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**The Construction of the Efficient Office: Scientific Management, Accountability
and the Neo-Liberal State**

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ABSTRACT

The office has been a central site of organisational planning, accountability and control since the 19th century. Yet it has been the subject of relatively little accounting research. Through the dual theoretical lenses of Foucaultian and Labour Process theories, this study employs historical photo-elicitation methodology to investigate the implementation of management control and accountability in the scientifically managed office which emerged in the US during the late 19th and early 20th centuries. Our analysis reveals the manner in which accounting records created new modes of disciplinary control and surveillance within the office and how accounting tasks were deskilled in a gradually feminised and mechanised office environment. We also witness the role of accounting in the physical structuring of office space through the assembly line arrangement of office furniture to facilitate paper flows and the installation of record keeping systems of surveillance. In addition, our visually derived historical account of these transformations in office administration allows us to reflect on some contemporary issues. The production line design and efficiency so promoted by scientific management served as a forerunner to the today's open plan office, as well as influencing contemporary office management philosophies such as Activity-Based Working (ABW). Furthermore, we seek to inform current debates on the role of accounting in contemporary neo-liberal society. In the history of the scientific office, we gain an early glimpse of the subsequent role that accounting comes to play within a neo-liberal agenda as a powerful technology of micro-measurement and micro management.

Keywords: Foucault, labour process, neo-liberalism, photo-elicitation, scientific management

1. Introduction

One of the most mundane, and yet significant, organisational settings is the office. This locale in which accounting is typically practised is often overlooked as a research site in its own right. Yet the humble office, whether in the guise of modest space or imposing global headquarters, has a rich history and one which is central to understanding the scope of scientific management, one of the most influential movements in organisational life. Today, the office as a site of accounting, accountability and management control has become for many organisations in the knowledge and service industries, the heart of organisational activity: the new factory. As Jeacle and Parker (2013, 1090) have argued, the office "has been the engine room of corporate governance, through the development of information and control systems". To understand and evaluate today's offices as sites of management control and accountability, we arguably need a more informed assessment of their historical precedents. Our critical assessment of contemporary office accountability and management control processes can benefit from an understanding of the historical influences that have shaped them. This can extend right through to our assessments of recent developments in Activity-Based Management (ABM) as well as Activity-Based Working (ABW) office design and management (Parker 2016).

In this paper, we examine a particularly transformative era in office affairs. The period from the late 19th century to 1930 witnessed a revolution in the internal administration of the American office (Litterer 1961, 1963). The American firm grew in size by 30% between 1904 and 1919 (Quail 2008, 129) and almost three million new clerical posts were created during the years 1900-1920 (Strom 1989, 63). This transformation was reflected physically in the morphing of the office from something akin to a domestic or club like arrangement to the iconic image of the skyscraper with all its accompanying corporate symbolism (Ford 1994). Many of these new office buildings adopted the modernist style reflecting the spread of scientific management principles to the field of architecture (Guillén, 2006). The period also witnessed increased pressure on such corporations for greater financial disclosure. As Radcliffe, Spence and Stein (2017) have noted, the early decades of the 20th century saw the launch of significant state-led programmes of corporate governance reform in the US.

However, there was more to this administrative transformation than a rise in office numbers and the architectural means of housing them. A new ideology emerged which soon came to dominate all aspects of organisational decision making. Following in the wake of a late 19th century discourse on eliminating waste through better systems (Litterer 1961), Frederick Taylor's (1917) scientific management principles quickly gained influence. Such was the popularity of Taylorism that it rapidly rippled out from factory floor to office administration and beyond. Through the pronouncements and publications of his ardent disciples, Taylor's core tenants came to revolutionise every mundane and minute detail of office administration (Strom, 1992, Yates 1989).

Despite the significant ramifications of this transformation, relatively little scholarly attention has been devoted to this period of office history. An important exception is Yates' (1989) seminal study of the rise of system in American managerialism. Within accounting, Cooper and Taylor's (2000) Labour Process perspective on scientific management is a rare contribution to understanding the implications of Taylorism for the office as opposed to the factory. Such neglect is surprising given the wealth of material devoted to scientific management within accounting history and more generally. Indeed, scientific management has been a topic of heated debate within accounting scholarship, played out most prominently in the opposing positions of the Foucaultians and Marxists. Some context is useful here. Two ideological stances in particular came to the fore: one drawing upon Foucault's (1979) concept of disciplinary power, and the other informed by a Marxist view of capitalism and the Labour Process¹. While clearly differing in theoretical perspectives, both approaches represented a more 'critical' interpretation of accounting history than had gone before: an interpretation which came to be known as the 'new accounting history' (Miller, Hopper and Laughlin 1991). Both approaches also shared a common research domain in the sense that their field of focus was the manufactory. For instance, the two seminal studies which typify the two theoretical stances, Miller and O'Leary's (1987) examination of standard costing and Hopper and Armstrong's (1991) critical assessment of cost accounting, both concentrate on scientific management practices within the context of manufacturing operations.

The core objective of this paper is to examine accountability and management control implementation in the scientifically managed office of the late 19th and early 20th centuries through a dual Foucaultian and Labour Process informed photo-elicitation of office images of the period. In doing so it broadens the scope of our scholarship on scientific management beyond the confines of the factory floor to the arena of the office. Drawing on archival web repositories of office photos, published office texts and manuals of the era, and historical photos reproduced in contemporary texts, we capture the comprehensive array of procedures and routines inherent in constructing the 'scientific office'. We provide this visually derived account by applying the methodology of photo-elicitation (Parker 2009) to 145 images that reflect the transformations in office administration during the period from the mid-1850s to 1930. In framing this visualisation through the two theoretical lenses of Foucault and Labour Process we seek, as Fleischman (2000) has advocated, to employ two ideological positions which, while opposing in manifest focus, provide complementary critical insights into the manner in which scientific management principles were implemented. Each perspective offers a critical understanding of a particular aspect of the 'scientific office', which taken together provides a more comprehensive view and critique than each can offer alone. For example, through the Labour Process perspective, we witness the deskilling of the traditional role of the bookkeeping function with the advent of new posting and calculating machines, whilst the Foucaultian lens yields insights into how accounting records offered management new modes of control and surveillance. By drawing on both perspectives we can also suggest the role of accounting in actually structuring the physical layout of the office space. The assembly line arrangement of office desks, resonant of the Labour Process perspective, was designed to facilitate the flow of the paper record, whilst the storage systems for the Foucaultian modes of recording and surveillance often dominated the office working environment. In addition, our analysis of the historical imagery of the office vividly reveals the highly gendered nature of clerical work that manifested during the early decades of the 20th century, a gendering which continues to this day. Our study consequently offers further insights to the history of women's role in accounting activities more generally. As Loft (1992) has argued, understanding gender issues in accounting involves not just the study of the accountancy profession but all those engaged in accounting related practices. Overall, therefore, our paper seeks to examine both the role of accounting in the deployment of scientific principles and also the impact of such new initiatives on the daily tasks of clerical and bookkeeping staff. By doing this through the alternative methodology of photo-elicitation, we hope to contribute to a rich understanding of the nature of accounting work, and those who conducted it, in the context of the scientific office of the early 20th century.

The paper has two further, more minor, objectives. First, we reflect upon this early period of the scientifically managed office as a predecessor to the recent rise in the phenomenon of Activity-Based Working (ABW) within the modern office and we examine the ramifications of scientific management for present day office design and

¹ An illustrative example of this ideological debate is found in a 1994 special issue of *Critical Perspectives on Accounting* (issue 5).

management philosophies. Second, we contribute to contemporary debates on the role of accounting in neo-liberal society. As Chiapello (2017, 47) has remarked, the word ‘neoliberalism’ has become “part of the critical vocabulary” and hence has become a common component of critical accounting discourse². Much of this discourse is theoretically informed by either a Foucaultian or Labour Process perspective. For example, Foucaultians view neoliberalism as a form of liberal governmentality – an apparatus of power that creates the calculable governable subject (McKinlay and Pezet 2010). Accounting metrics facilitate such governance by targeting the conduct of individuals and encouraging the pursuit of individual and collective goals (Carter and McKinlay 2017). By contrast, scholars such as Armstrong (2017) and Cooper (2015b) view neoliberalism as a form of capitalism and accounting a technology that enables human capital to be valued, monitored, measured and ranked. In this paper, our visual analysis of the office witnesses the dawn of a new management control regime based on micro-measurement in which accounting technologies increasingly came to play a key role. Hence, in a “gesture towards the present” (Miller and O’Leary 1987, 255), we suggest that the technologies of measurement and recording that accompanied scientific management are central to understanding the rise of neoliberalism and accounting’s role in it.

The remainder of the paper is structured as follows. We first provide an overview of extant historical accounting scholarship on the subject of scientific management. This discussion concentrates on the two opposing theoretical stances adopted by Miller and O’Leary (1987) and Hopper and Armstrong (1991). We also supplement this seminal debate by considering the influence of these two opposing theoretical positions on subsequent accounting scholarship. The next section considers one particular arena of scientific management which has been relatively overlooked by accounting historians: the office. Drawing on published texts from the era, we outline the range of initiatives introduced into the office in the name of scientific principles. We also highlight the transformative effects of a scientific approach on the office as a gendered space. Our photo-elicitation methodology is outlined in section 4. In section 5, we analyse our office imagery through the two theoretical lens deployed by Miller and O’Leary (1987) and Hopper and Armstrong (1991). We find aspects of both the Foucaultian and Labour Process approaches reflected in our photographic sample, which following Fleischman (2000), leads us to conclude that both ideological perspectives can shed insights into this particularly innovative time in office organisation. In the final section, we consider the ramifications of scientific management for the contemporary office and the rise of ABW. We also reflect on the continued relevance of the Foucaultian and Labour Process perspectives as evidenced by the current debates on the role of accounting in contemporary neo-liberal society.

2. Scientific Management and Accounting Research: Theoretical Conflict and Debate

Scientific management has proved a fertile ground for accounting historians. For example, the influence of scientific thought, and its accounting implications, has been investigated within the context of the French Renault factory (Bhimani 1993), the US department store (Jeacle and Walsh 2002), and the British and Australian household (Walker 2003a; Carnegie and Walker 2007). Parker (1984) and Parker and Ritson (2005ab; 2011a) have explored the work of Henri Fayol, Mary Parker Follett and Lyndall Urwick and their contemporary impacts. The influence of classical management concepts on contemporary accounting has also been explored (Parker and Ritson 2011b). And more recently, scientific management’s influence upon the historical and contemporary office has been investigated by Jeacle and Parker (2013) and Parker (2016). Unlike the debates which raged over the chronology of cost accounting³, there has been, as Fleischman (2000) observes, a consensus with regard to the importance of scientific management to the field of management accounting. However, the advent and subsequent significance of scientific principles has been understood from two contrasting ideological positions typified by the Foucaultian approach of Miller and O’Leary (1997) and the Marxist (Labour Process) stance of Hopper and Armstrong (1991). We outline both perspectives and their legacy on accounting research below.

Scientific management: The Foucaultian perspective

The work of the French theorist Michel Foucault has had a profound impact on the philosophical and social sciences. In his genealogical writings, most notably the seminal *Discipline and Punish* (1979), Foucault examines

² For accounting scholarship in this area, see Cooper, Graham and Himick (2016), Dillard and Vinnari (2017), Jupe and Funnell (2015), Morales, Gendron, and Guénin-Paracini (2014) and Morales and Sponen (2017).

³ For example, representing the Neoclassical tradition, Fleischman and Parker (1991; 1992) argued that the roots of cost accounting lay in the British Industrial Revolution. By contrast, Foucauldians Hoskin and Macve (1988) suggest that the initiatives in the Springfield Armory in the US during the 1830s and 1840s represent a key time and place.

the inter-relations between the body, power and knowledge. Using the context of the prison, Foucault explains how the process of hierarchical observation enables knowledge and power over the body. The concept of disciplinary power is central here: surveillance creates a visibility that identifies the deviant and normalises the rest of the population into ‘docile bodies’ (Foucault 1979, 177). Foucault’s work gained popularity within accounting research because it provided an apt way in which to explain the power of accounting, and in particular, the influential role of management accounting practices (Hopwood 1987; Hoskin and Macve 1988; Loft 1986).

The Foucaultian approach to scientific management is provided in Miller and O’Leary’s (1987) insightful work on the emergence of standard costing and budgeting practices during the early decades of the 20th century. The practice of standard costing and variance analysis is regarded as one of the innovations of the scientific management movement (Solomons 1968). By adopting a Foucaultian genealogical perspective, Miller and O’Leary (1987) argue that standard costing initiatives must be understood within the context of a discourse on national efficiency that dominated the late 19th and early 20th centuries, a discourse in which Frederick Taylor played a central role. Hence, the link between standard costing and scientific management was an alliance which simultaneously allowed individual actions to be made visible and efficiency to be made operable. As McKinlay et al (2010, 1015) observe:

The complex formed by those twin technologies of government was linked to developments beyond the firm. For at the same time that standard costing and scientific management were seeking to standardise and normalise economic life within the firm, parallel concerns about citizenship and national efficiency were generating new state-led forms of social statistics.

The changing nature of work within the firm is also crucial to understanding the emergence and scope of standard costing. Traditionally, manufacturing operated on the basis of internal contracting such that all aspects of work were in the control of skilled artisans. In the transition to the scientific corporation, labour became contracted on the basis of time rather than task. Such changes “constructed a new notion of the ‘employee’ (McKinlay et al 2010, 1024), and one who required constant supervision and control. For Miller and O’Leary (1987), standard costing was a means of achieving this control; it enabled the governing of the individual worker by making their actions calculable. The innovation of standard costs, suggest Miller and O’Leary (1987, 242)

... made it possible to attach to every individual within the firm norms and standards of behaviour ... with this step the possibility of a knowledge of every individual within the enterprise was established. A visibility and an allocation of responsibility could be attached to the individual.

In this manner, both efficiency and inefficiency within the firm could be traced to each worker. Deviations from the norm could be instantly identified and rectified. From a Foucaultian perspective therefore, accounting in the form of standard costing is a powerful tool within the organisation and beyond. “It is a constitutive element in a form of normalising socio-political management whose concern is with rendering visible all forms of activity of the individual in view of their contribution to the efficient operation of the enterprise and of society” (Miller and O’Leary 1987, 240).

Deploying Foucault’s concept of disciplinary power, a range of authors has illuminated the surveillance potential of accounting and the manner in which it creates visibilities within the organization⁴. Another strand of accounting research has engaged with Foucault’s work on governmentality (1991), as further elaborated by Peter Miller and Nikolas Rose (Miller and Rose 1990; Rose and Miller 1992). This seeks to link the micro techniques of accounting to a broader economic and social program of government⁵.

Scientific management: The Labour Process perspective

Marxism has similarly left an indelible legacy on accounting scholarship⁶. The Labour Process explanation of scientific management is proposed in Hopper and Armstrong’s (1991) seminal paper, and subsequently in Cooper and Taylor’s (2000) work on the gendered division of labour in clerical work. Both studies draw on the arguments

⁴ See for example, Himick (2016), Jeacle and Walsh (2002) and Walker (2010; 2014).

⁵ For accounting scholarship in this vein see Carter and McKinlay (2017), Graham (2010), McKinlay and Pezet (2010), McKinlay and Pezet (2017), Neu (2000), Preston, Chua and Neu (1997), Radcliffe (1998; 1999), Radcliffe, Spence and Stein (2017), Rahaman, Neu and Everett (2010), Richardson (2009) and Spence and Rinaldi (2014).

⁶ See for example, Bryer (2000, 2006, 2012, 2013a, 2013b, 2016), Cooper (2015a), Cooper, Coulson, and Taylor (2011), Gallhofer and Haslam (2016), Sikka (2011), and Toms, Beck and Asenova (2011).

of Marx and Braverman (1974) and view scientific management as a means by which management exert control over labour in capitalist organizations.

Hopper and Armstrong's (1991) paper was a direct response to the economic rationalist stance articulated by Johnson and Kaplan (1987) in their *Relevance Lost* book. In particular, Hopper and Armstrong criticised the evolutionary approach taken by Johnson and Kaplan to explaining the development of management accounting from 1850 to 1930. In contrast to such a transaction cost stance, Hopper and Armstrong suggest that a Labour Process framework is a preferable lens to capture the conflict and class struggle during this period of economic history.

At the heart of the Labour Process perspective is the deskilling of labour as a result of scientific management. In other words, the application of Taylor's scientific principles leads to a division of labour such that the knowledge and power of the worker is eroded. Management take control of the type of task to be undertaken and the pace at which it is to be achieved. Traditionally craft labour was enshrined in both the hands and minds of the worker. It was a skill built up over time through a process of apprenticeship. Attempts to move to a system of piece rate work, in order to increase output, failed in this scenario as only workers themselves were privy to the exact times required for each labour task. Consequently, as Taylor (1911, 49) observed, management were ignorant of "what really constituted a proper day's work for a workman". Taylor realised that for scientific management to work effectively, it was necessary for management to acquire the worker's skilled knowledge. He had also long since recognised that time and motion study was an essential exercise in the acquisition of this knowledge: ". . . the whole system rests upon an accurate and scientific study of unit time, which is by far the most important element in scientific management" (Taylor 1903, 58).

Once management had acquired this crucial job knowledge, they kept control of it. Such division of labour, inherent to scientific management, sought to shift all thinking from the craft worker to the capitalist: "craft labour processes were redesigned, fragmented and simplified so that skill levels were reduced and the mental aspects of production incorporated into management" (Hopper and Armstrong 1991, 419). This "separation of conception from execution", observe Cooper and Taylor (2000, 560) is a key aspect of Taylor's innovations. Understanding all aspects of a job in turn facilitated an identification of the 'one' best method, the most efficient approach to the task. Hence deconstruction of job tasks enabled the creation of standards or norms with regard to cost behaviour. From a Labour Process perspective, such standard costs constitute an effective form of managerial control, as by their very design, are "*invulnerable to the influence of the workforce*" (Hopper and Armstrong 1991, 420). Time study also indicated who within the workforce was more 'naturally' suited to perform which task. In this manner, argue Labour Process scholars, the craft worker's traditional freedom was replaced with a detailed set of instructions which outlined "not only what is to be done, but how it is to be done and the exact time allowed for doing it" (Taylor 1911, 63).

In summary, the Labour Process perspective views scientific management, not simply as a means of achieving greater efficiency on the factory floor, but rather a revolutionary division of labour by capitalist forces to deskill and control the craft worker. As Hopper and Armstrong (1991, 420) sum up:

From the perspective of labour process theory, the key feature of Scientific Management was not the increases in technical efficiency, but the creation of deskilled and fragmented labour dependent upon the production engineering and control now incorporated into management. Both to Marx and Braverman (1974), this *real* subordination of labour to capital was one of the defining features of the fully developed capitalist mode of production.

Alternative perspectives and compromising propositions

Both the Foucaultian and the Labour Process perspectives have in turn been criticised by scholars occupying a Neoclassical position. Tyson (1995), in particular, has criticised 'new' accounting historians for their use of secondary as opposed to primary data sources. His own research into the adoption of scientific management principles in the US clothing industry during the 1910s and 1920s reveals that it was market pressures which prompted the introduction of standard costing practices and that such initiatives were welcomed by both workers and management as a means of responding to competition. The Foucaultian response to this methodological critique is that a theoretically informed historical account is, by its very nature, interested in the discourse

surrounding accounting techniques and therefore will draw upon evidence from an array of texts, treatises and pamphlets of the era (Napier 2006)⁷.

Notwithstanding the significant ideological and methodological differences between the Foucaultian, Labour Process, and Economic Rationalist approaches, Fleischman (2000, 598) has suggested that all three perspectives offer particular insights, such that taken together, a more complete picture emerges: “the synergies amongst the three paradigms can provide an interpretive richness to the period of which each alone is incapable”. For example, in relation to the history of scientific management, the Foucaultian perspective, he argues (2000), reveals the power of accounting knowledge in rendering the individual worker calculable. By contrast, the Labour Process perspective facilitates an understanding of the opposition to these new work principles by organised labour. Finally, Fleischman (2000) suggests that the Neoclassical stance provides an explanation for the limited initial adoption of scientific principles by owner/managers due to cost/benefit considerations. In a similar vein, Fleischman, Kalbers and Parker (1996, 316) suggest that the “trichotomization of accounting historiography” that has emerged from the theoretical debates between the Foucaultians, Marxists and Neoclassicals is not particularly helpful to the field. Rather, these authors argue for a more pluralistic approach and a shared dialogue in their common interests around the dynamics of power and control. In her assessment of critical theory’s application to accounting history, Merino (1998, 613) cautioned against engaging ‘in the modernist trap of trying to find a “certified path to truth”’. Like her colleagues above, she argued the merit of productive dialogue between multiple voices and perspectives.

We similarly subscribe to such a pluralist perspective in this paper. In taking this stance, we follow in a long standing tradition which recognises the advantages of multiple or poly-paradigm research (Hassard 1991). Similar to the benefits of methodological triangulation, paradigm triangulation offers a more holistic understanding of issues that acknowledges differences, highlights marginal research domains and challenges hegemony (Hassard and Cox 2013; Vaara and Lamberg 2016). Such a multifaceted view also provides an opportunity to develop our theoretical understanding of historical moments. Hence in this paper we draw upon theoretical insights from both the Foucaultian and Labour Process approaches in our analysis of photographs of the scientifically managed office. Before such analysis however, we provide an overview of the principles of scientific management and the consequent emergence of the efficient office.

3. Scientific management and efficient office control

An increasing awareness of inefficiency and waste in office affairs had become manifest from the late nineteenth century, with businessmen and engineers such as Henry Metcalf (who began his experiments as early as the late 1870s) and Alexander Hamilton Church criticising traditional administrative methods (Yates 1989). A new system was advocated which favoured standardisation of routines, and rational, rather than ad hoc, methods. Systematic management, as Litterer (1961) refers to this movement, was ultimately dwarfed by the more populist scientific management. Although initially more narrow in its scope, being confined to production inefficiencies, Taylor’s principles were adopted with such zeal that they quickly penetrated myriad aspects of social and organisational life (Strom 1992). Fortunately for the historian, the advocates of office science produced a wealth of texts and treatises which minutely document the application of scientific principles to administrative affairs. It is from this discourse that we gain insight into a significant period of office reorganisation.

A sense of the office posing ‘a problem’ in need of resolving, pervades these texts. The opening stance was inevitably one of dissatisfaction with old ways and their inherent cost inefficiencies (Galloway 1919). The solution was clear and unequivocal: an adoption of scientific principles would signal the end of unnecessary office waste and bring order and control to the vast bureaucratic machine that had recently emerged (Leffingwell 1926). Hence the application of Taylor’s regime to the arena of the office was seen as a ‘natural’ extension of that which had been designed for the factory. Indeed, office work was presented as a form of “light manufacturing” (Frederick 1920, 85). Office science also encompassed a desire to move from previous patterns of hunch and guess work to a system of decision making based on science and rationality (Turner 1929). Simplicity over complexity was similarly the order of the day; superfluous activities were to be swept away (Galloway 1919).

The application of science to office affairs required the adoption of standardised procedures for every office task. Identification of the ‘one best method’, and its subsequent establishment into office routines, was viewed as the basis for not only achieving efficiency but also for implementing proper controls (Frederick 1920). Standardisation of procedures were, as Jeacle and Parker (2013) have argued, central to the pursuit of management control including the monitoring and evaluation of office staff. The notion of the standard as a tool for performance

⁷ The debate between the differing theoretical positions has continued in the works of Armstrong (2017), Bryer (2012, 2013a, 2013b), Fleischman, Tyson, and Oldroyd (2013), Tyson, Oldroyd and Fleischman (2013), Oldroyd, Tyson and Fleischman (2015).

evaluation became increasingly important (Leffingwell 1926). Consequently, a great deal of attention was paid by office engineers to the identification of standard methods, and the standard times for accomplishing these tasks. Office manuals outlined in minute detail the techniques for observing and investigating administrative tasks with time and motion studies comprising a central element in the determination of the most efficient methods (Lloyd 1930). Concerns with standardised routines and processes, formalised documentation and administrative controls have persisted in management accounting research and practice to the current day (Chenhall, 2003; Malmi and Brown, 2008). Indeed their contribution to the discipline of the office workforce is still reflected in the contemporary advocacy and application of ABW to the modern office (Parker, 2016).

As with the factory, Taylor's principles applied within the office involved a division of labour, ideally arranged such that the most competent clerk for a given task was assigned that duty. In accounting terms, such segregation of duties invariably implied the loss of an overall understanding of the business by the bookkeeper in favour of knowledge limited to the scope of the sales, purchases, debtors or creditors ledgers (Cooper and Taylor 2000).

The arrangement of the physical layout of the office space, similar to the factory space, was seen as a key ingredient to achieving scientific efficiency. In particular, the design of the office space was to facilitate the efficiency of paper flows and related administrative work (Jackson 1925). Hence office departments were arranged such that their respective physical documents would follow a sequential and continuous flow (Charles 1929). No time was to be wasted in any unnecessary passing of books and ledgers backwards and forwards in an uncoordinated way. By contrast, office space was to be mapped out and scientifically analysed to ensure the optimal positioning of furniture (Galloway 1919). For instance, the measurement of distances between desks was dictated in order to achieve the most efficient working methods (McGill 1922). Even desks themselves were subject to the scientific gaze. An efficient desk was one which was devoid of clutter to allow for the ready location of the necessary tools of the bookkeepers trade (Dicksee and Blain 1906; Leffingwell 1917). The position at which the office worker sat at their desk was also subject to scientific scrutiny. In chair posture lay the potential prevention to fatigue, a constant threat to office efficiency (Lloyd 1930). It was also recognised that worker productivity was affected by the lighting and heating of the physical environment. Indeed, "eye efficiency" was seen to be a product of a well lit office space (Leffingwell 1926, 139). In this manner, Taylorism reorganised space and its design as a way of exercising power and control over bodies and the spaces they occupy (Kornberger and Clegg, 2004). This was often referred to as the Taylorisation of space: open plan layout, with desks often in regimented rows, no visual or acoustic privacy, designed for ease of visual supervision, with all control of space and its infrastructure subject to management prerogative. Such spatial arrangements all reinforced the implementation of bureaucratic control systems and the intensification and routinisation of office work (Baldry, 1997).

As in the factory, automation also came to play a vital role in the implementation of scientific principles within the office (Strom 1989; Yates 1989). The scientific office, it was argued, could save time and money by introducing an array of new machines that had flooded the market during this era (Jackson 1925). Productivity gains were seen as the natural outcome of adopting devices such as the duplicator (a form of photocopier), the Hollerith machine (a sorting machine), and the comptometer (a calculating machine). The latter, for example, was argued to be three times as efficient as one clerk (Foster 1929, 96). However, the consequence of automation for the office clerk was the tedium of repetitive labour. This was particularly the case in relation to the office typist. Invented in 1873, the typewriter was the most popular piece of office machinery and as a consequence, a natural focus of attention for Taylor's disciples (Foster 1929). Scientific principles first segregated the roles of dictation and typing that had been previously combined in the position of stenographer (Lowe 1980). Efficiency was now achieved through a dedicated typing pool. Time and motion studies then sought to create the 'efficient typist' (Campell 1933). Every aspect of the task, from how to sit at the machine, how to place one's fingers on it, and how to insert paper into it, was examined in minute detail to determine the most productive outcome (Leffingwell 1917). Productivity in the form of words per minute could also be easily measured and compared within the confines of the typing pool (Galloway 1919).

The case of the typist is an illustrative example of how scientific management contributed to the construction of the office as a highly gendered space. Women had flocked to the newly created clerical posts since the late nineteenth century (Cohen 1985; Zimmeck 1997). Indeed, clerical work had been specifically identified as appropriate work for women by the Society for the Promotion of Employment of Women, a UK body which demanded employment rights for women (Zimmeck 1984). A signifying feature of the administrative revolution was the rise in the female workforce (Kwollek-Folland 1994). This is captured quite dramatically in the UK census records which indicate a rise in the percentage of women clerks from 1.1% in 1871 to 43.1% by 1931 (Kirkham and Loft 1993, 545). Similarly, the feminisation of the clerical workforce was a hallmark of North American offices of the early 20th century (Lowe 1980; Strom 1989) with women accounting for over 37% of clerical posts by 1910 (Anderson 1988, 9). As Davies (1983, 5) has observed, we witness during this time period in the US the transformation of "autonomous male clerks into female office operators". However, as clerical work became more

female dominated it became downgraded in terms of pay and promotion prospects (John 1986) and its status declined as an occupational category (Cohen 1986; Kwollek-Folland 1994). The roles occupied by women were invariably the newly created posts associated with repetitive and simplistic tasks (Strom 1989). By 1930, over 95% of office typists in the US were women (Anderson 1988, 7). In this manner “an administrative underclass” was created as male clerks were unwilling to perform the new menial work generated as a result of office rationalisation (Lowe 1980, 378). Scientific management, assisted by automation, therefore, successfully deskilled female labour and placed it in distinct domains of employment, primarily that of typist. As Cooper and Taylor (2000, 563) observe, “feminised work in offices meant Taylorised work”.

By contrast the primarily male position of office manager rose in status and significance. This new position was a direct result of embracing scientific principles of organisation (Cyclopedia of Commerce 1919). Indeed, the creation of such an ‘expert’ who would oversee the training of clerical staff in the science of office administration was viewed as essential (Leffingwell 1926). Additionally, office managers played a vital supervisory role through “an inspection habit” (Lloyd 1930, 5), constantly monitoring staff to ensure that the newly created routines were strictly observed. This reflected the scientific management philosophy that workers were manipulable and should be subject to scientifically designed office workspaces, routine working methods and close supervision (Parker, 2016). As Cooper (2015b) has argued, such supervision of the individual objectifies a human being as a tool, the purpose of which is to pursue and produce efficiency and profit, thereby producing a financial return on themselves; so that the individual is transmogrified from person to performance metric. From this perspective, office clerks were viewed by scientific management as minimisable overhead cost items to be managed as part of the agenda for organising and controlling office processes (Labardin, 2014). Thus supervisors were construed as essential tools of authority based control over individual office clerks (Parker, 2016).

In summary, scientific management brought about a radical reorganising of office design, routines and control systems. In subsequent sections, we will examine accountability and management control implementation in such a scientifically managed office. We will visually bring to light the role of accounting technologies in the deployment of scientific management practices, how the accounting record facilitated hierarchical observation and surveillance. Equally, our photographic analysis of office space will attempt to show the deskilling of the traditional bookkeeping craft which accompanied scientific principles and will also inform our understanding of the history of women in non-professional accounting roles. First though, we outline below the methodology of photoelicitation that we deploy in our historical examination of the office.

4. Methodology

The primary material for this paper are photographs drawn from accounting, business, finance and office management texts published during the mid-1850s to 1930, as well as contemporary texts and archival website repositories exhibiting office photographs of that era. These images capture the significant transformation in office routines that characterise this period: encompassing the 20 years prior to the early signs of scientific management that emerged in the 1880s, its zenith through the years 1900 – 1920, and its consolidation in the 1920s before other schools of management thought began to challenge and overtake it. The images are of both US and UK origin and have been subject to historical photo-elicitation. This represents an important alternative approach to data sourcing and analysis in the accounting literature which has to date seen precious few photoelicitation studies. Notable contributions in this respect have been methodological papers by Warren (2005), Parker (2009) and Warren and Parker (2009), with empirical study papers by Walker (2015) and Parker and Warren (2017). As Warren (2005) points out, accounting and accountability are arguably focussed on rendering otherwise opaque organisational operations and outcomes visible to outsiders. One natural pathway to such visibility and accountability is visual media. Thus the photograph provides a further approach to the ways of ‘seeing’ that as researchers we conventionally employ through our analyses and interpretations of narrative texts, numbers, statistics, graphs and charts. Visualisation implies that we can not only employ our immediate sense of sight in examining photographic evidence, but employ our social, psychological and cultural understandings to make sense of what is photographically represented. Thus photoelicitation allows us the greater possibility of visualising others’ worlds and ‘seeing’ into the past in a more immediate fashion than simply relying on traditional narrative and numerical textual sources.

This study responds to the prevalence of images and the importance of the visual in today’s society and business world (Mitchell 2005; Davidson 2009, 2014) and takes up the call for accounting researchers to recognise and incorporate the visual in their contemporary and historical investigations (Gallhofer and Haslam 1996; Parker 2009). As Davidson and Warren (2009) explain, the visual is a medium of communication that offers an abundance of accounting related signs and symbols. Despite the tendency amongst many scholars to dismiss visual images as trivial, decorative and subjective, imagery is a pervasive phenomenon in our society, surrounding, framing and involving so many aspects of accounting and accountability (Davidson and Warren 2009; Davidson 2010). In particular, photographic imagery in accounting can represent “a complex crossroads between reality and creation,

objectivity and subjectivity, incremental information and impression management” (Davidson 2014, 22). Thus the photographic medium has become a routine form of accounting and accountability communication within organisations and between them and their external stakeholders. Historical photographs therefore offer us an archive of imagery that can be analysed and interpreted for its content, representational story and apparent context. It may challenge, augment or amend our prior understandings from earlier traditional historical narratives (Warren and Parker, 2009).

In accounting research, historical photographs offer a hitherto untapped repository of visual inventories of objects, artefacts, people and events (Clarke-Ibáñez 2007). Just as accounting information and reports facilitate numbers and narrative based representations of organisational control, accountability and performance, so the photos in this study can provide an alternative visual window into office accountability and control practices (Nixon and Burns 2005). Visual photographic representations can allow us to more closely understand and almost experience “real” control system(s) as they operate(d) in practice (Berry et al, 2009). Such historic images can provide insights into broader social, cultural, economic, institutional and technological undercurrents permeating the settings, activities, and lifestyles of people represented. This may also provide clues as to their beliefs and practices (Banks 2001; Blacking 1984; Clarke-Ibáñez 2007; Edwards 2001; Miller 2007; Rose 2000; Scherer 1992; Walsh 2002). Bento da Silva et al (2017) questioned the assumed dominance in accountability relationships of the written over oral accounting record, finding evidence for the importance of oral forms of accounting in comparison with inscribed forms. In similar vein, methodologically we argue the importance of the visual photographic record for a deeper understanding of the shape, role and process of accounting and accountability work. The photograph makes this possible by offering us glimpses into the physical world of accounting record production, transmission, and storage as well as providing relevatory insights into the world those charged with production and maintenance of the textual accounting records. In this way, accounting is revealed as not only textually and orally based, but visually enacted through observation and inspection not only of textual accounting records, but of the office accounting staff themselves. Accordingly, the analysis of sample photographs involved a general appraisal of their content and what they purported to represent. They were then examined for emergent themes of relevance to the subject of this study. They were further examined for details and nuances of organisational and accountability related activity (Emmison and Smith 2000).

Ethnographically, photographs allow us a glimpse into what was and allow us to come closer to seeing the past through the eyes of those who inhabited it (Harper 2002). Through photographs, we can approach an arguably clearer sense of ‘how it was’ in the historical world of the office than can be approached through narrative representations. One pathway is via researchers’ contextualised interpretation of photographs that may have originally been taken for quite different purposes to those for which the researcher subsequently employs them (Geertz 1973; Margolis and Rowe 2011). This can allow both descriptive and interpretive hermeneutic analysis using semiotic and symbolic interpretation of elements of the photograph that the photographer did not ‘see’ or particularly focus upon (Stanczac 2007; Margolis and Rowe 2011). Thus the researcher may mine multiple and partial truths from collections of images, rather than some absolute unitary truth (Sontag 1978; Wagner 2007) and develop arguments as to what the images represented (Rose 2000; Parker 2009). That analysis can be informed by the researchers’ prior reading and familiarity with the historical subject matter and context which they are pursuing (Rose 2001). Both presence and absence of items and people may carry significance for the analysis and topic under investigation (Edwards 1992, 2001; Emmison and Smith 2000; Banks 2001). In this manner, insights emerge that challenge conventional wisdom and offer counter-narratives to stereotypes that have persisted in narrative written records and research studies (Edwards 2001; Rose 2001; Pink 2001; Walsh 2002; Warren 2005; Miller 2007; Parker 2009). The analysis and argument presented in this paper draw on the methodologies articulated by Emmison and Smith (2000) and Banks (2001). It has been undertaken in the spirit of Rose’s (2012, 2001) advocacy of bringing ‘fresh eyes’ to our examination of images and focussing both on image content (the images’ internal narrative) and image context (facilitating the development of an external wider narrative) (Banks 2001). Accordingly, the analysis of sample photographs involved

A total number of 145 photographs were examined spanning the 1856 – 1930 period. From the 1856 to 1913 (pre-World War I) period 38 photographs were examined. During the 1914-18 (World War I) period, 31 photographs were examined. Post-World War I to the beginning of the Great Depression (1919-1929), 76 photographs were examined. The photographic sources are listed in Appendix I and include 26 international sources ranging from published texts and manuals to archival websites. The sample selected represent US and UK located offices, being those predominantly represented in historical texts and web archives. Photos from both locations were reviewed for any readily apparent national differences, and none were found in evidence. Thus the two national locations of office photos represented dual cases of two dominant and related national economies of the period under study. The final selection of photos was based on the qualitative purposive sampling approach whereby photos were selected on the basis of the researchers’ assessment of their relevance to the study’s research questions and contexts, and their potential ability to throw light on related phenomena (Creswell, 1998; Glesne, 1999; Willig, 2001; Silverman, 2006; King and Horrocks, 2010).

The 145 photographs represented 61 small offices and 84 large offices of a wide variety and type. With respect to narrative text adjacent to each photograph or labelling of photographs in the book in which each appeared, very few of the photographs were accompanied by any narrative beyond sometimes a label that indicated the type/function of office or industry or some brief reference to (in)efficiencies being evidenced or illustrated. A very limited number made some reference to scientific management practices and illustrated its advantages (Leffingwell 1917). So following Parker (2009), in this study the photos examined occupy centre stage rather than being adjuncts to historical texts.

Each of the 145 photographs was subjected to 5 incremental layers of analysis. The first inspection and analysis constituting the 'looking through the window' strategy, documented the content of the photograph in terms of the objects, people and other elements being represented in the image. The analysis also recorded anything of possible relevance to the investigation that appeared to be absent. The second inspection and analysis examined each photograph relative to its immediately juxtapositioned narrative in the text in which it appeared, looking for any confirmations or contradictions between text and photograph. This inspection also recorded any stereotypes that appeared to be reinforced or challenged. The third inspection and analysis constituted the 'looking at the window' strategy and examined how the image was presented (including lighting, scope of shot etc.), arrangement of key elements within the image, and any apparent story being projected or told. The fourth inspection and analysis constituting 'looking behind the window' focussed upon the image's context, the expressive/affective content (such as apparent mood, atmosphere) and any aesthetic messages (e.g. social, interpersonal, communicative, scale) (Emmison and Smith 2000; Banks 2001). The fifth inspection and analysis searched for any signs or symbols projected to insiders or outsiders by the organisation (such as status, authority, functionality, flexibility, efficiency, transparency etc.). It also induced and categorised any significant themes that may relate to the study's aim (such as roles, hierarchy, mechanisation, gender, efficiency, accountability etc.). Finally it also searched for any evidence suggesting interior frames of mind or nuances reflecting life in the organisational unit portrayed. The findings from the analyses were then aggregated under the categories indicated in Table 1.

Manifest objects, people represented
Absences
Image compared to adjacent narrative text
Stereotypes challenged/reinforced
Signals sent to insiders/outsideers
Significant themes
Organisational frames of mind/nuances
Image presentation
Arrangements of image elements
Apparent message/story being projected
Image context
Expressive/affective mood
Aesthetic messages

TABLE 1

Primary photograph analysis categories

These categories and their component findings were then examined through Foucaultian and Labour Process theoretical lenses to inform our analysis and critique of scientific office management implementation during the period. Hence from a Foucaultian perspective, the photographs were examined for indications and manifestations of the exercise of disciplinary power and surveillance, the creation of visibilities, the identification of deviances and the establishment of norms and self-disciplinary behaviour. From a Labour Process perspective, they were examined for indications of the deskilling and control of labour through scientific management and for the physical manifestations of an office 'production' process controlled by management.

5. Visualising theoretical debates: the case of the scientific office

From salon to management controlled production line accounting

In commencing the account of findings from the photo-elicitation process outlined above, it is important to first outline the overall dominant imagery and presentation evident in the photographs examined, including what appeared to be present and what appeared to be absent. Specifically, the photographs evidenced the transition from a small scale salon or club style of office layout (at times including window drapes and curtains, hung portraits and pictures on the walls, patterned carpet etc.) to a large factory like operation. In the pre-1900 sample of photographs analysed, virtually all were salon style in size and design. One example of the former style appears in Figure 1. These spaces were designed for small groups, be they a small group of clerks, managers, or stenographers sharing one small office (generally 4 to 8 staff seated at desks).



Figure 1 Salon style stenographic office (Anon 1919, 266-267).

By the 1900 to 1930 period, the office profile in our sample of photos analysed was quite different, a very small minority being of salon design, almost half being factory-like in size and design, and the remainder being a mixture of designs all of large scale. In this latter period, we witness the emergence of a large open plan floor setting with larger numbers of staff sitting or standing at their desks (e.g. as in Figures 2 and 3). These larger offices appeared as vast administrative functions exhibiting rows of desks often all facing the same direction and arranged in factory production line layout. This at times included long aisles segregating sections of the open plan office, just as one would find on a factory floor. Indeed the frequency of production line layout evident in the sample of photos analysed rose from none in the pre-1900 period, to 29% in the 1900-09 period, 35% in the 1910-1919 period, and 48% in the 1920-30 period. The imagery, in this regard, is reflective of the Labour Process perspective and the capitalist reorganisation of office work.

What is also evident from the photographs examined is the significant increase in size and scale of offices particularly post-1900, arguably reflecting the increased scale of industrial and commercial operations and the volume of transactions associated with that trend. Hence the photographs visually attest to the increasing importance of accounting and management control functions in the 20th century enterprise and the central role of the office in executing those functions. From a Foucaultian perspective, the new administrative arrangements offered management new modes of observation and control.



Figure 2 Harland and Wolff counting house, Queen's Island circa 1912 (McAleese 1988, 59).

Photograph reproduced by kind permission of the Gill & Macmillan publishers.



Figure 3 A large scale production design office (Leffingwell 1917, 120).

What this sizeable sample of photos for the 1900 – 1930 period also reflects is the transition from offices exhibiting multidirectional facing desk arrangements to unidirectional arrangements (across various office sizes). The pre-1900 period reveals 75% multidirectional and 25% unidirectional and the 1900-1909 period exhibits 67% multidirectional and 33% unidirectional. Subsequently in the 1910-30 period, the balance settles at 56% multidirectional and 44% unidirectional.

Consequently, these images stand as testament to management's redesign and restructuring of office layout and processes. The simulation of the manufacturing production line is all too evident. Office layouts invariably mimic a factory layout, with serried ranks of individuals positioned like cogs in a well-oiled machine. The photos illustrate standardised desk and workspace designs, often quite densely packed as clerks worked in close proximity to each other as for example in Figures 4 and 5. The rows exhibit the underlying notions of industrial efficiency applied through high volume mass record production and processing. Here we see the visible evidence of the transformations in office routines as a result of the application of scientific principles which created, according to Cooper and Taylor (2000, 564), a "labour process in its own right". In the scientific management tradition, office tasks were deconstructed and deskilled, and redesigned into a production line flow in which clerks became subservient components in an accountability record production and control system planned by management. From a Labour Process perspective, "this *real* subordination of labour to capital was one of the defining features of the fully developed capitalist mode of production" (Hopper and Armstrong 1991, 420).

Our understanding of the office world of production line accounting and its impact on office workers is furthered by Lefebvre's (1991) seminal work on space. Lefebvre drew on many theoretical influences (Hegel, Kant, Marx, Nietzsche) and from varied subjects (art, architecture, semiology) to reflect on the relationship between space,

urbanism and everyday life. His central argument is that space is an outcome of social practices. Hence every society is responsible for creating its own space and new social relations in turn produce new spaces. As a Marxist, Lefebvre viewed the urban space as a product of capitalist forces. From this perspective, the office is a space produced and sustained by capitalism, a space in which one class achieves dominance over the other. Particularly in Figures 3, 4 and 5, we see office space regularised, constrained and ordered, reinforcing the subordination of office workers now redeployed as cogs in a mass accounting record production machine. Here is visual evidence of office spatial design and work practices in a mutually reinforcing relationship.



Figure 4 A British office: high density of staff occupancy (Leffingwell 1917, 120).



Figure 5 Large scale scientifically designed office (Leffingwell 1917, 135).

Finally, in setting the scenes portrayed in these photographs, it is also important to summarise how these images appeared to be constructed and presented by their photographers. Offices were photographed as either unoccupied (with no staff present as shown in Figure 6.) or occupied (with staff going about their apparently normal duties as shown in Figure 7.). Small offices were generally presented by way of close-up shot while for the larger open plan offices, photographs often took the form of elongated, panoramic ‘long-shots’ taken from an elevated position. This had the effect of emphasising the factory production-line semblance of large offices, dwarfing the employees marshalled across the rows of desks and filing cabinets. Thus the photographs illustrate how the production line approach to product manufacture was imported into the management control function and the production of accounting records.



Figure 6 Bank office (Anon. 1919, 331).



Figure 7. Dispatchers office 1905.
Norfolk and Western Historical Photograph Collection, Norfolk Southern Archives,
Norfolk, Va., Digital image courtesy of Special Collections, Virginia Tech, Blacksburg,
Va.

Management and accounting control through surveillance

As already indicated at the paper's outset, the office has traditionally been the site of accounting information and the primary source of corporate governance and control (Jeacle and Parker 2013). It has been home to the many functions and processes of measurement, calculation, standardisation, budgetary control and resource allocation. Analysis across the photographs within our study reveals clear visual evidence of the Foucaultian exercise of management control through surveillance. This occurs in two respects: first the control of office staff themselves through their physical visibility in the open plan layout and second, the control of other organisational staff through the visibilities created by the accounting and management control records maintained by the office staff. The office staff can be seen in the acts of recording and calculating, thereby rendering the actions of other organisational staff calculable. Hence we witness the "conception of the individual employee as a resource to be measured" (McKinlay et al. 2010, 1014).

The office supervisor was typically the agent of staff surveillance. Supervisors can be identified in the sample of photographs examined for this study – for example standing around the edges of a large scale office, walking in between rows of office workers, standing over and apparently advising clerks who are seated at their desks (as appear to be the case in Figures 8 and 9). For the sample of photographs up to 1920, very few evidenced clearly identifiable supervisors. What the photographs do suggest is that such open plan office layouts rendered all staff immediately and highly visible, so that direct supervision was easily accomplished by fewer supervisors who had an easy purview of all operations on their floor from wherever they were positioned. Indeed they could even be seated among the rest of their staff and easily able to exercise visual control. However it is notable that approximately one third of the photographs sampled from the 1920-30 period, did evidence the presence of supervisors. This appears to be a significant increase in profile compared to photographs of earlier decades. Parallels with the prison, the focus of Foucault's (1979) seminal *Discipline and Punish*, are present here. In the early 20th century office we witness the disciplinary practices of surveillance that emerged in the 19th century prison. The scientific office becomes merely one more exemplar of a disciplinary institution physically arranged in a manner conducive for the exercise of control. It reflects the subtle form of institutional punishment that signifies the birth of the modern state.



Figure 8. Office workers circa 1915-1923.

Courtesy of Library of Congress Prints and Photographs Division Washington, D.C., Harris & Ewing photograph Collection.



Figure 9. Letter Office

Courtesy of Library of Congress Prints and Photographs Division Washington, D.C., Johnston (Frances Benjamin) Collection

In almost all of the sample of photographs studied, office workers were all highly visible from any point on their floor. Even office work groups that were segregated by aisles, glass partitions, low wooden desk-high dividers and the like, were still immediately and continually visible to their colleagues and supervisors. It must be said that the scientifically arranged, standardised open plan desk layouts particularly facilitated this visibility. Where open plan designs still allowed non-standardised office furniture arrangement, such as desks interspersed with larger cupboards and filing cabinets, multi-directional facing desks and the like, visibility was still possible but not as pervasive as the scientifically designed and standardised layouts. Hence the scientific office was physically arranged to facilitate hierarchical observation (Foucault 1979, 170). Each office worker had an assigned place within this structure, specifically designed for their surveillance.

The photographs also make it clear that office staff generally worked in close proximity to each other such that personal privacy was minimised and surveillance by both supervisors and peers was easily achievable. One effect of this visibility is that in very few of the photographs analysed can office staff be seen speaking to each other. Their focus and gaze was on their individual work at their own desk⁸. They appear as individual operatives in a large scale office production line. This individualising effect of control by surveillance is potently revealed by the photographic evidence in a way not accessible via narrative textual explanations of the scientifically managed office. Figure 10 provides one example of these observations.

⁸ This observation must be qualified by the possibility that in some cases, staff were aware of being photographed and hence desisted from 'normal' social interaction. However in at least some of the photographs of office floors containing 100 or more staff, this photographer-effect is arguably to have been highly unlikely.



Figure 10 Large scale office employing mechanical messenger system (Leffingwell 1917, 69).

Thus the former private world of the office had become a very public world in which clerical staff administered the organisation, but were in turn subject to much greater scrutiny and governance themselves. In their accounting, recording, calculating and filing work, they made the actions of others calculable and governable. Meanwhile, their own work was similarly made observable, trackable and knowable. Thus as accountors for others, they themselves in turn became accountees. Hence the introduction of scientific management in the office created a myriad of visibilities and accountabilities. In this manner, the deviant became quickly identifiable while at the same time ‘normalizing’ the rest of the population (Foucault 1979, 177). In making this argument we are not denying the complexity of the processes by which this new system of control took root within the office. Control systems can be designed by different groups within the organisation (Otley, 2016) and may evolve over time (Tessier and Otley, 2012). There is also a continual tension between formal and informal mechanisms of control (Langfield-Smith, 1997; Pant, 2001; Tucker and Parker, 2013; Ladva and Andrew, 2014). However, it is clear that the intervention of scientific management into office affairs during the early decades of the 20th century created the conditions whereby both office and organisation become more amenable to control and the pursuit of efficiency.

Disciplinary accounting and management control through the record

Records of accounting and management control occupy centre stage in many of the photographs. They take the form of rows of filing cabinets, record card drawers, card index stands on desks, multilevel rows of pigeon holes, multi-level filing shelves, and more. These are invariably positioned along office walls, effectively surrounding and dominating office staff, or are centrally located, being juxtaposed alongside staff at their desks. Thus staff at times work in the very shadow of the record repositories - even when working in a small group setting as shown in Figure 11. Here we see the knowledge based accounting and accountability system that is the focus of office work. We witness its deployment in exercising disciplinary and accounting control over the full spectrum of organisational operations. Its centrality and broad reach across the organisation is symbolically reflected in the very visibility and positioning of the physical records in many of the office photographs in this study. Indeed some photographs examined show offices devoid of any staff at all, symbolically reinforcing the primacy of the record. Foucault’s (1979, 170-194) concept of ‘power-knowledge’ is apt here. Knowledge practices are intrinsically linked to practices of power. So the scientific office comes to house an interior records-based control function with the power to control both the internal and external organisational world.



Figure 11 A manufacturing plant costing office (Thompson 1920, 169).

The document in its many forms dominates these offices. It is manifest in both the form of records storage noted above, and in the pervasiveness of paper documentation across desks, benches, desk in-out trays, large scale filing systems and the like. Figure 12 provides an illustrative example of the extensive nature of a scientifically designed accounting office filing system. Operational, sales and financial data is converted into and maintained in this highly visible physical form that inputs into the accounting record of revenue. Indeed some of the office images give a clear impression of the subordination of office staff to the disciplinary records. Office staff almost appear as subservient adjuncts to the record. This arguably mirrors the scientifically managed factory in which workers are virtually subsumed and dominated by the machinery to which they become adjuncts (Merkle, 1980). As McKinlay and Pezet (2010, 490) have noted: “Taylorism aimed to create a science of docile bodies, a corpus of knowledge and practices that assumed and pursued the reduction of workers to ‘mere hands’.” From a Foucaudian perspective, the record provides the means of intervention into organisational life. Through this relationship, transactions are processed, recorded and tracked within a system of document based control. This is the heart of the organisation’s calculative data processing and control.



Figure 12 Tariff filing system in a railway office (Leffingwell 1917, 111).

Analysis of the photographs across time leads to a number of important observations regarding the types of records and their associated storage, access and focus. Pre-1900 photographs reveal a predominance of loose paper and ledger book records on desktops with a small number of photos suggesting the introduction of card record systems of an accounting nature. These early photographs reveal little evidence of major record storage systems that are desk proximate or positioned along walls. Post 1900, loose paper and ledger records become increasingly augmented by file card systems and computation tapes. In the 1900-1909 period, photos reveal the early signs of

desk proximate and wall located card storage systems. The photographs sampled from the 1910 – 20 period reveal an upsurge in frequency and volume of desk proximate (see Figures 11 and 13) and wall located mass record storage (files and cards). By the 1920-30 period, desk proximate storage becomes much less in evidence, clearly being replaced by mass card and file storage systems which dominate office walls (as shown in Figures 14 and 15). Hence, we can visually observe over time how office management control systems responded to increasing volumes of organisational activity, related accounting transactions and record systems. This suggests a major upsurge in accounting based control of organisational activities and members both within and beyond the office.



Figure 13 Mail order company office (Leffingwell 1917, 187).



Figure 14 Filing office circa 1925.

Photograph courtesy of the Charles Babbage Institute, University of Minnesota Libraries, Minneapolis, Burroughs Corp. Collection, cb000181.



Figure 15 Mass filing equipment Remington Rand Inc. (Jones and Bertschj 1930, 548)

Walker's (2016b) recent deliberations on the nature of social control are pertinent here. The manner in which accounting engages with the social was one of the central objectives of early interdisciplinary accounting research (Hopwood 1983). Walker argues that it is important to continually reevaluate and reinvest in understanding the interconnections between accounting and the social, and one means of conducting such an exercise is to examine the concept of social control, and more importantly, the interactions between accounting and social control. Although the control function has been a long standing central tenet of accounting (Bedford and Malmi, 2015; Emmanuel, Otley and Merchant 2004), and it is generally assumed that accounting exerts a form of social control, Walker (2016b) notes that the actual concept of social control is vague and imprecise in nature. It is often alluded to without being actually demonstrated. One means of illuminating the social control function of accounting, however, is by examining its role in information gathering, recording, and processing:

Like other bureaucratic practices, when an individual becomes the subject of an accounting record s/he potentially enters a network of relationships which facilitate their control - through surveillance, monitoring adherence to 'rules' and the exercise of discipline ... Moreover, the creation of a record itself can be consciously employed to facilitate social control. (Walker 2016b, 47).

The primacy of the document has been a central tenet of Foucaultian inspired accounting research. The record or account is typically the tool by which human accountability is achieved and norms of behaviour established. Prior literature has established the role of accounting as a surveillance technique which can have a significant impact on the workplace, by creating centres of calculation which render actions visible and hence accountable (Carmona, Ezzamel and Gutierrez 2002). As Miller and O'Leary (1987, 239) observe, by the early 20th century the employee had come to be "surrounded by calculative norms and standards". Our multi-level analysis of office photographs reveals control and accountability records to be an important theme pervading the images. The nature of these accounting and management control records can be partly induced from available visual evidence of office machinery and documents, as well as the photograph labelling used. In the pre-1900 period, books, ledgers, journals and loose documents dominate, mostly exhibited in integrated record systems, but also including some evidence of cash, ordering, purchasing and general accounting records. The 1900-09 period photographs reveal an expansion in range of record forms to include a stronger representation of cards, tape and ticket systems, predominantly still being created and processed in general offices. Some evidence of sales and advertising, booking and ordering, and manufacturing and production record systems was also apparent. Photographic evidence of the increasing prevalence and size of files and filing systems also attests to the increasing volume of organisational activity and accounting record construction and processing. However in the 1910-20 period, the photographs portray a major expansion in accounting and management control record variety, volume, storage and processing systems. Specialised offices focussing on particular areas of accounting and control proliferated. These included cash payments and receipts, costing, sales, customer orders, purchasing, billing, operating and production statistics, services, correspondence, filing, freight, and general accounts. They attest to the broadening definition of accounting functions and their related scope of accountability. What we witness, from a Foucaultian perspective is the emergence of an accounting apparatus to regulate the lives of the office worker. A repository of knowledge is created within the environs of the office. The photographic analysis reveals both the programme of scientific management introduced to administer the early 20th century organization and the detailed technologies of accounting designed to achieve this end (Miller and O'Leary 1997).

The dominance of the record is not only apparent from the pervasiveness of documentation and its storage systems, but also from the physical disposition of many staff in the photographs. The overwhelming majority have their gaze focussed on the documents with which they are working, evoking an expressive mood of studied concentration. Especially in large scale offices, it is arguably unlikely that so many staff could have been induced to adopt such a pose purely for the photographer, who (from our inspection of the photographs) in many cases was clearly distant from them or physically not within their view. In Foucaultian terms, the apparatus of control had achieved a self-disciplinary status such that the office worker had effectively internalised the principles of scientific management. Thus we see emerging from these historic office photographs the playing out of a concept of ‘Control Through the Record’. The photographs clearly reveal the office as the centre of organisational record creation, production, analysis and communication: in a manner arguably as potent as narrative text reflections or historic accounting records that accounting researchers have traditionally consulted. Through the visual image, we can better appreciate the growth over time of the systems and record controls to which office workers became virtually subordinate. This is graphically illustrated in Figure 16 revealing office clerks surrounded by volumes of paper records and files. The record controls those whose activities and outcomes are subject to its calculation and measurement, and at the same time in effect controls those charged with its operation. The latter is enacted through office workers’ visibility, supervision, often production line arrangement, and the growing volume of calculative, communicative, analytical and filing work required. Hence, a Foucaultian lens explains how accounting technologies enabled both office work, and workers themselves, to be rendered visible and accountable. The early 20th century office becomes a prime site for the emergence of Miller and O’Leary’s (1987) “governable person”.



Figure 16 General office 1920s, Norfolk & Western Railway, Roanoke, VA. Norfolk and Western Historical Photograph Collection, Norfolk Southern Archives, Norfolk, Va., Digital image courtesy of Special Collections, Virginia Tech, Blacksburg, Va.

Division, deskilling and mechanisation of office labour

Specialisation and mechanisation of labour was a significant component of scientific management. The concept of office work moved from a small group of clerical and accounting officers exercising their professional craft, to a mass of staff working according to detailed, predetermined, standard processing routines. From a Labour Process perspective, this involved the deskilling of labour as office work was divided into simple sequential routine steps undertaken according to detailed instructions formulated by management. Autonomy and judgement were to be removed from operatives who could then be trained to carry out routine tasks in a predictable and repetitive way. Added to this task simplification was the mechanisation of an increasing range of organisational duties.

The division of labour and its deskilling is visibly more evident in the photographs of larger scale offices where desk and record layouts are more often standardised, most often taking the form of neatly arranged, multiple long

rows of desks invariably all facing the same direction. In these images, staff appear as cogs in a large scale industrial like arrangement where each operative has a prescribed place and function in records processing. Indeed, accounting and record keeping can be seen to physically shape the layout of the office space. The office “came to resemble a factory with work organized around a paper-processing assembly line” (Lowe 1987, 135).

In comparison with the salon style of office (see Figure 17), the large scale standardised utilitarian office photographs signal a major break between the old world of the autonomous administrative craft and the new world of scientifically managed and deskilled routine office functionary. We witness the emergence of a paper bureaucracy in which the labour process is redesigned (Braverman 1974). The images clearly reveal the separation of conception from execution implicit in scientific management; clerical workers now only see their own domain (sales, purchasing etc) and “lose comprehension of the process as a whole and the policies which underlie it” (Cooper and Taylor 2000, 565).



Figure 17 Mailing department of a commodity investment company (Haight and Freese 1899, 43).

This specialised, deskilled environment was reinforced by the mechanisation of office functions so promoted by and characteristic of the application of scientific management. One example of a mechanised office that was analysing cost and sales data and creating the relevant accounting records is shown in Figure 18. Forms of mechanisation extended to typewriters, phonograph dictaphones, mechanical adding machines, vacuum powered tube systems for transporting documents within the organisation, mechanical paper message exchange systems, card sorting machines, and the telephone. All of these are evident in quite a number of the photographs selected for this study. Accounting related tasks were particularly prone to the effects of mechanisation. For example, Burrough’s automatic ledger and statement posting machine updated the accounting ledgers and prepared statements – its impact on the office was such that: “It is a usual experience for firms who have installed one of these machines to economise on staff salaries to such an extent that the cash saving will pay for the machine within twelve or eighteen months” (Foster 1929, 110). Figure 19 shows an example of an Elliott-Fisher ledger posting machine. There was also the comptometer (Figure 20), a calculating machine which could conduct the work of three clerks (Foster 1929, 97) and the Hollerith, a sorting and tabulating machine which could produce statistics in such a short time that would it allow management to “dispense with from 30 to 50 per cent of the staff at present engaged upon such work” (Foster 1929, 129). The advent of these machines had a significant deskilling effect on the traditional role of the bookkeeper (Strom 1989, 58). For example, the 19th century bookkeeper maintained an overview of the financial operation of the entire organization (Anderson 1988). With the growth in size of office administration and the adoption of scientific management, bookkeeping was broken down into an array of routine tasks facilitated by posting and calculating machines. In place of one accounting ledger, ledgers dealing with sales, purchases, debtors and creditors emerged and were updated in isolation by the respective clerk (Cooper and Taylor 2000). As Lowe (1987, 135) has remarked “By the 1920s, the generalist male bookkeeper had disappeared from most large offices, succeeded by teams of female functionaries monotonously processing financial data with the aid of machines”. This is an important historical moment for the nature of accounting work.

Similar, to Cooper and Taylor (2000), we suggest that such deskilling was to have significant ramifications for the work practices of future accounting clerks and bookkeepers.



Figure 18 A mechanised cost and sales analysis office in a manufacturing company (Leffingwell 1917, 108).



Figure 19 An Elliott-Fisher ledger posting machine (Foster 1929, 122)

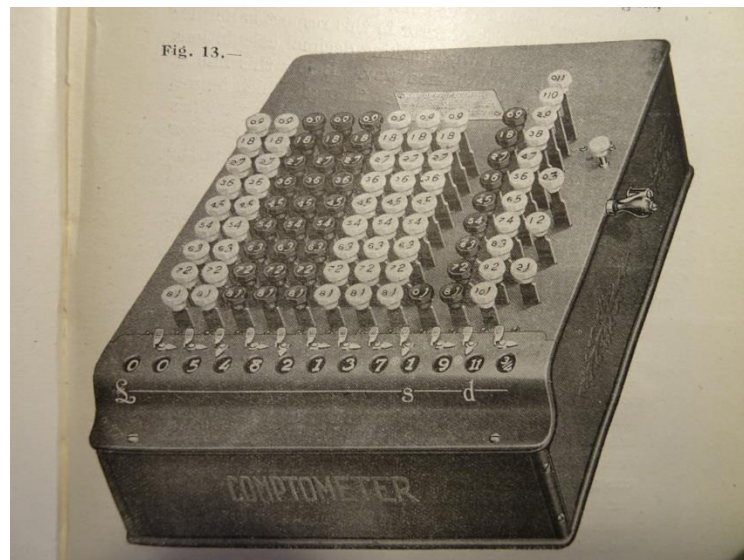


Figure 20 Comptometer (Dicksee 1918, 51)

The trend in mechanisation across the photographs studied, is revealing. Pre-1900 photos reveal no evidence of mechanisation at all. Even in the 1900-09 period, very little mechanisation is apparent, being limited to an occasional single typewriter or comptometer in an entire office. This suggests that the mechanisation dimension of scientific management followed factory mechanisation, appearing more frequently post 1910, with uptake still being apparently gradual. In the 1910-19 period for example, half of the office photographs examined were still entirely non-mechanised with only 15% appearing to be highly mechanised. In the latter group of photos, typewriters are strongly in evidence, comptometers being the next most numerous, with card sorting machines and Dictaphones beginning to emerge. A small number of 'typing pools' and 'comptometrist pools' also begin to emerge. By the 1920-30 period, approximately 40% of office photographs reveal offices with mechanisation ranging from dominant to complete. Again, this appears to visually evidence the increasing scale of organisational activity and associated accounting transaction recording. This is evidenced by large scale mechanised offices shown in Figures 21 and 22. Thus over time, not only was machinery increasingly employed to speed up work and produce time and cost efficiencies, but it further impacted on office staff in multiple ways – eliminating some tasks, creating other replacement tasks, and reinforcing task specialisation in the scientific management tradition. In addition, a different profile of office staff was produced by this mechanisation, and one which was highly gendered in nature. We will examine this phenomenon in the next section.

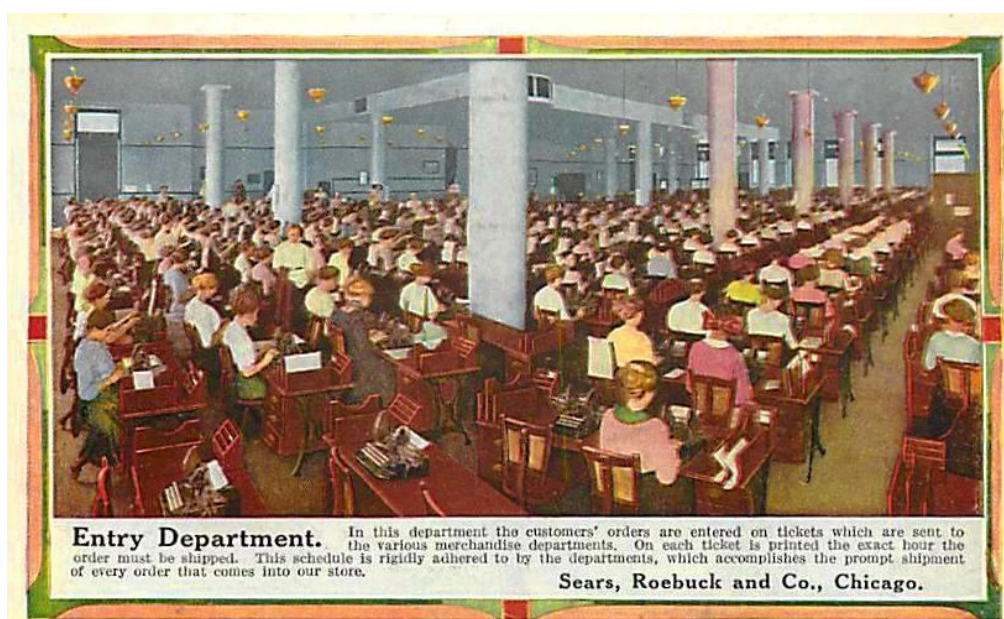


Figure 21 Sears and Roebuck sales order ticket production office 1920s.

Photograph courtesy of Chuckman's Photos On Wordpress.

<https://chuckmanchicagonostalgia.wordpress.com/2012/02/28/postcard-chicago-sears-roebuck-and-company-department-store-order-entry-department-for-catalogue-1920s/postcard-chicago-sears-roebuck-and-company-department-store-order-entry-department-for-catalogue-1920s/>



Figure 22 Computing Division, Veterans Bureau 1909-1932, Washington, DC, using Burroughs electric adding machines.

Courtesy of Library of Congress Prints and Photographs Division Washington, D.C., National Photo Company Collection.

The gendered office space

As observed in section 3, female clerks entered the previously male domain of the office in record numbers from the late 19th century onwards. Women accounted for over 37% of clerical posts in the US office by 1910 (Anderson 1988, 9) while in the UK office, Kirkham and Loft's (1993) statistics on the rising proportion of female clerks capture a shift from 1.1% in 1871 to 18.2% in 1911. As previously discussed, the result of this transformation is typically a history of gender discrimination with women occupying low status jobs associated with deskilled machine operation. Cooper and Taylor (2000) employed Labour Process theory to explain this historic deskilling of accounting work and the feminisation of the office. This theoretical perspective also illuminates our observations of gendered office space represented in the photographs analysed in this study. The increasing number and proportion of female staff is all too evident in the office photographs selected. This can visually be seen as accompanying the rise of both office mechanisation and the scientific management of the office. Clear indicators of this can be found, for example, in the photographic images (such as Figure 23) of women stenographers in typing pools and women engaged in large scale filing operations.



Figure 23 Part of a stenographic department (Anon 1919, 170-171).

The gender transformation of the office, when visually represented, is revealing. As could be expected, earlier photographs exhibit an exclusively male domain which then gradually transforms into a gender balance that varies considerably in proportions and in apparent work specialisation. Across the period from which photographs were selected, male dominated offices largely depicted male staff seated at desks working with paper and documentary records, and some engaged in filing. All pre-1900 photographs exhibit this exclusive male domain, and indeed half of the office photographs in the 1900-1909 period and 40% of the photographs in both the 1910-19 and 1920-30 periods show offices that remain exclusively male preserves. The 1900-09 photographs show half of the offices exhibiting between 50% to 100% female occupancy, rising to between 60% to 100% across the 1910-30 period. Of these, the proportion showing women at desks engaged in non-mechanised work with papers and documentary records fluctuated across time: being approximately 20% in 1900-09, 60% in 1910-19 and 20% in 1920-30. The percentage of women exclusively undertaking mechanised accounting related work, or undertaking some combination of mechanised and non-mechanised work, during the 1900–1930 period ranged between 40% and 80%. The mechanised office work in which women were engaged encompassed filing and calculating machines, typewriting machines, and card indexes. In the initial 1900-1909 period, two thirds of the female clerks operating mechanical equipment appeared to be predominantly engaged in typing and correspondence related functions. The remainder were largely engaged in calculation work (typified by comptometrists), with a very small number engaged in records filing. This balance changed across the 1910-1930 period to 10% of photographs exhibiting female clerks in accounting record filing activities, while the remainder were evenly split between typing and comptometry functions.

So while there was plentiful evidence of exclusively female offices, a good proportion of photographs across the 1900-1930 period did reveal the continuity of mixed gender offices, also exhibiting varying proportions of the type of work each gender was undertaking (as exemplified in Figure 24 showing both genders maintaining sales records). Examples were in evidence from small to very large scale offices, of males seated at their desks working on typewriters and females at their desks working exclusively with paper records. They also depicted the reverse, with females typing and males working only with paper records. Others depicted equal numbers of males and females with both groups working with documents at desks or on calculating machines (for example in a general office processing and recoding calculative accounting functions shown in Figure 25).



Figure 24 A rubber company sales office (Sharles 1929, 586)

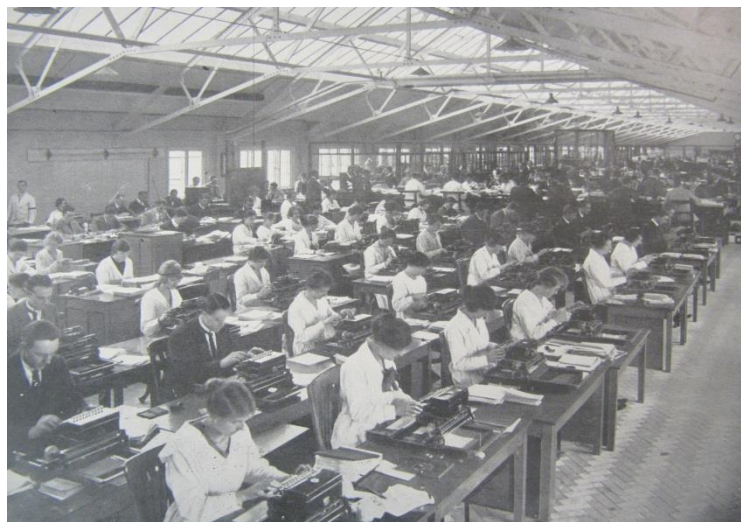


Figure 25 Part of a general office (Sharles 1929, 776-777)

Thus the office gender balance, as well as the range of functions undertaken by female office workers in the 1900-1930 period, appears from the considerable number of photographs examined in this study to present a more complex picture than the stereotypical image of female office employment limited to the stenographic role in the typing pool. It is visually evident that the female role in the office was clearly becoming more pervasive and was being increasingly taken up in the mechanised office functions. However, the female functional roles exhibited considerable variety, thereby symbolising the feminisation of office functions right across the spectrum of office activities. Nonetheless, the hierarchical genderisation of the office as revealed in the photographs is evident in two particular respects. First, where a supervisor appears to be present, they are very often male. Second, one particular aspect of office mechanisation appears to have been male dominated. This relates to the advent of the phonograph as a dictation machine. Some photographs such as Figure 26 reveal the construction of narrative communications and related accountability by males dictating into phonograph machines and female stenographers at typewriters typing what has been recorded by the male clerks. This division of labour is a classic example of the deskilling associated with scientific management as highlighted by Hopper and Armstrong (1991).



Figure 26 Males using dictaphone technology in large scale feminised office (Leffingwell 1917, 132).

From a Labour Process view then, these photographs do reveal the gradual feminisation of the office as it increasingly becomes subject to mechanisation and scientific management – Ms Taylor is very much in evidence. There is clear evidence, for example, of the Remington Girl, the popular selling slogan used by the makers of Remington typewriters (Cooper and Taylor 2000, 566). Her arrival and increase though does not appear to be solely linked to mechanised deskilling of functions. Indeed, how we view deskilling requires some reflection, since arguably the use of some of these office machines required intensive training and the development of a specific set of unique skills. Women's presence is also visibly apparent in non-mechanised offices where they appear to be conducting a range of bookkeeping and accounting related tasks (see Figure 27). Our photographic findings in this regard are consistent with Walker's (2003b) argument that female labour had been a feature of office work since the 19th century and was not simply a product of the mechanisation of the large modern office of the 20th century. Drawing on the source material for the 1881 UK census (the census enumerators' books), he finds that 18% of recorded bookkeepers were women, a much higher number than the 3.6% recorded in the official census. Most importantly, this bookkeeping work was not of the deskilled or dehumanised variety that we have come to associate with female office labour.



Figure 27 Male and female bookkeepers circa 1900.
Photograph courtesy of the Charles Babbage Institute, University of Minnesota Libraries, Minneapolis, Burroughs Corp. Collection, cb000183.

What must be observed then is that the feminisation of the office is a nuanced affair. Reference to Carmona and Ezzamel's (2016) recent work on the gendered workplace is insightful here. Drawing on Foucault (1979), the authors argue that accounting operates as a gaze which produces gendered divisions in the workplace. Accounting logics, they suggest, impact how spaces become designated for men versus women within the workplace:

Accounting technologies divide and demarcate space into new configurations that obey accounting priorities (e.g., costing and control) ... These spacings and the demarcations they produce are not gender-neutral. The physical partitioning of space produces zones where men and women do gender and where their reciprocal positioning in relation to each other is played out (Carmona and Ezzamel 2016, 4).

Consequently, the gender narrative within the history of the office may not be confined solely to the advent of mechanisation and the implementation of scientific principles. It is not solely a story of deskilling as suggested by the Labour Process perspective. The gendered workspace is no doubt also a product of the accounting logics which were rolled out during this era and the Foucaultian gaze they enabled. The new systems for filing, recording, calculating, and monitoring business transactions had spatial implications for the workplace which were to become highly gendered in nature. Our study therefore contributes to a further understanding of the history of women in non-professional accounting roles.

6. Concluding comments: Scientific Management, Activity-Based Working, and Neoliberalism

Scientific management was seen as a way to control the incredible expansion in the administrative apparatus that had emerged in the US from the late 19th century. Following in the footsteps of a 19th century concern with implementing improved systems for the elimination of waste and inefficiency, the scientific principles of the early 20th century were quickly taken up within the context of the office. As in the case of the factory, office tasks were segregated into their constitutive components while time and motion studies identified the most efficient manner of conducting each element. In this way, office routines became standardised and consequently easy to monitor for performance evaluation. Advances in mechanisation facilitated the application of science. Office machinery raised efficiency levels in terms of productive output, saving time and money, but it also cemented the division of labour and created repetitive and tedious clerical tasks. Increasingly female staff came to occupy these posts; the typist, calculator machine operator and filing clerk emerged as distinctly gendered occupations.

The central objective of this paper is to understand the implementation of accountability and control through the scientifically managed office. Its employment of photo-elicitation methodology has afforded unique and alternative insights into such scientific management processes, supplementing those that have usually been confined to narrative textual sources. In 'witnessing' through these photographs the transition from the small salon-style office to the large scale open plan office, we can all too readily understand the transfer of scientific management principles from factory to office. Hence our study seeks to redress a scholarly neglect of the office within accounting history, and in the accounting research literature more generally. The analysis of the photographs selected has been informed by the dual application of two theoretical lenses: Foucaultian theory and Labour Process theory. Our interpretation of office imagery through these two dominant theoretical lenses within accounting history facilitates a comprehensive view of scientific principles in action. Despite the gulf between the two theories, both are concerned with understanding power relations and human accountability (Fleischman, Hoskin and Macve 1995).

For example, through the process of photo-elicitation, we see the surveillance potential of scientific management, as advocated by the Foucaultians. The arrival of the large scale scientifically designed and managed office facilitated the visibility of all staff and their functions. This ease of surveillance of organisational operations was achieved via the records processed in the office, and the fact that office staff themselves were visible to their supervisors. Management control by surveillance was thereby conducted both visually and through the accounting records. It was applied *by* office staff to the rest of the organisation, and *to* office staff. Thus calculation and recording of information was the central office activity, whereby those creating and maintaining the knowledge based instruments of governance, were also governed in and of themselves. Hence, the office becomes one more locale in which we witness the territorializing power of accounting, how calculative technologies create and define calculable spaces (Miller and Power 2013). Indeed Radcliffe, Spence and Stein (2017) observe that accounting's territorialization of new spaces was a prominent feature of the progressive era in the US. From an accounting and management control perspective, we see in action the concept of 'Control Through the Record'. In this sense the accounting and management control record virtually assumes a life of its own, controlling and dominating those subject to its disciplinary calculative gaze *and* those charged with its creation and maintenance. This arguably reinforces the role of accounting and management control in organisations today, where the potential for its dominance of both controllers and controlled still persists.

Our visual analysis also witnesses the deskilling of labour, as argued by the Labour Process perspective. We see the deconstruction and deskilling of accounting, accountability and related clerical tasks in many of the large scale office photographs. This is all too evident in the transition from the smaller salon style offices to the increasingly mechanised, large scale, mass production line replicating offices. In particular, we witness the deskilling of the traditional role of the bookkeeping function with the advent of an array of new posting and calculating machines. In addition, we evidence the impact of deskilling on the gendered division of labour. Although the transition towards the feminisation of the office emerges as a rather more complex process than stereotypical references and narratives have previously suggested. We would venture to suggest that the role of women in accounting related activities during this period is more significant than usually recounted. Our photographic analysis reveals women carrying out a range of bookkeeping tasks rather than being permanently tied to the typist table. Consequently, our study makes a useful contribution to the relative paucity of research on the history of women in non-professional accounting roles.

Both theoretical lens offer insights into how accounting practices actually shaped the physical space of the office. The Labour Process perspective, for example, provides an explanation of the assembly line layout of the scientific office where desks were organized to facilitate the paper flow of accounting records. The Foucaultian lens also highlights the significance of the accounting record within the office space. This is visually evident in many of the photographs where staff work alongside and indeed often appear to be physically dominated by accounting surveillance records and their storage systems. In addition, the arrangement of office space more generally was designed to facilitate hierarchical observation of staff.

Consequently, similar to Fleischman, Kalbers and Parker (1996), we suggest that a pluralistic research approach can often yield a fuller and more insightful picture. Both theoretical perspectives help to reveal the office's emergence as the engine room of the organisational accountability and control process. The office was redesigned to increasingly mass produce accounting and management control information.

Our historical analysis also carries implications for the world of the office today. Gaining a more critical understanding of earlier periods of office scientific management and associated accountability and control implementation strategies may afford us a better foundation for evaluating accountability and control implementation processes and effectiveness in today's offices. Indeed, it is possible to chart the ramifications of Taylor's social engineering approach to office design and layout for the contemporary open plan and Activity-Based Working (ABW) offices (Parker, 2016). Contemporary offices have moved through various phases of open plan design and associated working processes including wheel designed desk groups, rows of standing or sitting workbenches, hot-desking, bookable cubicles, and most recently ABW designs (Parker 2016). Despite being presented as innovative, flexible and supporting the world of the knowledge worker, research has indicated that these office arrangements are frequently subject to an array of problems (Walker 2016a). For example, office worker satisfaction and motivation have been observed to decline when they make the transition to open plan offices where they find themselves subject to greater levels of distraction, a perception of distance from supervisors, and deteriorating relationships amongst neighbouring workers (Appel-Meulenbroek et al, 2011; Haynes, 2008; Malm and Strömbäck, 2015; Morrison and Macky, 2017; Oldham and Brass, 1979; Oseland, 2009; Rolfö and Eklund, 2015).

While proponents of ABW often argue that their office designs, systems and processes avoid some previously dysfunctional elements of scientific management, they have in fact returned to that Taylorisation so clearly represented in the photographs analysed for this study. Not only that but the presentation of a 'humanised' version of the office as record production space mimicking both the offices of the 1900-1930 period and the manufacturing plants they mirrored, suggests that despite protestations to the contrary by contemporary office designers and organisational adopters, the underlying philosophy of scientific management and control persists (Jeacle and Parker, 2013; Parker, 2016). Consequently, this study brings sharply into focus the observation that the contemporary open plan office brings nothing significantly new to accounting and management control today, but provides empirical evidence of Parker's (2016) earlier claim concerning contemporary offices' return to and continuation of philosophies and practices a century old. So yet again, in today's increasingly service industry oriented era, the office has arguably become the new factory floor.

Finally, similar to Radcliffe, Spence and Stein (2017), our paper offers a "history of the present". In the latter study, the authors examine the political struggles behind the first legislation on corporate disclosure in the US in 1933, legislation which is generally viewed as the original impetus for contemporary accounting disclosures. Our own study, we suggest, also contributes to current debates in accounting research, in particular to the role of accounting within neo-liberal society. As discussed earlier, the rise of neoliberalism has attracted the increasing attention of accounting researchers in recent years. For the purposes of our study, this scholarship is relevant as it frequently seeks to explain the role of accounting and management control systems in a neo-liberal society with recourse to either a Foucaultian or Labour Process perspective. Hence, the Foucaultian and Labour Process perspectives which provide the theoretical underpinning of our historical analysis of the scientific office have

continued to inform discussion within the scholarly accounting community. While the context of debate has moved on from the ‘new’ versus ‘old’ accounting histories of the 1990s, the relevance of Foucaultian and Labour Process ideologies remains as important as ever in understanding contemporary issues. The epoch of scientific management is far removed from the advent of neoliberalism, but the roots of explaining and understanding these two moments shares a common thread. The histories of scientific management proposed by Miller and O’Leary (1987) and Hopper and Armstrong (1991) may have differed in theoretical stance, but they both recognised that accounting serves various political and economic interests. Similarly, Foucaultian and Labour Process approaches to neoliberalism view it as a political project. Our recognition of the role of accounting in neo-liberal society is premised on an understanding of the manner in which accounting has shifted from a concern with cost information to a focus on micro-measurement and micro-management (Cooper 2015b). The scientific office of the early 20th century is a site in which such a shift began to emerge. Our visual analysis of the office highlighted the dawn of a new management control regime, one which was based on deskilling, segregation of duties, and the construction of the knowable disciplined worker. Miller and O’Leary (1987, 263) concluded their seminal contribution to the history of scientific management by suggesting that “accounting today can be viewed as in continuity with, albeit in a considerably modified form, a mode of exercise of power which was installed in the early decades of this century”. We contend that this observation is as equally valid in explaining the role of accounting in neo-liberal society today.

APPENDIX I

Text & Web Sources of Analysed Historic Photographs

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