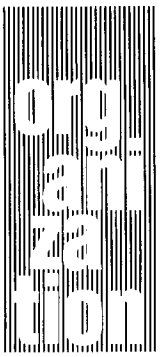
Volume 11(6): 743–757
ISSN 1350–5084



foreword

Spacing, Timing and the Invention of Management

Keith Hoskin
Warwick Business School, University of Warwick, UK

Abstract. *This piece reflects on what we might mean by spacing and timing in a number of ways. It considers first how we might see the Palermo conference that launched this journal issue as a* kairos, *a temporal moment of crystallization that worked through the coming together of its participants to signal that a new intellectual path was already being and continues to be cleared. It then reflects on how these terms work, for the author, to make a new sense of his long-term attempt with Richard Macve to understand where management comes from and what management is. It suggests that management emerges when humans succeed in engineering the spacing and timing of activity into a new kind of centripetal amalgam. At the structuring level this entails the design of a centripetal kind of structure, where vertical and horizontal nodal connections are engineered to cohere rather than collapse—something that is arguably first achieved with the articulation of the line-and-staff structure. But such a structuring is nothing without a set of processes ensuring and enacting the continuity of spacing–timing coherence within and between nodes, all day every day, and here and every relevant where. Such processing, it is suggested, takes place once writing and examining practices get combined with putting numbers on people. Finally the paper asks whether spacing and timing may not have a conceptual or theoretical status analogous to that of Heidegger's 'lighting of the world', as horizonal constructs marking out the ground and limit of our acting and making sense in the world at all.* ***Key words.*** *engineering history; Heidegger; kairotic events; lighting of the world; line-and-staff structuring; management as invention; time-and-motion processes; United States Military Academy at West Point*

DOI: 10.1177/1350508404047249

Pre-script: Palermo as Kairos?

This is a historic or historical reflection in two senses of the term. First, as a reflection on the Spacing and Timing event that took place in Palermo in 2001, it contemplates how or how far that event has a claim to being not just historical but historic in the sense of being 'kairotic', i.e. a *kairos* as a significant moment of crystallization, turning point, or things coming together. Second, it reflects on how, after that event, one—this one—now finds himself on the path to a re-thinking and re-writing of things I have long been thinking about, most particularly the historic and historical questions of what management is and where it comes from. Through this dual reflection, I hope I may make some contribution to the possible ways of thinking about these particular terms, 'spacing' and 'timing'.

My first reflection is that Palermo was a kairotic event: not in the sense of a moment of discovery—a fanfare breakthrough moment of seeing things never seen before—but in a more oblique way, perhaps being seen as a significant way-station on a path already being cleared or constructed. As such it was more a sign that a way of seeing and thinking, in retrospect already under way, had reached a level of interest and attraction where significant numbers of people were willing to congregate intellectually as well as in person, however different the individual paths that led them thither and took them thence. Such intellectually kairotic events are, in my experience, rare. The first such that I can recall was some 25 years ago: a weekend meeting in London called by the Ideology and Consciousness (I & C) scholarly collective to discuss the work of Michel Foucault. The second was some 20 years ago: the first Interdisciplinary Perspectives on Accounting (IPA) conference in Manchester. There has perhaps been one other in between.

What brings them together in my thinking is that each, dimly in prospect but clearly in retrospect, signalled some deeper intellectual sea-change. That is not to say that any of these events was some kind of consensual happy-consciousness meeting of minds (perhaps it would be the worst of insults to suggest that they might have been). Indeed the first degenerated, as I recall, into a classic fissiparous intellectual slanging-match—appropriate perhaps given the subsequent maze of paths that has made up the forest of work claiming to carry the true Foucauldian Word. But each time, even within the event, there was a sense of something different going on. At the I & C event, it was kairotic, on walking into the room, just to discover that over 200 people had also found themselves willing to commit a sunny weekend to such an intellectual engagement at all. In Palermo, it was kairotic to participate in such disparate debates with such varying senses of what spacing and timing might be, but without therefore any obvious or immediate retreat from the terms.

But a *kairos* is never just a fleeting 'now'. It retains, even as it shifts, significance after the event. Immediately after the I & C and IPA events, it

was kairotic to realize something that may not be apparent now but was very real for many working in Anglo-Saxon academic institutions then—that each of us was not alone in our attempting what were for us new and seemingly isolated intellectual engagements. A later shift in significance has emerged in the way that these *kairoi* can now be read as moments heralding an institutional sea-change, as their participants have progressed to editorships and chairs at the heart (living or dead) of intellectual matters. But they can also, alternatively, be read as 'hinge' or perhaps better 'funnel' events—moments that helped engineer the channelling of the roiling waters of intellectualizing (and not only for their participants but more generally) into a new discursive sea of texts and counter-texts.

With Palermo, it is still too soon for really long-term reflections and interpretations, positive or negative. But for me it is already readable as a kairotic event in itself, given that it provoked so many disparate people to respond to the call to engage with these intriguing terms 'spacing' and 'timing'—a call for which those who organized the conference and then this consequent collection of texts deserve a particular credit and acknowledgement. And I want also to attempt to read it, even this soon after the event, as a hinge or funnel event, for the way it has, in my own case, begun to dislocate or redirect my ways of thinking. (Of course, whether this is a private reverie or the ghost of an idea that evokes echoes for or in others, only its reading in other times and places will tell.)

My choice is to reflect here upon two questions that I have long pursued in my work with Richard Macve: the historical question of where management comes from and its historic but ever-present twin—what management is. In our work to date we have attempted to answer the first by following and extending the argument first proposed by Alfred Chandler in *The Visible Hand* (1977), i.e. that modern management first materialized in the USA in the early to mid-19th century, with the consequent development of modern business enterprise and *the* modern business enterprise, and an economic world in which, as his title declares, the visible hand of management dominates the invisible hand of market forces, leading to the endemic and systemic outcome of 'imperfect competition and misallocation of resources' (1977: 4). We are now attempting to answer the second by proposing that what management 'is' is something distinctively different in human ways of acting and thinking—a difference we now characterize by describing it as a new solution to the age-old human problem of 'getting people to get things done'.

Here is not the place to rehearse the detail of our answers, but I hope that summarizing them briefly may demonstrate how our thinking on these questions is getting shifted and displaced by having now to think (and such thinking is hard work) about the constructs of spacing and timing.

So our still-evolving argument on the historical side has argued that Chandler is right to identify just a few key US sites over the period

1830–55 as the locations where management first surfaced in the economic world—specifically, as he says, in the context of musket manufacturing undertaken in the US Armory at Springfield, Massachusetts, and then on a couple of the early US railroads, first on the Western Railroad and then (in our interpretation though not his) on the Pennsylvania. Where we differ is, firstly, that Chandler interprets these as two distinct developments, differentiable by their structure, with single-unit or factory-focused management beginning at the Springfield Armory and multi-unit management (and so ultimately his epitome of management structure, the multi-divisional M-form) beginning on the railroads. We see this structural difference as only secondary and contingent, with the two forms being two versions or aspects of one change. But then that is because we also differ over who was responsible for this breakthrough (which ultimately leads us to our different answer to the 'what is management?' question). As those who know our work will be aware, that is because the archival evidence indicates to us that the people who developed the new solutions to the age-old problem were not businessmen at all, as Chandler concludes. They were graduates of the United States Military Academy at West Point, and all of them were cadets there under the regime of the Academy's third Superintendent, Sylvanus Thayer (1817–33).[1]

In the context of this reflection, perhaps the key thing to be said concerns what the men involved in what we would now describe as the 'invention' of management did to engineer (a term I use here advisedly) new modes of spacing and timing, with just an aside on the question of why they did so. But if I take that 'why?' question first, our answer is that it was the learning they went through at West Point, under the new pedagogic regime that Thayer introduced from Europe, that made the crucial difference. They were the first people in the USA to learn via the practices under which we all now learn: getting students to write and surrounding their performance with writing about them, submitting them to constant examination, both written and oral, and then using numerical grading to evaluate their examination performance. They were arguably the second generation inside that world, given that similar practices had been spreading from the 1760s in elite higher education institutions in France, Germany, England and Scotland (Hoskin, 1993).

What all such people, it seems, took from learning under these practices was both a new set of knowledges, early forms of the modern knowledge disciplines, and a new way of engaging with and solving problems, which typically took the practices of writing, examining and numerical grading and translated them to whatever new situation demanding solution confronted them. In the US context, the West Point graduates took these practices and applied them (as no one apparently did as yet in any European context, so far as the archives show us to date) to solving the problems of coordination in workplace contexts. What they

came up with is what Chandler describes as the soul of management, administrative coordination.[2]

So how may one now see those involved in management's supposed 'invention' (whether they be these West Pointers, whether indeed they should ultimately prove to be people located in the USA or not) as engaged in engineering a new kind of spacing and timing? At the Springfield Armory, the breakthrough lies in the articulation of a new way of engaging people in the activity of musket production through first establishing a *prescribed* time required to make each musket part, and then reordering the space across which manufacture proceeded, so that the musket 'took shape' following a principle of linear flow.[3] The trigger for this was a study that to all intents and purposes was a time-and-motion study, but 50 years before the work of F. W. Taylor, undertaken at the Springfield Armory in 1831/2. An 1819 West Point graduate, Daniel Tyler, who was by then Army Inspector of Contract Arms, deployed the practices of writing, examining and numerical grading to conduct a study that established the precise time that *should* be required for producing each part of the army-issue musket (Hoskin and Macve, 1994). He did so simply by spending six months standing 'watch in hand', examining and recording the average time actually required to produce each musket part, and then extrapolating a norm or 'standard' time (naturally lower) that each part should take. On that basis Tyler then (a) constructed a table of daily piece-rate targets and rates for each part and (b) devised an overall production coordination system across the successive shops involved in the production process. Once he had covered the whole production process, he had the information necessary to work out, by cumulating his standard times, the standard time for the production of one musket (1772 minutes 36.2 seconds), and to calculate via the piece rates established for each item a daily production target of acceptable-quality pieces—a 'tough but attainable' target (equally naturally).

We know of nowhere where such an examination had been previously undertaken, which is not to say that clock-time and indeed spatial lay-out of activity had not previously been focuses of attention in workplaces.[4] But it is the way in which this solved the problem of getting people to get things done, by imposing standards for each activity and coordinating the whole, that represents a new kind of systematic 'space–time compression' (to use the familiar phrase, which so often runs the risk of concealing rather than explaining what was new). The idea would now perhaps be better phrased by describing it as a new mode of spacing and timing compression, since what ensued was not in any way a 'compression' of physical space and time, but instead a prescription (via the practices of writing, examining and grading) of how much time you should take for an activity, what space should be occupied to undertake it, and how each particular facet of timing and spacing should be linked to each preceding and succeeding facet. Further, that prescription did not circulate in an exterior physical time and space (indeed arguably it had no purchase on

such time and space at all). Instead it circulated between the semi-virtual exterior space of prescription and inscription, the writerly apparatuses and texts that recorded and accounted for standard and actual performance, and the semi-virtual interior space of mind, soul and body, where such writings became internalized as norms and boundaries of acceptable and unacceptable work, definers of success and failure, and circulators of competition for promotion and such forms of resisting cooperation as F. W. Taylor's 'soldiering'.[5]

Our argument for then seeing the development of multi-unit management as a complement to the single-unit breakthrough derives from a similar historical analysis. Chandler—again we think rightly—sees the first breakthrough on the railroads as the development of the line-and-staff form of organizational structure, which he sees as emerging first on the Western Railroad, which started running trains in 1839, with George Whistler as its first Superintendent. Perhaps he sees Whistler as not particularly creative in this regard (see endnote 1), because historians to date have seen the breakthrough as a crisis response, following a head-on collision in 1841 of two trains on the single-line track running through the Berkshire Hills in Massachusetts. However, our archival work indicates that the new structure was there from the beginning of train operations (and indeed the 1841 crash may be the first instance of the business world's counterpart to iatrogenic disease, the 'manageriogenic disaster').

For us, this is, like Tyler's breakthrough, an intriguing apparent first. Even though the Western was by no means the first railroad system, either in the USA or in Europe, it was the only one to come up with this particular form of structuring ways of getting people to get things done, where the staff function concentrated information from the lines into a distinct top office and required a presence of such a function at each node within the line. What was therefore new, again at that semi-virtual exterior level that is the space of prescription and inscription, was the construction of a fully connected (and chartable) organizational structure running alongside actual activity in time and space, as its prescribing and inscribing twin. Such a structure could therefore equally become internalized and occupy the semi-virtual interior space of mind, soul and body of the organization's members, visualizing for them their relative insignificance (or indeed, as they moved up the chart, increasing significance). It could also, as a structure, become seen in quasi-biological terms as something organ-ized, in the sense of endowed with organs, a living entity defined in its coherence, as in biology, by its functions.[6] But what was being developed here, at the level of spacing and timing (seeing those still as constructs operating between semi-virtual exterior and interior worlds), was not some form of spacing–timing 'compression', but a new principle of spacing–timing *coherence*. And the successful implementation of management in the modern world could then in principle

follow, at any time and place where the complementary and conjoint operation of such compression and coherence is implemented.

However, that is not the end, or even the end of the beginning, of this possibility, under our analysis. For there was one further, and as we now see it decisive, step taken emanating out of the West Point worldview by our final pioneer of management, Herman Haupt. Haupt was the man who, in our current work, we see as having transmuted the processual and structural breakthroughs of Tyler and Whistler into the quintessential form of Chandler's 'administrative coordination' through constructing the first form of modern multi-unit management on the Pennsylvania Railroad (Hoskin and Macve, 2004).[7]

But there is a special aspect to Haupt's innovation that has only recently 'come out of concealment', to use an appropriate Heideggerian term, from the work we have been doing. We had long been aware, if vaguely, that Haupt was not only a successful 'engineer of management' but a successful 'engineer proper'. But what has now emerged from under our noses is a precise homology between his achievements in each field (Hoskin, 2004). For Haupt has a place in the history of bridge-building, as noted by the distinguished historian of engineering Daniel Calhoun in his book *The Intelligence of a People* (1973). Calhoun singles out as a sign of that new American 'intelligence' a breakthrough in bridge-building wherein blueprints and calculations take over from old artisanal 'rule of thumb' approaches, and draws attention to the distinctively American invention of the counter-truss bridging system. In this system, first articulated in book form in 1842, the old simple type of truss bridge, easy to build in the context of early American engineering skills but systemically weak because of the centrifugal forces that potentially affected any and every truss as weight was put upon it from above, was superseded by a new system, which, by employing carefully designed triangular arrangements of beams, created at each nodal truss point a *centripetal* instead of a centrifugal force. The book's author was Herman Haupt.[8]

The homology to the new structuring in management is, I suggest (but I would), both elegant and exact, and a perfect exemplar of how modes of engineering spacing and timing may migrate across supposedly distinct knowledge fields. We need only to begin reading the classic organization chart, with its combination of line and staff functions, as a form of counter-trussing, a capturing and stabilizing of contrary dynamics wherein the staff function is the means through which each organizational line remains stable and able to connect activity, from the organization's 'top' to its 'bottom', within and across its various nodes. With such counter-trussing one may have multiple lines and, cross-cutting between nodes on different lines, one may indeed, at the phenomenal or surface level, have all kinds of apparent organizational forms, so long as the Haupt engineering principle remains embedded in the underlying structure.

In terms of spacing and timing this was, it seems to me, a qualitatively new kind of structuring. Just as in the physical world the counter-truss solution rendered physical conjunctions of beams and space centripetal and thus enabled the construction of many forms of bridge that would remain stable across time, so, in (and equally between) the semi-virtual exterior and interior worlds of spacing and timing, Haupt's structuring of administrative coordination enabled a new quality of 'structural' coherence and stability. Add to this Haupt's deployment of the practices of writing, examining and grading to set the timing and spacing of the activity taking place within the organizational structure, and one can perhaps see just why this can (or in our view should) be seen as an invention, to be set alongside Watt's invention of the steam-engine or Morse's of the telegraph. The new structuring and processing together engaged a new kind of spacing and timing for humans at the levels of both their semi-virtual exterior and interior worlds.

This is, it seems to me, a model form of the kind of action net construct that Barbara Czarniawska sets out elsewhere in this issue. It prescribes and inscribes the kind of action and thought that is required in undertaking administratively coordinative tasks, and it constructs the kind of net that is robust under pressure and able through its centripetal dynamics to handle in a relatively friction-free manner the everyday coordinative demands of running the business, undertaking projects, and planning and implementing strategy, and yet also to withstand the shock of potentially or actually catastrophic events. In other words, this is a net that does not automatically unravel or disintegrate at the first sign of pressure. On the contrary, it is a net that, through its centripetal tendencies, shows a great capacity to repair or reconstruct itself in extremis, or of course, in a more normal form of catastrophe, to keep things going even when, in the evocative phrase, the lights are on but nobody is home. This it does through the routinized invocation of the now-endemic practices of writing, examining and grading, and the consequent constant circulation of those plans, budgets, reports and appraisals that constitute the processual lifeblood of the staff function.

As to what management 'is', as a result of such a reflection, it turns out to be, in its new way of engineering spacing and timing, a historically unprecedented way of getting people to get things done, both structurally and processually.[9] But also, if our analysis is even half right, it was not in its essence, as is widely assumed, a form of power but a knowledge breakthrough.

Postscript: What, Then, Are 'Spacing' and 'Timing'?

As I have said, one does not have to buy these particular answers to the questions of where management comes from and what it is. My concern here has been only to open to others a reflection that I have not been able to avoid since the *kairos* that was Palermo—that the thinking I have been

pursuing with Richard Macve into these questions has now been radically shifted and displaced. If we previously had a focus on practices and on how a change in the practices of learning was the means to the construction of what we may now understand as 'management', we now must work with a qualification to that focus. Spacing and timing as constructs 'turn up' at the heart of what we had been investigating purely via a theory of practices. They 'emerge out of concealment', taking that Heideggerian phrase again, which suggests that they were there already all along, always (for us) just beyond the horizon of perception or articulation.

So how may one—this one—begin to characterize this turning up and emerging of spacing and timing? How indeed may one begin to specify what might be signified by calling them 'semi-virtual' yet possessing both an exterior and interior status, outside and inside us, as horizons of our ways of seeing and knowing? The analogy that emerges for me, hinted at in these invocations of Heidegger, is with his conception of the 'lighting of the world'—that which goes before any emergence of understanding or truth, that which enables, for instance, truth (in Greek, *aletheia*) to be that which, so to speak, 'escapes from escaping notice'.[10]

For Heidegger, *aletheia*, as what emerges out of concealment, can succeed in emerging at all only given some 'lighting of the world'. Similarly, such a lighting can alone enable *logos*—as what is, in another closely observed Greek etymology, 'gathered together' as something cohering—to become visible and comprehensible as such a coherence. Drawing on that analogy, I suggest that spacing and timing are categories or constructs with a similar status. They are what is given to us as the constituting, from the exterior and the interior, of our coming into being and becoming. But as what is given to us in such a way, they are not a 'pure there' or 'pure then', external to us (as 'pure' space and time may be, and have been, conceived, within our philosophical-scientific tradition, as being), just as any 'lighting' of the world is never a pure there and then either. The world's lighting as we encounter it emanating from the exterior includes the natural in all its forms, from brightest sunlight through dusk to the dark lighting of the night, but in our world now includes all those artificial forms of lighting, fire, electrical, and the artfully artificial—chiaroscuro, the lighting of photography, film and TV. But all these exterior sources, which are simply given to us as and when we come into the world, become lightings of our world only through the intervention of what emanates from the interior as our mode of seeing. Any coming out of concealment entails both.[11]

The same principle of action, I would suggest, applies to spacing and timing, as ground of our making sense. Spacing and timing have a similar supplementary relation to space and time as the lighting of the world has to light. They are similarly horizonal, as ground of our moving and communicating in the world, but again not simply horizonal in an exterior way, framing what we do and think from without, but a horizon

for what occurs internally as well. The one difference from lighting is perhaps that spacing and timing implicate the whole sensorium—sight, hearing, smell, taste and touch—in constituting the horizonal ground of our comprehending.

Again we can trace a distinction between what is given as spacing and timing 'naturally' and artificially, and, in terms of artificial but exterior supplements that shape our senses of spacing and timing, there are all the semi-virtual devices our culture has developed. So, we experience spacing not just through seeing and moving through the natural world, but via such devices as mapping and perspectival projection; seeing the world as 'all-in-focus' even though natural vision can focus on only one aspect of the visual field, and sensing distance in terms of the apparatuses of geographical or geometrical measurement (as a golfer can 'see' that it is 100 yards or metres to the pin). We similarly experience timing less through day versus night or the seasons than via the unchanging measures of clock and calendar time—just as we measure the past in centuries, a way of 'timing history' unknown to historians before the 16th century, when it was apparently introduced by the Counter-Reformation writer Flacchius Illyricus (Hay, 1977).

Additionally, we are now used to spacing and timing coming to us simultaneously in many synthesized ways, coordinated out of our engagement with the semi-virtual devices of writing we have available. To give just one example, we are now totally familiar with an acoustic form of 'harmonization', musical harmony, that was unknown in human experience before spacing and timing were brought together in the 14th century and synthesized into a textual format in which the principle of the zero-point is combined with a regularized spacing system and applied to the transcription of sound. Before the development of stave notation and the inscribing within staves and bars of a series of 'notes' that are fixed in pitch and named (in English A to G and their sharps and flats) and given 'time values' (minim, crotchet, quaver or half-note, etc.), elaborate harmonization was apparently unknown, because in a strict sense it is unknowable.

But, given stave notation, 'western' music rapidly progressed through polyphony to harmony and counterpoint, and since into all the arrays of post-harmonic music. Such a musicality then becomes a feature of our interior timing and spacing. Few of us will 'know' the rules of harmony, but many can both compose and perform in harmonizing modes (including today many born and raised well beyond 'western' musical contexts).

Such timing–spacing syntheses are now integral features of our exterior and interior worlds, perhaps summable up by reflecting on the extraordinary semiotic diversity of our media-saturated world. But even at the simplest levels, we should never forget that timing–spacing synthesis has been a necessary precondition, or horizon, to signifying and making sense at all.[12]

Which perhaps is where this postscript should pause . . . *in medias res*, naturally, as we always are within the exterior and interior horizons of spacing and timing. But if this may begin to alert us to how miraculous, yet quotidian, inventions in general are (whether management is taken as qualifying as such or not), because of the horizonal way we are all within spacing and timing, that is enough—for now. . . . If anything has hereby come out of concealment for any other one than this one, then the miracle of signification has demonstrated that it has not—or not yet—lost its strange but familiar power to transgress boundaries to where it was never bidden before, or perhaps, always before, seemingly for-bidden. . .

Notes

1 In this regard, Chandler observes that West Point graduates did have a role in some of the developments, including two pioneers of railroad management, George W. Whistler on the Western and George B. McClellan on the Illinois Central. Such West Pointers initially got involved in railroad surveying because they were at this period the pre-eminent and best-trained engineers in the USA, being the only people in the new nation who had had a formal training in the new advanced mathematical, scientific and engineering disciplines that had, over the previous generation, begun to be formalized and taught in France at the Ecole Polytechnique (see further, endnote 2). But Chandler's overall conclusion is that, as pioneers of railroad management, the West Pointers were 'the least innovative of the lot' (1977: 95).

2 Our particular 'why' explanation has focused on the West Point connection, on the basis that this was the first institution in the USA to import from Europe the new kind of knowledge 'disciplinarity', with its focus on learning via the familiar modern practices of writing, examining and grading (Hoskin and Macve, 1988; Hoskin, 1993). Thayer imported a version of this new disciplinarity, specifically the educational system used at the Ecole Polytechnique in Paris—textbooks and all. This new system of learning promoted a new kind of behavioural discipline wherein, as individuals, students became engaged in a new kind of success/failure game where they were knowable as objective subjects on the basis not just of ordinal ranking but also of an absolute number giving your intellectual 'worth'—the examination mark, or later the Intelligence 'Quotient'. As groups they were formed as a field involved in forms of competition of each against all (and also a new mode of cooperation either as learning subgroups or in resistance to the total demand for truth production, including the truth of one's self as objectively measured self-worth). But this was not just a behavioural discipline of the kind that is, in our view, mis-read from Foucault's *Discipline and Punish* (1977). It was, equally importantly, an exposure to and internalization of the truth contained in the *content* of the knowledge disciplines studied, which in the case of the West Pointers was all the mathematical, scientific and engineering knowledge concentrated into the textbooks written for the Ecole Polytechnique. (Initially, *mirabile dictu* in the monolingual USA, they had to study these texts in French. Indeed several of those early students became some of the highest-selling authors of 19th-century America by translating

those texts, and seeing them sell literally in the millions in the burgeoning mass market of US secondary and higher education.)

3 This was not of course a modern operations management system, as it still proceeded across physically separated production shops. Nevertheless, the shops became ordered successively and the foremen responsible for successive shops became accountable, via performance records, for the level, quality and velocity of production across a given time period within their given location within the flow system.

4 There is of course much research into the development in various sites and countries of new forms of workforce discipline—including 'time discipline' as discussed in the seminal article by E. P. Thompson (1967). Richard Macve and I have set out elsewhere (e.g. Hoskin and Macve, 2000) our detailed explanation as to why earlier developments in Europe, including the British industrial revolution, did not develop forms of modern management but were instead manifestations of other approaches to getting people to get things done.

5 Incidentally, if one does buy into this West Point connection and the pedagogic genesis of timing and spacing discipline, there is a fascinating connection between Tyler and Taylor's much more famous time-and-motion studies. Taylor, reflecting before the House of Representatives on when he first conceived of time study, referred back to his time studying at Phillips Exeter Academy in the early 1870s. They were taught mathematics by a professor who would set them a lesson that seemed always to take two hours. Finally, after two years, the boys figured out why. 'Mr Wentworth would sit with his watch always hid behind a ledge on his desk. . . . He would give a series of questions and insisted that the first boy that got them done would raise his hand and snap his fingers. . . . He went right through the class until just half of the class held up their hands. . . . What he wanted to do was find out just how many minutes it took the average boy in the class to do the example which he gave. Then we found out that Wentworth timed himself when he first tackled those problems . . . and the ratio between his time for doing the examples and the time of the middle boy . . . enabled him to fix the exact stunt for us right along. The speed of the class changed. He did not change. All he had to do was to get this ratio of change' (Wrege and Greenwood, 1991: 5, citing House Resolution, 1912, pp. 1494–5).

6 Again, we see a direct link here between Whistler's innovation and West Point. For Whistler, like Tyler, graduated in 1819 and so was already at the Academy when Thayer arrived with his new pedagogic regime. But, further, it turns out that Thayer, soon after his arrival, and in the process of erasing the old gentlemanly regime of learning, had introduced a way of running that tiny little Academy (of some 200 cadets) on the same principle, getting a constant flow of information on the academic and behaviour performance of all classes and all cadets funnelled into his own Staff Office; and the first cadet Staff Sergeant in this new Office was George Whistler (Hoskin and Macve, 2004).

7 For more detail, see Hoskin and Macve (2004). Haupt was a second-generation Thayer graduate, overlapping with the latter's last two years as Superintendent and graduating in 1835. He was first hired by the Pennsylvania Railroad (PRR) in 1847 for his engineering skill as a surveyor, and quickly showed his superiority to others in both the speed of his surveying

and his ability to map out quality and cost-effective routes. Promoted to the number two post of Superintendent in 1849, he undertook for the railroad a survey of all the current management practices of existing roads and, before its opening, laid out a managerial system including both a line-and-staff structure and the numerical grading form of performance measurement systems (both financial and non-financial). In the first three years of operation between 1849 and 1852, we see him having solved all of the key modern managerial issues, covering (Hoskin and Macve, 2004: 10) 'how to subdivide the operational responsibilities, how to separate operational and financial control, and how to organize a central "General Transportation Office" which was the origin both of the "staff" function in the PRR's ultimate "line-and-staff", divisionalized organization, and of the "controller" function of accounting and audit that eventually became clearly identified—from 1857 onwards—as the key organ of managerial control. Haupt's initial design achieved success along five crucial dimensions simultaneously: financial control, cost control, strategic analysis, and both internal and external corporate governance and accountability.'

8 As Calhoun puts it, this was now a 'statically determinate' design, enabling exact calculation of forces, using 'simple trigonometrical methods and the principle of the parallelogram of forces to analyze the stresses and strains in any truss that was compounded of triangular arrangements of beams' (1973: 297, 299). This was Haupt, of course, employing the disciplinary expertise in engineering he had learned at West Point.

9 To put it briefly, what was new processually was the practice of putting numbers on human performance. Earlier educational systems might have examining, but not numerical grading. Earlier accounting systems accounted for goods, materials and wages, but did not track the quantity and quality of human performance, particularly not in terms of quantity and quality produced in a given time, as Tyler's system did. Earlier structural forms had entailed forms of hierarchy and of principal–agent relation. But where there were hierarchies they were interrupted hierarchies, and usually interrupted by a principal–agent setup. So even large companies such as the East India companies had a hierarchy but were interrupted at the point where the agent 'ran the company' (or alternatively ran things for himself) in a given city. Imperial powers such as Rome operated the same principle, where ex-consuls would run provinces. The Catholic Church had the same provincial system, with bishops as the local agents. Military powers had no central staff function, but had to leave the waging of war to the general as agent of the state, so that, strategically, 'the general was the plan'. In accounting terms, at such points of interruption the relation was one of stewardship accounting, with the steward required to be responsible for the return on what had been given as assets into trust. Now there are examples of extended hierarchy before this moment—the Jesuit system has been closely analysed in just this way (Quattrone, 2004 in press). But what Whistler and Haupt, and before them Thayer, wrought were the first non-interrupted hierarchical systems of which we are aware, incorporating constant accountability and promoting visions of strategic organizational futures out of what was known as the organization's past.

10 Heidegger here plays on the possible etymology of *aletheia* as a term combining the verb form *lanthano* (to escape notice) with the so-called

'alpha privative' prefix of negation, thus presenting us to truth not in its ex post frozen form, truth-as-correctness, but as truth as revelation, that which we experience in the phenomenon (always frustratingly but of course necessarily recognized in our personal timing and spacing only *after* the event) of the 'a-ha' moment.

11 We should therefore not presume too complete a dichotomy between exterior and interior, given this complementarity, particularly considering the peculiar but familiar lighting that we encounter diurnally, when we pass over from the exterior 'exterior lighting' of the world to the interior 'exterior lighting' that we encounter in or as our subconscious dreaming of the world. Across all these lightings, unbidden, we cannot deny or resist an inexhaustible variety of comings out of concealment and gatherings together.

12 In this respect, *interior* spacing and timing are absolutely horizonal to each different mode of signifying. The very possibility of meaning getting articulated and communicated in any form—speech, writing, art, music, etc.—derives from highly precise and differentiated spacings and timings being at hand, and then getting established, internalized, practised and reproduced in particular formats and modes, within individuals and across groups. Speech, shouting, singing, whispering—all entail the appropriate articulation of successive and precise spatio-temporal conformations of the organs involved, combined with an appropriate velocity of breath through the requisite passageways; and so similarly are different conformations of organs, emanating from within, involved in the many modes of writing, drawing, painting, etc. Comparable skills are of course involved in the decoding of whatever is thus encoded.

References

Calhoun, D. (1973) *The Intelligence of a People*. Princeton, NJ: Princeton University Press.

Chandler, A. (1977) *The Visible Hand*. Cambridge, MA: Harvard Belknap Press.

Foucault, M. (1977) *Discipline and Punish*. London: Allen Lane.

Hay, D. (1977) *Annalists and Historians: Western Historiography from the Eighth to the Eighteenth Centuries*. London: Methuen.

Hoskin, K. (1993), 'Education and the Genesis of Disciplinarity: The Unexpected Reversal', in E. Messer-Davidow, D. Shumway and D. Sylvan (eds) *Knowledges: Historical and Critical Studies in Disciplinarity*, pp. 271–304. Charlottesville: University of Virginia Press.

Hoskin, K. (2004, forthcoming) 'Management and Design: A Historical Reflection on Possible Future Relations', in R. Boland and F. Collopy (eds) *Managing as Designing*. Stanford, CA: Stanford University Press.

Hoskin, K. and Macve, R. (1988) 'The Genesis of Accountability: The West Point Connections', *Accounting, Organizations and Society* 13(1): 37–73.

Hoskin, K. and Macve, R. (1994) 'Reappraising the Genesis of Managerialism: A Re-examination of the Role of Accounting at the Springfield Armory, 1815–45', *Accounting, Auditing and Accountability Journal* 7(2): 4–29.

Hoskin, K. and Macve, R. (2000) 'Knowing More as Knowing Less? Alternative Histories of Cost and Management Accounting in the U.S. and the U.K.', *Accounting Historians Journal* 27(1): 91–149.

Hoskin, K. and Macve, R. (2004) 'Pennsylvania ($)65,000?', paper presented at the American Accounting Association Annual Congress, Orlando, FL, August.

Quattrone, Paolo (2004, in press) 'Accounting for God. Accounting and Accountability Practices in the Society of Jesus (Italy, 16th–17th Centuries)', *Accounting, Organizations and Society.*

Thompson, E. P. (1967) 'Time, Work-Discipline and Industrial Capitalism', *Past and Present* 38: 56–97.

Wrege, C. and Greenwood, R. (1991) *Frederick W. Taylor: The Father of Scientific Management, Myth and Reality.* Homewood, IL: Business One Irwin.

Keith Hoskin is Professor of Strategy and Accounting at Warwick Business School. He writes and researches on the genesis of modern management and accounting practices, and also on the modes of teaching and learning in school and workplace. His work with Richard Macve on the genesis of modern management is to appear in book form as *Powerful Knowledge: or The Way We Manage Now* (Oxford University Press). **Address:** Warwick Business School, University of Warwick, Coventry CV4 7AL, UK. [email: keith.hoskin@wbs.ac.uk]