).

Evidence of increasingly vocal worker resistance to increases in work intensity and inhumane working conditions had become apparent in disputes in the automobile industry during the 1960s and early 1970s (Arrowsmith & Zangalis, 1965, 44-60; Lever-Tracy & Quinlan, 1988, 250-8).

A reassessment of the efficacy of Taylorist practices was also occurring in sections of management by the 1970s. During this period, human relations theories of worker motivation, which had for some time competed with a more instrumental view of worker behaviour, became increasingly dominant (Nettle, 1990, 219-55). Within management literature emphasis was placed on techniques of employee participation and industrial democracy. For a growing number of Australian managers the concept of output-related wage incentives and detailed work measurement was seen as an out-moded and increasingly ineffective form of worker control. As the Jackson Committee of Inquiry into Manufacturing Industry noted:

"Among the industries studied there was general disillusionment among employers and unions with incentive payment systems...Many employers saw no use for them, primarily because they were not working to increase productivity but were creating additional opportunities for conflict." (Ford, 1976, 33)

One response for companies anxious to be rid of their costly wage incentive schemes was to "buy them out". This involved management absorbing bonus payments within flat over-award payments, in many cases with the active co-operation of the relevant unions (*SMW*, Oct. 1966, 5; Personnel Records, Email). In some cases this led to the paradoxical situation of workers berating union officials and management in their desire to retain the incentive scheme (interview Ray Gietzelt).

Where incentive schemes were ended, methods engineering or work study departments declined in importance, becoming absorbed within general production management or shifting to new areas such as quality control or materials handling (interviews Allan Villiers; Hal Porter). Such a trend had been foreshadowed in the automobile industry, where the technical control of the assembly line precluded the need for direct output based wage incentives. For example within GM-H by the mid-1960s, methods and work standards (the hallmarks of Taylorist control) were merely one function of the Company's Technical Engineering Department, which included production planning, machine loading, equipment engineering, plant layout, project control and tooling design and development (CCAC Transcripts, No.1357 of 1966).

Conclusion: Implications For Contemporary Debates

With the decline in the use of directly measured wage incentives in the manufacturing sector during the 1970s and 1980s, much of the rationale for explicit Taylorist control was lost. As had been the case with the introduction of these techniques, the timing of their demise was far from uniform or wholesale. In some sections of manufacturing they linger on. Hence in electrical appliance manufacture, time study based incentives have continued in a number of firms up until very recently. In the clothing industry where practical limitations to mechanisation prevail and work pace is still reliant on the manual dexterity of machinists, they are still dominant features of work organisation in many firms (Werner, 1990). Outside these examples however, the Taylorist model of detailed work measurement and corresponding wage incentives became largely discredited in Australian industry by the end of the 1970s.

As a number of writers have pointed out however, the broader implications of Taylorism continue today in a number of guises. Such "institutionalised Taylorism" can be seen in the manner by which work study and methods engineers have broadened their applicability within industry. For example, in large white-collar organisations such as banks, insurance and retail firms, this has involved a move away from simple work measurement functions alone, to a consideration of ergonomics, materials handling, work flow, and the introduction of new computerised technologies (Wishart, 1990; Lee, 1990; Dentry, 1990). The importation of new industries such as "fast foods" has also resulted in forms of work organisation in which Taylorist principles are still apparent (Reeders, 1988, 147–9; Dunford, 1992, 56–7). Within many manufacturing firms, industrial engineers are also involved in the introduction of new work organisation techniques such as Just-In-Time and Total Quality Control (IIE, 1988, 112–143). Indeed the extension of industrial engineering principles within these new production concepts and the continuation of detailed management surveillance of workers, has led critics of the post-Fordist paradigm to emphasise the continuity of such techniques with Taylorist prescriptions (Parker & Slaughter, 1988; Thompson, 1989, 228–9; Bramble & Fieldes, 1989, 9–11).

However, as this paper has emphasised it is important not to over-emphasise the generality of Taylorism. If the term is not to become a "catch-all" phrase for all forms of managerial control, it needs to be confined within specific limitations. As has been demonstrated, Taylorism as *practice* amounted to a number of fairly explicit managerial techniques which aimed (in the Australian context at least) to intensify manual labour. This was to be achieved through detailed re-examination and rationalisation of the work process, monitoring of worker performance and the use of positive financial inducements. However as has been

demonstrated this process was far from a general trend, nor was it the *only* way in which Australian employers attempted to gain greater control over the labour process. Unlike the situation in American and European industry, industrial engineering in Australia took much longer, and was generally less successful, in broadening its approach beyond incentive based work measurement and into production design and control. As a result, Taylorism as an explicit form of shopfloor control was limited to a particular phase of Australian industrial development.

However, despite the relatively short life of such techniques in most Australian industries, the term "Taylorism" has become ingrained within the consciousness of academics and trade unionists. Courses on management usually begin with a recitation of Taylor's principles, and the universal application of scientific management has become an article of faith amongst most observers. Upon this basis post-Fordist reformers argue that the dictates of new technology and market changes will force such "bad old days" of authoritarian, deskilled work to an end (Carmichael, 1989). However, a major problem with this line of argument is the degree to which a single strategy of management control (Fordism/Taylorism) has been generalised across all labour processes.

What is needed is a greater understanding of the *diversity* of management practice at the workplace. Taylorism was merely one strategy that Australian employers used in an effort to intensify production and maximise labour application. As this paper has demonstrated not all employers used such techniques and in many industries and types of work, scientific management techniques were limited in their impact. Nor was Taylorism necessarily a successful or lasting form of managerial control. While the post-Fordist debate has resurrected the concept of Taylorism as the source of craft deskilling and the degradation of work, such literature has tended to simplify and generalise historical reality.

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