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False numbers as formalizing practices

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Abstract

It will be argued that false numbers in working documents, formulae, and business plans are used as temporary or conditional devices to enable rationalization. The social processes of creating formalized practices depend upon activities that are themselves conditional and ephemeral. That is, rather than subvert the ostensible purpose of fixed representation, false numbers make stability and fixity in representation possible. Examples used include business forecasting, property tax assessments, and the introduction of accounting into cooperative agriculture in Stalinist Hungary.

Keywords

accounting, numbers, quantification, rationalization, socialism

The purpose of numbers varies, as does their meaning. Adept use of numbers depends upon a clear understanding of what they are doing, and why, in any particular situation. Then what do the numbers in the following two stories mean?

> At a meeting of faculty and administrative staff at a West Coast university held several years ago, a debate arose about the viability of a number in a long-range planning document, specifically in relation to the number of parking spaces on campus. Faculty expressed concern about the number being planned in light of university expectations that the student population would grow substantially. After several rounds of questioning, a senior administrative official finally blurted out in exasperation, 'It's just a false number, o.k.?' This immediately silenced the faculty, and the committee proceeded to review the rest of the planning document.

> On 7 April 1953, the accountant of the Red Star Cooperative Farm challenged her fellow accountants in the county to participate in a competition in honor of 1 May. She set the terms of the competition, including having one's books up-to-date, posting monthly advances

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> distributed to farm members, and appraising the membership of plan targets and actual items realized at each quarterly meeting. Officials from a neighboring district responded by nominating X.Y., whose accounting practices were deemed to satisfy the terms advertised. Ten features of her accounting practice were described, covering a range of tasks from recording expenses, earnings, and members' [pay] advances, providing data to higher agencies, and keeping cooperative farm leaders and members aware of their financial situation. The first two characteristics of her award-winning accounting practices warrant citation: '1) She keeps the books up to date with minor inadequacies, and 2) she prepared the financial plan by the deadline, although not entirely in accord with reality.'[1]

Two stories, two numerical discrepancies: both, I will argue, are 'good to think' (Levi-Strauss, 1963).

The point of this exercise is to identify two kinds of numbers that are used in formalizing practices: false numbers and provisional numbers. These are to be distinguished from numbers as we usually understand them: referents to stable entities that carry the same meaning no matter what their context. Provisional and false numbers do not share this stability, nor are they meaningful outside specific contexts. I will argue that provisional and false numbers occur in clearly identifiable situations. Provisional numbers are used in planning and strategizing: to assist groups in setting the parameters for tasks at hand and debating their relative merit. In other instances, provisional numbers parade as stable and fixed indicators, though their provisional status is well known by those responsible for making them. False numbers appear when the primary task is to learn how to deploy numbers, making the relative accuracy of the numerical sign less important than the attempt to master the logic of formal procedures.[2]

Why make this analytic distinction? I will argue that identifying these peculiar instruments permits us to track the means by which a range of complex social projects is accomplished. In particular, the purpose is to divorce the study of everyday formalizing practices from criteria inherited from modernist paradigms that evaluate social practices in terms of idealized representations in which approximations to elegant structures serve as evidence of increasing formalization. Attending merely to the spare features of formalized procedures means we overlook the dynamic social processes by which rationalization actually occurs. In other words, assuming that the effective use of numbers depends upon their veracity obscures crucial social processes at the heart of modernizing practices.

Confronted with the stories told at the outset of this paper, one could easily explain them as examples of bad technicians and poor practices. The former explanation would identify the practitioner as flawed: the vice chancellor was a hack, and the young bookkeeper was unsuited to the job. We might concede that the vice chancellor was properly trained, but just doing a bad job, whereas the young trainee accountant would be described as innumerate or ignorant. The latter interpretation – poor practices – would see the problem arising from inefficient or underdeveloped institutional structures: bad bureaucracies needing to be streamlined or modernized. Another interpretation might place the blame at the foot of planning, a pernicious practice associated with the failure of socialism or the heavy hand of big government. I will argue, on the contrary, that in both examples the practitioners were doing exactly what they were required to do, and doing it well. Plans were being worked through, and skills were being acquired. In both cases, the numbers made sense to the users, if not to us.

The paper begins with a notion of formalizing practices, followed by a review of the literature on numbers and accounting. Then follow examples of provisional numbers from a variety of domains: finance, taxation, and modeling in the social sciences. The second part is devoted to false numbers. In that section I will discuss one example at length: Stalinist accounting practices. This example is based on primary materials I have gathered in the course of another, larger project.[3] While the evidence marshaled in the two sets of examples diverges in specificity and depth, they serve the purpose of illustrating the use of provisional and false numbers, as well as their value in analyzing formalizing practices, that is, as productive means of rationalizing modern organizations, planning finances, or distributing social goods.

Formalizing practices

I stumbled upon provisional and false numbers while exploring the notion of formalizing practices. I have crafted this term to encompass a wide range of social practices, which are usually treated separately: quantification, standardization, rationalization.[4] I prefer the term formalizing practices to other catch-all phrases, as it emphasizes the doing of quantification by focusing attention on the actions taken to institute standard protocols or rationalized procedures. This, after all, is where the social resides: in actions, practices, processes. And if, as provisional and false numbers suggest, the doing of rationalization diverges substantially from the final form of a rationalized organization or standardized process, then this insight is worth pursuing.

Whether an iron cage or a sprawling network, the image of a formidable architecture of rules and regulations is familiar in discussions of modern rationalization. These edifices are built, code-by-code, statute-by-statute, forged in lengthy deliberations and hard-fought battles; this too is a commonplace. And of course, we know that techniques of quantification and formal representation (mathematical formulae, charts, and graphic depictions) have been instrumental in creating the standards for and gauging the status of a rationalized process. We err, however, if we assume that numbers perform the same task, and refer to the same element at all moments in the process of rationalization. Formalizing practices may rely on numbers, but stipulate neither their meaning nor their use a priori.

In an important paper, Laurent Thévenot (1984: 2) admonished economists to pay greater attention to 'investment in form' – to the expense and time required to produce forms or 'form-giving activities'. In particular, he was interested in expanding the range of activities subsumed under the notion of investment, taking Frederick Winslow Taylor's 'mechanism' of management as an example. Thévenot (1984: 8–9) assembles the following list from Taylor's handbook: the implement; the adjustable scaffold; slide-rules; methods for time study; experiments to establish rules, laws and formulae; systematic records; precise delineation of task; written instructions; planning department; bonus and premium; writing and talking; scientific selection; and personal cooperation.[5] These are familiar elements, but they are rarely drawn under the same rubric, for the purposes Thévenot (1984: 3) espouses of 'a more general discussion of the effects of the investments which contribute to the establishment of equivalent forms'. For our purposes, a crucial aspect of his argument is that a range of pedestrian actions entailed in standardizing and formalizing are neglected, because, he says, analysts 'tend to assume that they

have been established from the outset, rather like the currency' (1984: 3).[6] In other words, rather than assume 'from the outset' what investment in form would look like – what sorts of social processes configure formalized practices – we need to subject these events to closer examination. If our understanding of rationalization has been premised on the notion of ever greater formalization over time, then we may also assume – wrongly, I would argue – that all moments and stages of rationalization are themselves increasingly formalized and standardized. On the contrary, I am proposing that one of (certainly many) recurring features of formalization, then, is a set of practices that are ephemeral, temporary, conditional.

The social always exceeds rationalization; formalizing is necessarily limited, despite its frequent association with utopian or dystopian images of totality and control. Remaking categories and retooling techniques occurs even in the context of the most faithful attempt to follow a procedure. Ethnomethodologists have been making this point for decades (for example, Cicourel, 1964; Garfinkel, 1967; Goffman, 1959). I am making a different argument. The point of taking provisional and false numbers seriously is the insight gained that, rather than subvert the ostensible purpose of fixed representation, provisional numbers make stability and fixity in representation possible as a final result (Henke, 2000; Hull, 2002). Indeed, a significant element of formalization or standardization is its 'always already incomplete and inadequate ... character' (Star and Lampland, 2009: 14). Idealized conditions are never reached, with the consequence that the need to adjust, accommodate, and re-calibrate is ever present. Andrew Barry makes a similar point:

> while many standards are fixed and accepted, standardisation is never a completed process .... On the one hand, the development of technology continually destabilises existing standards, thereby creating the conditions for new standards to emerge. On the other hand, the process of standardisation serves to create new sites and objects of political conflict. (2001: 63; see also Bowers, 1992)

Barry's analysis of the broadening of European Union (EU) regulation and the dynamics of 'harmonization' stresses political conflicts over standardization, but in fact the necessarily recursive character of standards is a general feature of formalization.[7] Unfortunately, the everyday processes of standardizing – the work devoted to building modern infrastructures day in and day out – fly under the radar of overt conflict, and so go unnoticed (cf. Martin and Lynch, 2009). Animating infrastructural features such as financial instruments or unraveling the actions embedded in bureaucratic procedures reveals the enormous and ongoing social investment standardization and rationalization entail.

The meaning of numbers

There is no dearth of studies of numbers as signs and as symbols. In the history of science, and science and technology studies, the study of numbers and the increasing significance of quantification in the last two centuries are central themes. Ian Hacking (1990) crafted the by now familiar phrase 'an avalanche of numbers' to describe the

stupendous growth in classifying, collecting and cataloguing by administrative agencies in the 19th century. His purpose was to tie this phenomenon to the 'taming of chance' and the rise of probabilistic thinking during the 19th century. Norton Wise (1995: 352–53) writes of 'an explosion of everyday precision' in the first half of the 20th century, aided by a widening range of instruments, resources, and skills produced in industry and commerce. Achieving precision in labs and factories, however, was an arduous and protracted project, the culmination of two centuries of debate and experimentation among philosophers, scientists, government officials, and business agents. Of particular significance to the contemporary role of numbers is our willingness to 'trust in numbers', as Theodore Porter (1995) has argued. Our trust is premised on a view of objectivity as the elimination of the subjective, a reconceptualization of objectivity altering scientists' self-understanding in the mid-19th century (Daston and Galison, 1992). Having acquired the connotation of the impartial and objective, Porter argues, numbers became the preferred conduit for information in increasingly open and democratic political systems where authority is regularly contested. Thus, the shift toward quantifying information is a result of the specific *social* features of bureaucracies and political struggles over knowledge produced by scientific and technical experts, not a simple result of refined techniques. Norton Wise (1995) makes a similar claim about the value of precision: it is both an 'agent of unity' and a 'product of agreement'. In short, to achieve precision requires a shared understanding of its dimensions, made possible by extensive negotiation among interested parties. Hence precision is a direct consequence of social processes, not a feature existing outside the practices that make it knowable and doable. Lorraine Daston's (1995: 9–10) discussion of the moral economy of quantification rehearses similar arguments about the 'portability' of numbers facilitating 'far-flung sociability' among scientists and other consumers of quantified data, resting firmly on the historical shift toward self-restraint and 'moral obligation ... what Bachelard once called "that asceticism that is abstract thought"'. In all of these accounts, the question of accuracy or the truth-value of numbers is not at issue. The significance of impartiality, objectivity, systematization, intersubjectivity, and trust as socially crafted historical achievements is the primary consideration, independent of the strong realist claim that quantified data actually represent the world 'out there'.

Studies of accounting offer another site to examine how numbers are used 'in action'. In the 1980s and 1990s, 'a new accounting history' took shape, invigorated by the work of Foucault and the field of science studies (Miller et al., 1991).[8] The journal *Accounting, Organizations, and Society* began to feature papers on the epistemic status of bookkeeping and disciplinary strategies in managerial accounting procedures (see, for example, Hoskin and Macve, 1986; Miller and O'Leary, 1994; Morgan, 1988; see also Hopwood and Miller, 1994), alongside work on more traditional domains of accounting, such as auditor evaluation, budgeting, self-disclosure, and corporate social accounting. Analytic tools familiar from science studies, such as action at a distance, inscriptions, and translation, have also been creatively employed (Law, 1996; Miller, 1992; Preston et al. 1992; Robson, 1992).[9] A crucial intervention has been to point up the rhetorical role of bookkeeping, focusing on the communicative and legitimating functions of accounts (Carruthers and Espeland, 1991; Davis et al., 1982; Thompson, 1991, 1998). A number of studies have been deeply historical, laying to rest any vestigial traces of arguments tying

accounting to early capitalist development (Ezzamel and Hoskin, 2002; Quattrone, 2004; for a critique of the imperative to fix the date of bookkeeping's genesis, see Arnold and McCartney, 2003). By moving the study of accounting away from technical determinism and simple modernization narratives, scholars have successfully demonstrated important cultural and historical variations in accounting practices (Ahrens, 1996; Gallhoffer and Haslan, 1991; Loft, 1986). Contemporary investigations into the role of accounting in organizational change – in government as well as corporations – examine the complex convolutions entailed in refashioning bookkeeping techniques and redefining metrics for analysis, raising important questions about the instability of reference for accounting numbers (Dent, 1991; Hopwood, 1987). Recent studies of audit culture and protocols for transparency and accountability have encouraged a careful reading of the demands for specific kinds of formal representation in numbers (and in texts), while scrutinizing the means by which these formal requirements are actually achieved (for example, Hoskin, 1996; June, 2005; Knights and Collinson, 1987; Strathern, 2000; Wilmott, 1996).

Of course, accountants themselves have long engaged in lively debates over what numbers are suited to their task and who is qualified to decide. Witness Baxter's cautionary commentary about adjusting standards in the profession in the early 1980s.

> Even if a standard lays down a principle well, it may leave scope for personal estimate: we must still choose the figures to be slotted into the formulae. And many of the figures must be a subjective compromise, with plenty of room for disagreement .... The estimation of wealth is probably closer to judging in a beauty competition than to physical measurement. (Baxter, 1981: 7–8)

In Bentson's analysis of the consequences of the Securities Acts of 1933 and 1934, he emphasizes the costs imposed by disclosure requirements. Included among costs he lists is 'the cost of misinformation should investors believe that most elements of financial statements reflect the economic affairs of companies' (1969: 515). Or as Mattessich (1964: 12) has explained: 'not only is the degree of accuracy of many accounting measures very low, but frequently accountants are operating in a vacuum of reliability which does not provide any error measurement at all'.

A more effective way of illustrating the complexity of these debates is to discuss the recurring problem inflation poses for bookkeepers. This takes us to the complex issue of reference, a question also raised by provisional and false numbers. Thompson poses important questions about signification and numerical indices in his discussion of the controversies prompted by changing accounting standards and inflation in the British economy. In the 1970s, for example, the need to sustain the value of capital assets in the midst of an inflationary spiral prompted a lively debate among accountants over how those assets should be defined and calculated (Thompson, 1987: 528). Two different methods were proposed with different consequences, bringing to light the contingency of accounting practices.

> What rapid inflation does is to enable us to prise open a distinction inherent in all monetary and financial calculation .... This distinction is one between the ability of monetary data to *represent* and to *signify* .... In times of rapid inflation monetary variables somehow lose their connection to the real quantities they are supposed and required to represent. But while this kind of a

> problem *appears* more obviously during inflationary times, it is in fact fundamentally predicated upon the general manner of theorizing money and its value equivalents which is independent of the actual rate of inflation .... Despite this acute problem with representing the real position of the firm in its accounts, money must still sign if it is to remain socially effective, i.e. act as a universal mechanism of exchange. Thus while money fails to represent (in general and in times of inflation) it always signs, and it is precisely with *how and what* it is to sign in the case of company accounts that the debate about inflation accounting methods is concerned. (Thompson, 1987: 532–33; italics in the original)

In short, in order to grasp the meaning of any set of numbers, it is crucial to appreciate who created those numbers, for whom, and why (see also Martin and Lynch, 2009).

Unfortunately, it is difficult to evaluate the status of more temporary and immediate numbers within organizational politics since, as Porter has pointed out, practices of assessing and estimating costs have not been given sufficient attention in studies of accounting. This is true even though the literature on modern organizations offers us numerous examples of complex manipulations of numbers to achieve particular ends and to assuage crucial audiences (for example, Bowker and Star, 1999; Dalton, 1959; Garfinkel (with Bittner), 1967; Thomas, 1994). 'Modern economics textbooks of cost–benefit analysis never take up seriously the problem of practical estimation. Estimates of engineering or medical quantities often leave more room for fudging the figures than do economic ones – the former because these numbers are nobody's specialty, and the latter because experimental studies are so difficult and unreliable' (Porter, 1994: 236, n. 87). For this reason, MacKenzie (2005: 566) has appealed on several occasions for a field of 'ethnoaccountancy': '"Ethnoaccountancy" is the study of how people actually do their financial reckoning, setting aside preconceptions of how that reckoning should be done.'

Numbers are instruments, not simply transparent signs.[10] Thinking of numbers in this way sidesteps the historical, political, and moral claims of accuracy, precision, and objectivity, in order to train our attention on the daily production of numbers. For those who use numbers day in and day out, the observation that numbers are temporary devices is banal. Yet this temporary, provisional deployment of numbers flies in the face of the dominant representation of numbers as ends, as settled and fixed signifiers. It is difficult, nonetheless, to come to terms with formalizing practices without recognizing that in specific contexts numbers must be as temporary and as fluid as are the quotidian, recurring processes used to stabilize experience and produce knowledge. Confusion can occur, if different communities of users with varying purposes gain access to these data. Then numbers made for thinking or planning are misread as precise and accurate representations, for example, by consumers of a product or policy. This is precisely what happened when faculty 'misread' the numbers in a long-range planning document. In a similar way, I also misread the results of the Stalinist competition for bookkeepers, as I overlooked the possibility that a false number does more on an accounting sheet than mislead. I hasten to add that I do not by any means intend to argue that all numbers crafted in the process of formalizing processes are provisional or false, just as I am not arguing that the only means to achieve a standardized process is to produce impermanent metrics. The point is to analyze what numbers are doing, and hence what they mean, in any particular context.

Provisional numbers

The first type of 'impermanent metric' I wish to discuss is the provisional number. Two different aspects of impermanency are illustrated: provisional as temporary, and provisional as conditional. No doubt there is a variety of contexts in which these instruments appear; I have chosen to focus on a limited range of examples. In her recent work on financial markets, Knorr-Cetina (2006) has identified a crucial use of 'provisional numbers': quarterly reports. Specialists in the field know that these reports are provisional. Potential trends are suggested, based on a series of assumptions about what might occur in the near future. They are not intended to be read as describing actual conditions at the time of their publication. With time, Knorr-Cetina argues, the information provided in these reports 'decays', losing its value for guiding investment. Since these reports had been compiled to anticipate future possibilities, rather than chronicle ongoing transactions, they cannot and do not function as historical documents for recovering traces of economic transactions already concluded.[11] They are valuable for those who understand the status of the numbers, but useless for others. Thus, these reports constitute exemplary illustrations of temporary numbers, provisional for the task at hand. Working documents, business plans, forecasting reports, memos, all the artifacts of the workaday world are chock full of temporary numbers.

In his book on tax policy in the US, Isaac Martin (2008) provides a clear example of provisional numbers: 'fictitious' property tax assessments in the several decades following Word War II. In this case, the emphasis is on the conditional nature of provisional numbers, rather than on longevity, as in the previous example. Discrepancies between market value and property assessments were common across the US. The difficulty of figuring out the market value of properties not for sale played a small role in these differences. Far more important, however, was the fact that property assessments were determined locally, usually at the county level, in the absence of any broader supervision or standardized system of estimating value. To complicate the picture further, nearly all tax assessors were elected officials or political appointees, whose fortunes were subject to their constituencies' satisfaction with their performance in office. Everyone participating in tax assessment knew the numbers were dodgy, as a quote from the director of the California State board of Equalization in 1951 attests.

> Since those whose duty it is to effect equalization are answerable directly to the taxpayers, there has been an understandable reluctance to act. If it be suggested that the officials are lacking in courage, there is the obvious rejoinder that it takes extraordinary courage to do something that is predestined to be followed by an undesirable development for which you are not responsible but for which you know that you will be blamed. (Martin, 2008: 16)

There was little incentive, therefore, to raise taxes, prompting Martin to characterize property taxes in this period as based on custom rather than on the market. Property tax assessments varied within jurisdictions, as well as across them. Moreover, since tax assessors were in the habit of privileging supporters and currying favor with shifting voting alliances, no reliable or consistent pattern of assessing properties existed

over time. This was just as true for businesses as it was for individual property owners. Clever politicians filled their campaign coffers by soliciting bribes from businesses, whose tax liabilities were reduced in exchange for money under the table. Not surprisingly, communities seen to have less clout were treated more harshly, such as the poor and people of color.[12] Martin's analysis of the political logic of tax assessments in the US thus provides us with another stark example of provisional numbers performing a critical role. One might be tempted to call these numbers false (in the generic sense of wrong); property assessments bore little resemblance to the going price of real estate. I find this unsatisfactory. Defining the property assessments as wrong merely tells us that market values and property assessments had diverged, but does not tell us why. A more rigorous analytic is required. Describing the assessments as provisional numbers forces us to consider alternative social explanations to account for the discrepancy. In other words, we must figure out the mechanism whereby the numbers were reached, which in this instance was that the pattern of relative values assessed varied with the state of political allegiances.[13] In other words, the values assessed were the product of recurring political machinations, serving the immediate calculus of insider privilege rather than any relatively stable matrix of market prices. As provisional numbers, tax assessments were much more valuable to county tax authorities, and preferred by tax payers, than if they had been tightly indexed to prevailing market rates of houses for sale. As Martin convincingly argues, taxpayer revolts in the 1970s were prompted precisely by the strong pressures to standardize taxation rates coming from the courts, as this made assessments entirely independent of intervention for personal gain.

Scientific modeling is another site where temporary numbers play a valuable role, albeit for epistemic reasons. Scientific models often function as provisional hypotheses, working tools with which to specify mechanisms, discover causal relations, and reveal counterintuitive connections. As Naomi Oreskes has argued in the context of ecosystem science, for many purposes modeling is a necessarily iterative process, requiring reformulation as it develops over time. The process of discerning the crucial features over time means these models are necessarily provisional by nature.

> *All* models are open systems. That is to say, their conclusions are not true by virtue of the definition of our terms, like '2' and '+', but only insofar as they encompass the systems that they represent. Alas, no model completely encompasses any natural system. By definition, a model is a simplification – an idealization – of the natural world. We simplify problems to make them tractable, and the same process of idealization that makes problems tractable also makes our models of them open. (Oreskes, 2003: 17)

No matter how much models may be tweaked and refined over time – as the exigencies of the material and social world are accommodated through experiment and analysis – models still remain idealizations of empirical conditions. They are never accurate and thorough depictions of physical or social dynamics. In fact, the conditional status of models is a general feature of scientific practice. Thus the process of idealization to facilitate modeling is not a problem in itself. Simplifying conditions and granting unrealistic assumptions are part and parcel of the modeling process. This is as true of physics

as it is of economics, as Nancy Cartwright (1983, 2005) has argued. A problem arises, however, when one forgets that the idealization is a sharpened instrument to think with, not a true-to-life portrayal. This is a common error, especially if one is outside the community of modelers. As Harry Collins has observed in his study of TV programs about science, confidence in numbers is inversely related to one's participation in their making. 'Recent studies of science have shown that there is a relationship between the extent to which science is seen as a producer of certainty and distance from the research front' (Collins, 1987: 692).[14]

In the social sciences, actually seeing a model applied is difficult to accomplish without downplaying its provisional character. To strengthen their case for implementation, researchers may promote the value of a model in such a way that temporary variables become confused with prescriptive features.[15] Unfortunately, the conviction one conveys rhetorically about the positive outcome of a model is not compatible with the conditional character of the model itself. To make an argument for implementation – for example, in the case of innovative but experimental policies – one must insist upon the necessity of this model over another, of this policy over others. In other words, to actually implement a policy, and so to see whether it will produce results, one must gloss over the provisional character of its development. Rhetorical strategies to promote the potential value of a model, and to see results, are as much a part of model construction as is its on-going development, re-working, and re-fashioning (Lynch, 1991). Mistaking provisional indices for normative characterizations can cause difficulties, but it does not lessen the degree to which scientific modeling relies on provisional numbers. The issue then becomes who participates in the deliberate illusion of veracity, and for what purposes?

Two examples illustrate this point. Early advocates of Taylorism preached widely about the miracles of engineering the shop floor, long before these techniques were fully operational (Merkle, 1980; Nelson, 1995). The Taylor Society office in New York served as a clearing-house for information and contacts, providing libraries to interested parties in Europe and planning itineraries for foreign delegations visiting the US (Cooke, 1927: 488–489). The *Bulletin of the Taylor Society* also kept track of their influence worldwide (see, for example, Cooke, 1927; Lenin, 1919; Mouravieff, 1929; Slonim, 1922). The degree to which these new techniques actually produced the result promised by the Taylor Society was a different matter altogether. When expectations raised by advocates were not met, poor implementation was at fault, skirting entirely the question of whether the original model had the virtues of general applicability. In more recent years a comparable campaign promoting the miracles of 'lean manufacturing' has been waged (Liker, 2004; Womack et al., 1990).[16] Fascination with the Toyota Production System (TPS) swept across business schools, engineering departments, and management consultancies, promising a better use of resources – both material and labor – at reduced cost. Firms scurried to adopt TPS as the answer to competitive pressures in the global marketplace; its apparent success also encouraged those in service industries to consider its implementation. When problems arose, questions about the wider applicability of the TPS model or the accuracy of its initial description tended to be ignored, explanations focusing on incomplete adoption of the system, inadequate managerial oversight, and insufficient attention to detail.[17] Advocates of both miracle cures – Taylorism and TPS – were convinced of the potential their innovations offered, downplaying historical contingencies of

development and underestimating the complex dynamics of emergent practices. The models looked so good, they had to work. Provisional metrics became necessary measures.[18]

Provisional numbers are powerful tools and meaningful signs, despite their ephemeral character. They constitute forecasting benchmarks for investing in financial markets. They have formed the basis of tax schedules, while strengthening the ability of government officials to respond promptly to the demands of constituents. Provisional numbers enable scientists to think creatively about a problem: model its possible contours, consider various configurations, prompt new answers. In each instance, crucial tasks are achieved; significant investment in form has occurred. And in each instance, the actions devoted to formalizing practices are necessarily recursive, that is, they must be repeated over and over again to achieve the task at hand.

I now wish to turn from a discussion of provisional numbers to false ones. Here the emphasis is on learning to formalize. This will be illustrated by contextualizing the anecdote on accounting from Stalinist Hungary at the beginning of the paper to understand a situation in which recording, but not recording faithfully, would be a welcome development. In brief, I will argue that in order to make rationalization and formalization an easy and reasonable everyday task, one must become accustomed to performing the task, even though in so doing the ostensible demands of formal representations may not be met. One might say that practice makes perfect, but not right away. Thus, to make counting count, one must be able, at first, to count awry.

False numbers

> If the modern farmer wishes to get by, he will be forced to farm with a pencil.[19]

The Stalinist state in Hungary (c. 1948–56) was committed to modernizing the economy. On the eve of the land reform in 1945, nearly 50% of the farmland was owned by less than 1% of the population, whereas approximately three-quarters of the farms in Hungary were smaller than 2 hectares (Orbán, 1972: 11). The land reform dismantled manorial estates, but at the cost of substantially increasing the number of tiny farms (Donáth, 1977: 88). In short, nearly all farms were primarily devoted to subsistence production. Since the party/state equated modernization with industrialization, the underdeveloped agricultural sector had to be eliminated, a tall order since approximately half of the labor force was employed in agriculture in 1949 (Pető and Szakács, 1985: 146). The first order of business would be to free a large number of rural workers to join industry; improving agricultural productivity was also necessary so that the loss of workers could be made up for with increased output. Collectivization was intended to achieve these goals, but it fell far short of the party/state's aspirations. In fact, collectivization was not fully implemented until the early 1960s. Its early history nonetheless documents crucial problems impeding the party/state's modernization strategy.[21]

Modernizing agriculture in the early 1950s faced many challenges. While investments in technology – tractors, combines, threshing machines – would have helped, the party/state plowed investment into the industrial sector instead.[22] Innovations in the organization of labor and in the ways wages were calculated – in short, efforts to improve the productivity of labor – constituted the party/state's primary policy in

cooperative farm production in the 1950s. The party/state's wage policy for cooperative farms, the so-called work unit system (*munkaegységrendszer)*, demanded the careful recording of each worker's labor contribution. In the early years of the work unit system, farm members consistently refused to differentiate labor inputs, arguing that since everyone worked together as a group, all should receive the same pay. 'There are some groups, for example the Lenin cooperative farm in Mórichida, who even deny that at some time or other they learned how to figure work units .... The opinion of this group, which they have insisted upon, is that everybody worked alike, so why should they bother calculating work units?'.[23] Another was heard to explain, 'Everyone has a stomach.' This notion bears a strong resemblance to calls for a 'bread day' among Soviet peasants in the early days of collectivization (Davies, 1989: 262, 266; Viola, 1996: 216).

But distributing income equally among the farm members – egalitarianism (*egyenlősdi*) – was a cardinal sin, a central heresy committed against the reigning principle of socialist productivism. Socialism rejected bourgeois egalitarianism, as Stalin had so forcefully argued; the industrious were to be rewarded and the lazy punished. Bourgeois tendencies could not be tolerated when building new socialist institutions.[24] New cooperative members paid little attention to these principles. Time and again party officials complained that cooperative farm members simply neglected, or outright refused, to record labor inputs. The party-state warned that farms where paying work units was ignored were threatened by 'the danger of capitalism'.[25] And even when farm members wrote down everyone's daily contribution, they still didn't calculate the values in work units. 'Members don't know the significance of the work unit. They didn't even know what it is .... They record work when completed in a separate ... book, but they don't convert [the work done] into work units.'[26]

Unfortunately, these strategies for increasing productivity relied on documenting individual effort, which foundered on the widespread indifference to bookkeeping and written accounts. Keeping records was considered a waste of time. 'All the writing and administrative work is considered an unnecessary burden'.[27] County officials impressed upon cooperative presidents the importance of bookkeeping. 'Good bookkeeping is an indispensable condition of proper management.'[28] Party and government officials had to contend with the frustrating experience that cooperative management – presidents, bookkeepers and even pursers – were often unable to settle accounts.[29] 'By and large the calculations and appraisals are satisfactory. On the other hand, we found mistakes in the course of summing up and carrying the balance forward.'[30] Or in other cases, bookkeepers began to keep records current on livestock, but continued to do a poor job of keeping track of fixed assets and rough fodder.[31] Cooperatives commonly forced administrative personnel to work in the fields, refusing to pay them for their office work.[32] Accountants then lagged behind with their books.[33]

> [This] discourages bookkeepers from bookkeeping, especially in situations when they have to enter a more difficult entry, they don't find a solution and simply don't enter it. The various bookkeeping notifications sent by banks play a large role in this, since they differ from the regular printed material and unsophisticated bookkeepers can't figure them out.[34]

Fed up with poor working conditions and tired of farm members' expectations that they work without pay, bookkeepers (very often women) regularly threatened to quit their job. Domestic politics also played a role here. With their wives suffering from disrespect and unreliable pay, husbands complained; it didn't help that their wives weren't getting their housework done.[35]

It is worthwhile noting that efforts to modernize agriculture earlier in the century had also been thwarted by wide indifference to bookkeeping. Agrarian modernizers in the 1920s and 1930s bemoaned the fact that basic calculations required to guide economic rationalization could not be tallied, as records were simply not kept. Rationalizing agriculture required finer grained business records. 'Reckoning constitutes the weak side of Hungarian farmers, which may explain the impossible situation that many of them do not even know the values hidden in their farms, so they cannot provide an account of the earnings on their invested assets' (Juhos, 1920: 700). These problems were found just as commonly at large manorial estates as on small family farms. Agrarian work scientists and business economists devoted much effort to demonstrating how estate managers and farmers alike could benefit from the knowledge they would gain from proper accounting procedures. Indeed, one of the highest priorities of agrarian business economists was establishing advisory offices on bookkeeping, making it possible for farmers to seek aid in working through their records. Their model, as for so many other policies, was Germany. Hungarians were particularly impressed with the dual purpose of German advising stations. Not only did they provide farmers with valuable assistance, but staff also extracted data from farm records to be fed into a national agency. This permitted the German state to craft policy on the basis of reliable information to ensure sufficient foodstuffs for the populace, as well as to improve agricultural production. An additional advantage was the data it made available to those in the field of business studies to conduct rigorous comparative studies of agrarian firms. Agrarian economists and interest groups knew they faced serious obstacles to developing a comparable system in Hungary, and so looked to the government for leadership.

> The reason so many private accounting and consulting stations were established in Germany was so that the taxing of farmers based on their accounts would be more just and proportionate than here. Since in our country the possibility for accounting is pretty much unknown and unutilized, there is no basis for establishing private accounting and firm consulting organs. To spread acounting better than this therefore can only be done by the state, so that accounting be standardized as well as uniformly institutionalized. (Kesztyűs, 1943: 10)

Unbeknownst to Kesztyűs, his vision of establishing a centralized authority supervising accounting practices would be taken up with a vengeance by the socialist bureaucracy in a few short years. Under its mandate to plan and run the economy, the new socialist regime would grant itself the authority to intervene in the most minute details of accounting and accountability.[36]

Holding a competition among accountants, comparable to labor competitions, was precisely the kind of strategy the party/state regularly pursued to motivate workers to participate more actively in the socialist project, and so alter behaviors seen to stand in

the way of progress.[37] Although the party/state had a strong interest in mounting labor competitions to ratchet up the level of production, an abiding theme of these and other campaigns was the participants' willingness to strive toward goals rather than reach a stipulated end point. Hearty competition was rewarded, but participation itself was recognized favorably, as newspapers regularly listed the varying levels of success brigades, factories, and farms achieved. In the long run, the final result of any particular competition mattered less than the effort expended to meet expectations and the behaviors acquired in the process. Communist Party officials would tolerate discrepancies in accounting procedures, if this meant that taking bookkeeping seriously would eventually result. In this context, false numbers were much better than no numbers at all.

Competitions were occasional affairs, mounted in celebration of 1 May or a party secretary's birthday. More reliable and consistent effort was devoted to teaching bookkeeping. County officials regularly visited rural communities to provide training in bookkeeping. In the early years (1949–51), stress was placed on calculating daily labor contributions, and more importantly, trying to convince villagers that the work unit system was fair. In 1955, Zala County was mounting monthly 'bookkeeping days'; 80% of the county's accountants attended, appreciating the fact that the meetings had been moved from the district offices to cooperative farms 'because they learn much more when they see problems solved in practice, e.g. having books agree, etc.'.[38] In addition to offering classes at village level, the party/state also established schools to teach bookkeeping. Cooperative farm presidents and bookkeepers were sent off for 6- to 8-week training seminars. Young villagers identified as having the potential skills to be a good bookkeeper were also dispatched to training sessions to foster the next generation. The scarcity of qualified accountants made them valuable assets, to be poached by other government agencies.

> Although undoubtedly agriculture must provide a significant number of cadres to industry and administration, this is not compatible with the cadre policy pursued to date by the OSZH [*Országos Szövetkezeti Hitelintézet,* National Cooperative Credit Bank] ... when they had been attempting to lure away bookkeepers – bookkeepers who had been trained to work in cooperative farms – with a variety of promises. The [not politically enlightened] workers at our cooperative farms easily forget how much the cooperative needs them. They weren't sent to bookkeeping courses so that afterwards they could end up behind a desk at the OSZH. Although this practice of enticing cadres away is waning, it nonetheless resulted in the fact that of the approximately 400 cadres we trained as bookkeepers to date, only about 190 work at cooperative farms.[39]

Ironically, many times cooperative farms faced problems with their books because the one person knowledgeable enough to solve the problem was away at school.

Another strategy designed to assist farms with bookkeeping was the patronage movement (*patronálási mozgalom*). In the name of worker–peasant solidarity, office workers and brigades from nearby factories would visit farms to assist with all manner of tasks, not least reviewing and correcting accounts. Neither villagers nor industrial workers liked this set-up. Villagers resented being lectured to about agriculture from industrial workers, and workers from town resented the time away from income-generating work. Nonetheless, socialist 'patrons' could come in handy, as for example

when they corrected mistakes on the books and made sure that work units were properly recorded.[40] Certain barriers between farm and factory could not be easily breached, however, as in the example of two members of the patronage bookkeeping brigade who visited 'Victory Farm' in the summer of 1951. The accountants, who had been trained in commercial accounting, realized upon reviewing the cooperative's books that they were unfamiliar with the kind of accounting used at cooperative farms. Nonetheless, they did their best to muddle through, identifying several deficiencies in how the books were kept.[41]

Villagers' reluctance to keep written records was complicated by two further problems: unqualified trainers and the absence of proper forms. The Hungarian party/state was haunted by the cadre problem: not enough skilled officials working in a bloated administration needing serious pruning. Bureaucrats employed at the county or district level were not necessarily trained in accounting, and yet they were expected to take on these tasks as part of their job. While it wasn't hard to determine that including entries in the work unit book on the 30 and 31 February was an obvious falsehood, other cases were more complicated.[42] 'With three exceptions, the district auditors are incapable of overseeing farm bookkeeping and preparation of the financial plan. Therefore the plans are bad and the management of cooperative farm finances is also bad.'[43] This was not only true at the local level. 'Many times the skilled auditors at the Ministry of Agriculture are insufficiently informed. As one can determine from auditing the books, the directives are incomplete and rarely is concrete help provided.'[44] Add to these kinds of problems the on-going confusion over lines of authority within various sectors of the national and local bureaucracy, and you have a recipe for chaos.

> Cooperative farms don't believe the district council any more, since, as the auditor from Polgár complained, [the people at the district] have practically become mailmen. They have no scope of authority. He has been a bookkeeper for two years now, but he was never so disheartened about his work, because the management of finances at cooperative farms has never been so anarchic.[45]

General confusion also meant that simple problems like not distributing the new forms in time for bookkeepers to work up the yearly report were common. To make matters even worse, planning forms were redesigned, perhaps for good reasons, but that didn't help novice accountants.

> The planning forms delivered were good, simpler and more understandable than last year. However, it is our conclusion that whereas some of our planning workers are able to follow the most developed Soviet plan work, they are frightened by summing up or multiplication problems of some figures and commit the error of leaving these forms empty. When we explained it to them they understood and completed the work easily. This was particularly so when we suggested they carefully read through and use the study aids.[46]

In a separate incident, the forms sent by banks did not correspond to those the cooperative farms used.

Confusion with lines of authority within the party/state bureaucracy was paired with discomfort over changing patterns of authority at the farm.[47] New forms of knowledge,

like bookkeeping, challenged views of skills in farming, skills that were both the source of authority and prestige. In the 1950s almost all cooperative members had been agrarian proletarians – very poor villagers and manorial residents – before the land reform. Despite efforts to equip new landowners with tools (plows, scythes, and so on), the land reform effectively burdened these families with land they could not cultivate. Banding together in cooperative farms made it possible for them to succeed as farmers, an elevation in social status that they had long desired. Finally wresting authority as managers of the farm away from aristocrats and wealthy peasants, they would be reluctant to be tutored in agricultural work by lowly office workers. This was an affront to their social aspirations, so county officials had to explain to cooperative farm managers that they shouldn't be offended if they were given tasks by bookkeepers.[48] The class dimensions of this struggle were further complicated by gender politics. Bookkeepers were predominantly women in this period, whereas farm managers were men. No doubt this division of labor rested on the simple assumption that women were to be assigned less prestigious jobs within the enterprise. It is also significant that women managed the purse strings in village homes, so their supervision of budgets at cooperative farms made sense. Yet their authority at home did not travel easily into the halls of management.

Bookkeeping required particular skills that were not common among villagers. Performing complex calculations with numbers was a daily affair for agricultural workers; laborers were in the habit of estimating acreage sown or the volume of a haystack or figuring yields or fluctuations in market prices. So the problem the party/state faced was not one of complete numerical illiteracy, but one in which the numerical fluency of one set of tasks did not (and could not) move easily to another context. In short, the problem with bookkeeping was not its numerical or calculative character; it was the requirement that accounts be recorded on paper within specific formal guidelines set by standardizing bodies, in this case, the socialist state bureaucracy. Having the skill to perform calculations alone was insufficient as a condition of proper accounting methods; learning how to be a bookkeeper in practice – not in some abstract world of accountants' dreams – would alter the skills villagers brought into cooperative farm offices.

It took time for bookkeepers in training to appreciate the difference between numbers that simply cluttered the pages and numbers that fit within a matrix of relevant calculations. Once they grasped this distinction, it became possible to knowingly insert a wrong number to abet their own agendas (see Harrison, 2009). So unlike provisional numbers, which are temporary from the outset, the status of false numbers only emerges in practice.[49] If and when a number was false depended in the final analysis on the judgment and discretion of auditors. This assumed consistent oversight, which was lacking. Early cooperative farms had essentially no administrative apparatus, so it was impossible to comply with the requirement in the state-mandated by-laws for oversight committees to be established within cooperative farm management. County officials were also short-staffed. In addition, local party committees – either in the village itself or at the farm – were unreliable or non-existent. Without a local arm of the party in place, it was impossible to enforce oversight; there was no heavy hand forcing compliance. In 1949 the Ministry of Agriculture mandated that county agencies conduct audits of all farm records, but this was impossible to ensure.[50] (In 1953, these audits were still falling short of the ministry's expectations, as an article from the county newspaper in

Hajdú-Bihar attests. 'In the interest of effective work, fleeting oversight must cease. A 5–10 minute visit is useless. They won't get to know the local problems and cannot provide practical necessities.')[51]

In time, tolerance for dodgy numbers evaporated. County administrators were threatened with disciplinary action if their work was not properly completed.[52] Increasingly, the Hungarian National Bank sent auditing committees to review the annual reports farms had produced. Leniency could still be exercised, at the discretion of the auditor. When scattered problems were found in the books, then these apparent aberrations would be fixed. But in other cases, patience had ended. The authorities cracked down; what had once been tolerated as false numbers had become wrong numbers. Punishments varied, depending on the infraction. If it was clear that farm managers and brigade leaders had simply neglected their accounts, they would be given light sentences, or at least threatened with retribution, the penalty being a deduction of some work units from their yearly earnings.[53]

Patterns of systematic misrepresentation brought more serious charges, in particular those falling into an entire category of systematic misappropriation that arose from disagreements with central authorities over farm earnings. The party/state insisted that the state be paid first from a farm's earnings, leaving the farm members with whatever was left. (In the early years of cooperative farming, this could result in a negative balance, depriving workers of any income for an entire year's work.) This policy, called the 'remainder principle' (*maradék elv)*, was strongly criticized by farm members, as they questioned the legitimacy of the state's claim to their surplus, just as Russians had in early days of the Soviet kolhoz (Lewin, 1985). This bred resentment, and spawned a variety of strategies to circumvent the state's control over their budget. Two means of subverting the remainder principle were common. The first was a simple refusal to pay anything to the state, and distribute all surplus among the membership.[54] The second strategy was to sell produce or livestock on the side, and distribute the monies among the membership without recording the transaction in official ledgers. When county officials reviewed the farm's annual report or the National Bank conducted an audit, these strategies could be discovered, and then farm personnel were punished.

Cases of personally motivated embezzlement or malfeasance brought harsher penalties.

> The brigade leader of Red Star [farm] in Nagyléta hauled sugar and beer to X.Y.'s house. The forenamed brigade leader was caught stealing, that is, to accomplish tasks he was in charge of he misappropriated 400 Forint from the common fund. Since X.Y. had a relationship with the brigade leader, it can be surmised that as financial clerk X.Y. knew about the affair.[55]

The clerk was fired. (It didn't help the clerk's case that the district determined that she was living an immoral life.) In another case, an egregious case of mismanagement was identified by bank auditors, and brought to the attention of the authorities. Not only were the books in poor order; the cooperative president spent money recklessly, emptying the farm's coffers. He was promptly arrested.[56] In the final analysis, the issue of well kept records was about more than state oversight of finances; it was also about fairness. Having the party talk about fairness may have rung hollow, but members could be

cheated when books were sloppy. 'The annual report demonstrates deficiences which arise from not following the by-laws, planning out of proportion, and lags in bookkeeping. Auditing plan fulfillment, the fair division of income, and protection of the cooperative's communal property are not guaranteed, where accounting is inadequate.'[57] False numbers were tolerated because they were useful. They provided a broad road to modernizing agriculture, on which people acquiring new skills and new attitudes could travel. But the road narrowed over time; pleas of ignorance had less and less validity as training became more widely available and county services more reliable. And the party/state never shied away from punishing those it labeled as wrongdoers, especially if their actions could be depicted as vicious and mean-spirited acts against the community.

Conclusion

What numbers do, or more precisely, what people do with numbers is an important social question worthy of more sustained investigation. In summary, I wish to make three points. The first is that the meaning of numbers is situational. As Latour (1987) has been at pains to point out, a complex set of social relations and technologies enable numbers (inscriptions) to travel great distances in stable form. By the same logic, complex social relations and technologies can also impede numbers from wandering away, as is the case with provisional and false numbers. Their meaning is circumscribed in significant fashion; some kinds of formal representations speak only in local dialects.

Arguing that the meaning of numbers differs from context to context is related to the crucial insight that people's understanding and commitment to specific practices varies from context to context as well. This view builds on Jean Lave's (1988) important research on knowledge as situated action, which shows that the form and place in which numbers are used influences the facility and comprehension associated with them. Provisional and false numbers can only function if there is some sort of agreement about their status as temporary or conditional symbols. If they are not read this way, their immediate purpose is defeated, depriving users of the effective tool they would otherwise have been. Desrosières makes a similar point about the producers and users of statistics sustaining a capacious definition of reality, dependent on context.

> This paper argues that the way in which producers and users of statistics talk about 'reality' is informed by the fairly unconscious intermingling of several attitudes to reality. The mix of these attitudes and the links between them vary according to the circumstances – or, rather, according to the specific constraints prevailing in different situations. (Desrosières, 2001: 339)

In the final analysis, Desrosières (2001: 344) is committed to 'accounting realism', a point where our arguments diverge. Nonetheless, the point about context and constraints is the same. So when faculty misunderstood the planning document, they balked. Reassured by the university's senior fiscal officer that this number was provisional, they could heave a sigh of relief. So too, party/state officials tolerated discrepancies in bookkeeping records provided in the accounting competition, confident that getting a semblance of bookkeeping practice on paper indicated progress, rather than corruption.

Sending leagues of potential bureaucrats to accounting schools was intended to instill a respect for the knowledge required to be good accountants, and to eliminate misunderstandings among accounting ingénues. Eventually, however, auditors from the National Bank refused to sanction false numbers, dealing harshly and swiftly with accounting discrepancies. Hence creating provisional and false numbers works in specific social and material conditions, and not others.

The third point concerns the relationship between formalizing practices and their immediate representation. In the present analysis, my focus has been the centrality of provisional and false numbers to processes of formalization and rationalization. To wit, the means by which rationalization or formalizing practices take form over time may diverge in substantial fashion from their common description. The ways of making these categories natural, of transforming our experiences into tacit modern knowledge entails abrogating those features that ostensibly characterize rationalization: that is, expectations of unambiguous and abiding formal rules. This in itself is not a groundbreaking notion, as the discrepancies between rules and action are a commonplace of social analysis. The point here is different: when and where a formalizing practice is provisional or stabilized, temporary or fixed, emergent or destabilizing, depends upon the social conditions of its production, which must be interrogated. I have identified two crucial sites where provisional or false numbers are used: the everyday doing of rationalization, and learning to rationalize. I do not assume that these two examples exhaust the realm of provisional number usage; that is an empirical question. This theoretical insight, however, demands that we attend more closely to social conditions under which the impermanence or fixity of a number's referent necessarily obtain, and why. These cautionary remarks suggest the important but oft overlooked point that the means by which social forms take shape vary in significant ways. Accordingly, one must attend to the procedures whereby new practices are introduced and mastered, or alternatively, how innovations are stymied. For without interrogating the means, the techniques and practices of formalization, we will be unable to account for its history.

Notes

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Unless otherwise noted, all translations are my own. Names in archival documents have been redacted – replaced by the simple moniker X.Y. – to protect individuals' privacy. Beyond simple

archival etiquette, it is also important to emphasize that we have no way of verifying the veracity of these accounts. To ease reading, archival materials are cited in the endnotes, with abbreviations I have created for this purpose. Complete citations for each source are listed in the references.

1. GYS.vb 31-34-1./953.V.29.
2. I wish to clarify a possible misunderstanding arising from the two opening anecdotes. Although the university official is heard to exclaim that the number he promotes is false, in my analysis his is a case of a *provisional* number, whereas it is the second anecdote about inaccurate bookkeeping that epitomizes a *false* number as I use the terms here. The phrasing of the opening anecdote may be infelicitous, but I have kept the original for two reasons. The first is that this is a quote. The second reason is that it was the official's adamant defense of a false number that prompted me to think about false numbers as interesting social phenomena in the first place.
3. The larger project is a study of agrarian work science in Hungary from 1920 to 1956.
4. I have discussed this notion at greater length in the introductory chapter of *Standards and their Stories,* co-edited with Star (Star and Lampland, 2009).
5. '[I] have attempted to outline an analytical framework which would allow a broad range of material or formal "equipment" to be related to a single model of *investment* in forms .... Since these conceptualizations derive from a number of different disciplines, they tend to constitute objects which appear to be *naturally* very different: product, trademark, machine, capital, accounts, skill, qualification, collective agreement, etc.' (Thévenot, 1984: 25–26; italics in original).
6. Using currency as an example of a complex historical form mistaken for a stable object echoes a familiar analytic tradition about 'value-giving' activities, that is, Marx's analysis of the misplaced concreteness of commodities and Simmel's (1990: 130, 147) argument about money being the true means. And as both authors argued, confusing means with ends leads to a significant misreading of social processes.
7. The recursive character of standardization can be understood in the terms of path dependency, or Callon's (1991) notion of irreversibility. This is an important feature. Less frequently emphasized, but just as important for historical analysis, is the possibility that standardization can be de-stabilized. When and how a process becomes irreversible, and the conditions for its demise, are empirical questions worthy of our attention.
8. Accounting has enjoyed a special status in sociological analysis since Weber's (1958) seminal analysis of bookkeeping in the rise of capitalism. But, as Vollmer (2003) points out, this privileged status has not resulted in a sustained analysis of accounting within sociology, at least until recently.
9. A parallel development to the flourishing field of accounting studies is the growth of work on finance by sociologists of science (for example, Callon, 2007; MacKenzie, 2005, 2006).
10. Simmel (1990) is a strong influence here, in his analysis of money as the purest means.
11. As one reviewer pointed out, some would argue that these reports *do* constitute the economy, that is, the economy is not independent of its representations. A lively debate has been underway for a while now about how and to what degree economics, in the words of Michel Callon, 'performs, shapes and formats the economy' (Callon, 1998: 2; see also MacKenzie, 2006). Adjudicating this debate in relation to false numbers would take me far afield, so I have sidestepped the question for the purposes of this argument.

12. Martin has calculated that the enormity of the discrepancies in tax assessment provided a subsidy that was, in the aggregate, almost as big as Social Security for most of the postwar era (see Martin, 2008: Appendix A).
13. Tax obligations set by the 1855 cadastral survey of Franz Josef in Hungary bear strong resemblance to Martin's description of post-World War II US assessments. Wealthier landowners' properties were assessed at a lower level than those of peasants. Political allies of the Hapsburg throne were given lower tax assessments than those who opposed him. Of course, since distrust of the Hapsburgs after the defeat of the War of Independence was high, people frequently lied about the value of their property to the court's agents, which only added to the discrepancies (Lampland, n.d.).
14. I owe Steve Epstein thanks for bringing this paper to my attention.
15. There is also the danger of provisional numerical values being inadvertently understood to be fixed indicators. This occurs in scientific modeling, when a particular element of a model is transformed over time, and unwittingly, into a fixed metric (Naomi Oreskes, personal communication). This also occurs in the development of technical systems in business accounting. Discussing the development of flexible machining systems (FMS) in an aircraft company, Thomas (1994: 61) notes:

    > On the one hand, corporate review required [return on investment] figures in support of the proposal; this requirement, in a sense, encouraged FMS proponents to play games with the numbers. On the other hand, divisional management and R&D [Research and Development] took the corporate view seriously enough to make bold claims despite their fragile numbers.

16. I am indebted to Michael Evans for bringing lean manufacturing to my attention.
17. For examples of papers providing a more critical account of lean manufacturing, see Browning and Heath (2009), Cusumano (1994), and Mehri (2006).
18. I am not making the point Scott (1998) describes in broad strokes about abstract plans and local practices here. I am arguing that this disjuncture characterizes all situations in which provisional models are portrayed as necessary interventions. This is as true for policies that are successfully implemented as for those which fail. The analytic task then becomes explaining how the chasm between formal schemes and social practices is bridged over. This is as important when policies become effective, as when they fail. In brief, a symmetrical account is warranted, not the sort of Whiggish melancholy Scott's book presents.
19. *Köztelek* L./45./1940.XI.3.:871.
20. Properties of 100 acres (40 hectares) or more accounted for 48.1% of agricultural lands, owned by a slim 0.8% of the population, whereas 10% of the land – in farms of 5 acres (2 hectares) or less – constituted 75.2% of the farms in the country (Orbán, 1972: 11). After the land reform, 78% of all farms were under 6 hectares, and covered approximately one-half of the country's acreage. Another 17% of farms were between 6 and 12 hectares, covering about 30% of the remaining land.
21. One official summarized the problem clearly:

    > One of the greatest difficulties is that we are training agricultural cadres at the same time that the socialist reorganization of agriculture is happening. They are learning to lead when the battle to put the Party's goals into practice is at its height, when the Party's grand plans must be practically realized in agriculture. The majority of managers of socialist firms were only yesterday farming alone on small plots of land. Now they are the managers of large farms.

They must tackle hard tasks, carry out planning and collective labor organization and must master and apply the basic knowledge of the scientific management of agricultural production (HBML. tanács.vb, 546 sz., 1952.nov.26., p. 1) .

22. This was even true for the state farm sector in the 1950s, which was always better financed than the cooperative farm community.
23. GYS.mszo 1O/195O.XI.8./3.
24. It was also believed that recalcitrant landowners would be more apt to join cooperative farms if they knew incomes would be calibrated to effort. The party was wrong in this regard, finding the only effective tool for collectivizing in the early 1950s to be intimidation and heavy taxation schedules.
25. GYS.sopron 38/113/late 1949.
26. GYS.mszo 17/497/1949.XII./6.
27. HB.mszo 106/1950.IV.23.
28. GYS.mszo 31/1952.I.27.
29. HB.mszo 106/1950.VI.12.
30. Z.mszo 64/1951.V.21.
31. GYS.vb 31-28-5/1953.X.15./1.
32. HB.mszo 106/1950.VI.12.
33. 'It is only possible to dismiss or fire a bookkeeper if he did not perform his duties the way it is written in the by-laws (embezzlement, etc.), and even then only with the consent of the district Agricultural Department.' (HB.vb 429/1338/1951.XII.8./2-3).
34. GYS.vb 31–28–5/1953.X.15./1.
35. HB.vb 73/14–49/952.IV.11/1.
36. Elizabeth Dunn's (2002, 2004) excellent work elucidating the relationship between formal accounting procedures and political and moral accountability is worth mentioning here. V. Rafael (1993) has also written about moral accountability and counting, in the case of a census conducted in the Philippines.
37. There were a variety of competitions held in the 1950s, such as competitions to reduce waste or to encourage innovations on the shopfloor. See Gille (2007).
38. Z.mszo 65/P-624-10-c/1955.XI.1./ 3.
39. HB.vb 546/1952.XI.26./3.
40. HB.vb 1425/1951.VII.5.
41. HB.vb 1413/1951.VI-VI.; see also HB.vb 1426/1951.VII.5.
42. *Néplap* 1951.V.8.:1.
43. HB.vb 389/1952.VI.18.
44. Ibid.
45. HB.vb 388/1951.IV.21./ 2.
46. Z.vb 27/T-20-1-16-a-III./1952.IV.16.
47. Skirmishes over bookkeeping could easily be summarized as a sustained battle over authority and power in the new state, as several reviewers have suggested. I resist the urge, however, to reduce the history told here to those terms alone. To do so neglects the time and energy people spent just trying to figure out what was going on. Confusion was rampant, and just as common among those inclined to support the party/state as among those who were pledged to resist it. In our rush to see everything in terms of struggle and opposition, we underestimate the degree to which people simply needed to understand what was being asked of them, and why. Then, once the contours of the new system took shape, it became possible to choose whether and how to comply with policies.

The social dynamics of the 1950s were far more complicated than has been traditionally conveyed in the literature, in part because everything has been read simplistically as resistance or oppression.

48. GYS.mszo 2/31/1952.I.27.
49. I am grateful to one of the reviewers of this paper for pointing out the significance of emerging distinctions between false and wrong, and the importance of relative expertise.
50. Z.mszo 57/2/1/62.
51. *Néplap* 1953.IX.9./3.
52. Z.vb T-624–5-22-c-VII /1954.V.4./2.
53. HB.vb 149./13-i/9/953.V.29.
54. Withholding money from the state was a widespread phenomenon, as illustrated by the frequency with which putting the state first was a criterion for excellence in bookkeeping contests. 'The cooperative farm completely fulfilled its obligations – in kind and monetary – to the state' (GYS.vb 31-67-1/1953.XII.14.).
55. HB.vb 149/14-94/953.VI.29.
56. Crimes against communal property were common in this period, a handy excuse to deploy if the party/state needed a reason for a trumped up charge. Destroying communal property covered a wide range of actions, from not sweeping one's front stoop to neglecting to clear stalks from a field of harvested corn. It is safe to assume, therefore, that many infractions committed against communal property were not related to accounting misdeads.
57. Néplap, 1954.XII.17.:5.

Archival materials

Győr Archive of Győr-Moson-Sopron County (GY-S-M. M. GYL)

- Hungarian Workers' Party County Committee (MDP), Agricultural and Cooperative Policy Department: Fond 30., fondcsoport száma 2. (GYS.mszo)
- Sopron District: Fond 32., fondcsoport száma 2. (GYS.sopron)
- Agricultural Department of the County Executive Committee: Fond XXIII., fondcsoport száma 9. (GYS.vb)

Archive of Hajdú-Bihar County (HBML)

- MDP County Committee Agricultural and Cooperative Policy Department: XXXII., Fond 41, fondcsoport száma 2. (HB.mszo)
- Agricultural Department of the County Executive Committee: Fond XXIII., fondcsoport száma 9/b. (HB.vb)

Archive of Zala County (ZML)

- MDP County Committee Agricultural and Cooperative Policy Department: Fond 57., fondcsoport 2. (Z.mszo)
- Agricultural Department of the County Executive Committee: Fond XXIII., fondcsoport száma 8. (Z.vb)

Néplap [The People's Daily], the party/state newspaper for Hajdu-Bihar County

References

Secondary Sources

Ahrens, Thomas (1996) 'Financial and Operational Modes of Accountability: Differing Accounts of British and German Managers', in R. Munro & J. Mouritsen (eds), *Accountability. Power, Ethos and the Technologies of Managing* (London: International Thomson Business Press): 149–63.

Arnold, A.J. & S. McCartney (2003) '"It May be Earlier Than You Think": Evidence, Myths and Informed Debate in Accounting History', *Critical Perspectives on Accounting* 14: 227–53.

Barry, Andrew (2001) *Political Machines: Governing a Technological Society* (London: The Athlone Press).

Baxter, William T. (1981) 'Accounting Standards—Boon or Curse?', *Accounting and Business Research* (Winter): 3–10.

Bentson, George J. (1969) 'The Value of the SEC's Accounting Disclosure Requirements', *Accounting Review* 44(3): 515–32.

Bowers, John (1992) 'The Politics of Formalism', in M. Lea (ed.), *Contexts of Computer-Mediated Communication* (New York: Harvester Wheatsheaf): 232–61.

Bowker, Geoffrey & Susan Leigh Star (1999) *Sorting Things Out: Classification and its Consequences* (Cambridge: MIT Press).

Browning, Tyson R. & Ralph D. Heath (2009) 'Reconceptualizing the Effects of Lean on Production Costs with Evidence from the F-22 Program', *Journal of Operations Management* 27: 23–44.

Callon, Michel (1991) 'Techno-Economic Networks and Irreversibility', *Sociological Review* 38**:** 132–61.

Callon, Michel (1998) 'Introduction: The Embeddedness of Economic Markets in Economics', in M. Callon (ed.), *The Laws of Markets* (Oxford:Blackwell Publishers): 1–57.

Callon, Michel (2007) 'What Does it Mean to Say that Economics is Performative?', in D. MacKenzie, F. Muniesa & L. Siu (eds), *Do Economists Make Markets: On the Performativity of Economics* (Princeton: Princeton University Press): 311–57.

Carruthers, Bruce & Wendy Espeland (1991) 'Accounting for Rationality: Double-entry Bookkeeping and the Rhetoric of Economic Rationality', *American Journal of Sociology* 97(1): 31–69.

Cartwright, Nancy D. (1983) *How the Laws of Physics Lie* (Oxford: Clarendon Press).

Cartwright, Nancy D. (2005) 'The Vanity of Rigour in Economics: Theoretical Models and Galilean Experiments', in P. Fontaine & R. Leonard (eds), *The 'Experiment' in the History of Economics* (New York: Routledge): 135–53.

Cicourel, Aaron (1964) *Method and Measurement in Sociology* (New York: Free Press).

Collins, Harry (1987) 'Certainty and the Public Understanding of Science: Science on Television', *Social Studies of Science* 17: 689–713.

Cooke, Eleanor (1927) 'The Third International Management Congress. Held at Rome, Italy, September 5–9, 1927. A Report', *Bulletin of the Taylor Society* XII(5): 486–90.

Cusumano, Michael A. (1994) 'The Limits of "Lean"', *Sloan Management Review* (Summer): 27–32.

Dalton, Melville (1959) *Men Who Manage. Fusions of Feeling and Theory in Administration* (New York: John Wiley & Sons).

Daston, Lorraine (1995) 'The Moral Economy of Science', *Osiris* 10: 3–24.

Daston, Lorraine & Peter Galison (1992) 'The Image of Objectivity', *Representations* 40: 81–128.

Davies, R.W. (1989) *The Soviet Economy in Turmoil, 1929-1930* (Hampshire, London: MacMillan).

Davis, S., K. Menon & G. Morgan (1982) 'The Images that have Shaped Accounting Theory', *Accounting, Organizations and Society* 7(4): 307–18.

Dent, Jeremy F. (1991) 'Accounting and Organizational Cultures: A Field Study of the Emergence of a New Organizational Reality', *Accounting, Organizations and Society* 16(8): 705–32.

Desrosières, Alain (2001) 'How Real are Statistics? Four Possible Attitudes', *Social Research* 68: 339–55.

Donáth, Ferenc (1977) *Reform és Forradalom: A Magyar Mezőgazdaság Strukturális Átalakulása, 1945–1975* [*Reform and Revolution. The Structural Transformation of Hungarian Agriculture, 1945–1975*] (Budapest: Akadémiai Kiadó).

Dunn, Elizabeth (2002) 'Accounting for Change', in M. Kelemen & M. Kostera (eds), *Critical Approaches to Eastern European Management* (London: Palgrave Publishers): 38–64.

Dunn, Elizabeth (2004) *Privatizing Poland: Baby Food, Big Business, and the Remaking of Labor* (Ithaca: Cornell University Press).

Ezzamel, Mahmoud & Keith Hoskin (2002) 'Retheorizing Accounting, Writing and Money with Evidence from Mesopotamia and Ancient Egypt', *Accounting, Organizations and Society* 11: 333–67.

Gallhofer, Sonja & James Haslan (1991) 'The Aura of Accounting in the Context of a Crisis: Germany and the First World War', *Accounting, Organizations and Society* 16(5/6): 487–520.

Garfinkel, Harold (1967) *Studies in Ethnomethodology* (Englewood Cliffs, NJ: Prentice-Hall).

Garfinkel, Harold (in collaboration with Egon Bittner) (1967) '"Good" Organizational Reasons for "Bad" Clinic Records', Chapter 6 in H. Garfinkel, *Studies in Ethnomethodology* (Englewood Cliffs, NJ: Prentice Hall): 186–207.

Gille, Zsuzsa (2007) *From the Cult of Waste to the Trash Heap of History: The Politics of Waste in Socialist and Postsocialist Hungary* (Bloomington: Indiana University Press).

Goffman, Erving (1959) *The Presentation of Self in Everyday Life* (Garden City, NY: Doubleday).

Hacking, Ian (1990) *The Taming of Chance* (Cambridge: Cambridge University Press).

Harrison, Mark (2009) 'Forging Success: Soviet Managers and False Accounting, 1943 to 1962', *The Warwick Economic Research Papers* no. 909.

Henke, Chris (2000) 'The Mechanics of Workplace Order: Toward a Sociology of Repair', *Berkeley Journal of Sociology* 44: 55–81.

Hopwood, Anthony G. (1987) 'The Archaeology of Accounting Systems', *Accounting, Organizations and Society* 12(3): 207–34.

Hopwood, Anthony G. & Peter Miller (ed.) (1994) *Accounting as Social and Institutional Practice* (Cambridge: Cambridge University press).

Hoskin, Keith (1996) 'The "Awful Idea of Accountability': Inscribing People into the Measurement of Objects', in R. Munro & J. Mouritsen (eds.), *Accountability: Power, Ethos and the Technologies of Managing* (London: International Thomson Business Press): 265–82.

Hoskin, Keith W. & Richard H. Macve (1986) 'Accounting and the Examination: A Genealogy of Disciplinary Power', *Accounting, Organizations and Society* 11(2): 105–36.

Hull, Matthew (2002) *Paper Travails: Bureaucracy, Graphic Artifacts, and the Built Environment in the Islamabad Metropolitan Area, 1959–1998*. PhD dissertation, University of Chicago.

Juhos, László (1920) 'A tisztajövedelem számitása' ['Figuring Net Revenue'], *Köztelek* XXX évf., 38. sz., 1920.IX.18.: 700–01.

June, Raymond (2005) *From Dissident Truth to Market Transparency: Global Knowledge and the Making of the "Governance Intelligentsia" in Czech Society*. PhD dissertation, University of California.

Kesztyűs, Imre (1943) *Számtartásstatisztika és Termelésirányítás a Németbirodalomban* [*Management Statistics and the Supervision of Production in the German Reich*] (Budapest: Hornyánszky Viktor R.-T. Nyomdai Műintézet).

Knights, David & David Collinson (1987) 'Disciplining the Shopfloor: A Comparison of the Disciplinary Effects of Managerial Psychology and Financial Accounting', *Accounting, Organizations and Society* 12(5): 457–77.

Knorr-Cetina, Karin (2006) 'The Information Architecture of Financial Markets', paper presented to the Department of Sociology, University of California, San Diego.

Lampland, Martha (n.d.) *Transforming Objects: The Transition from Feudalism to Capitalism in 19th Century Hungary,* unpublished manuscript, University of California, San Diego.

Latour, Bruno (1987) *Science in Action: How to Follow Scientists and Engineers Through Society* (Cambridge: Harvard University Press).

Lave, Jean (1988) *Cognition in Practice. Mind, Mathematics and Culture in Everyday Life* (Cambridge: Cambridge University Press).

Law, John (1996) 'Organizing Accountabilities: Ontology and the Mode of Accounting', in R. Munro & J. Mouritsen (eds), *Accountability. Power, Ethos and the Technologies of Managing* (London: International Thomson Business Press): 283–306.

Lenin, Nikolai (1919) 'What Lenine [sic] said about the "Taylor Society"', *Bulletin of the Taylor Society* IV(3): 35–8.

Levi-Strauss, Claude (1963) *Totemism* (Boston: Beacon Press).

Lewin, Moshe (1985) '"Taking Grain": Soviet Policies of Agricultural Procurements before the War', in M. Lewin, *The Making of the Soviet System: Essays in the Social History of Interwar Russia* (New York: Pantheon Books): 142–77.

Liker, Jeffrey K. (2004) *The Toyota Way* (New York: McGraw Hill).

Loft, Anne (1986) 'Towards a Critical Understanding of Accounting: The Case of Cost Accounting in the UK, 1914–1925', *Accounting, Organizations and Society* 11(2): 137–69.

Lynch, Michael (1991) 'Pictures of Nothing? Visual Construals in Social Theory', *Sociological Theory* 9(1): 1–21.

MacKenzie, Donald (2005) 'Opening the Black Boxes of Global Finance', *Review of International Political Economy* 12: 555–76.

MacKenzie, Donald (2006) *An Engine, Not a Camera: How Financial Models Shape Markets* (Cambridge: MIT Press).

Martin, Aryn & Michael Lynch (2009) 'Counting Things and People: The Practices and Politics of Counting', *Social Problems* 56(2): 243–66.

Martin, Isaac (2008) *The Permanent Tax Revolt: How the Property Tax Transformed American Politics* (Palo Alto: Stanford University Press).

Mattessich, Richard (1964) *Accounting and Analytical Methods: Measurement and Projection of Income and Wealth in the Micro- and Macro-economy* (Homewood, IL: R.D. Irwin).

Mehri, Darius (2006) 'The Darker Side of Lean: An Insider's Perspective on the Realities of the Toyota Production System', *Academy of Management Perspectives* 20(2): 21–42.

Merkle, Judith (1980) *Management and Ideology: The Legacy of the International Scientific Management Movement* (Berkeley: University of California Press).

Miller, Peter (1992) 'Accounting and Objectivity: The Invention of Calculating Selves and Calculable Spaces', *Annals of Scholarship* 9: 61–86.

Miller, Peter, Trevor Hopper & Richard Laughlin (1991) 'The New Accounting History: An Introduction', *Accounting, Organizations and Society* 16(5/6): 395–403.

Miller, Peter & Ted O'Leary (1994) 'Accounting, "Economic Citizenship" and the Spatial Reordering of Manufacture', *Accounting, Organizations and Society* 19(1): 15–43.

Morgan, Gareth (1988) 'Accounting as Reality Construction: Towards a New Epistemology for Accounting Practice', *Accounting, Organizations and Society* 13(5): 477–85.

Mouravieff, V**.** (1929) 'The Central Institute of Labor: A Russian Contribution to the Sciences of Work and Workers' Education', *Bulletin of the Taylor Society* XIV(4): 168–72, 186.

Nelson, Daniel (1995) *Managers and Workers: Origins of the Twentieth-Century Factory System in the United States, 1880-1920* (Madison: University of Wisconsin Press).

Orbán, Sándor (1972) *Két Agrárforradalom Magyarországon. Demokratikus és Szocialista Agrárátalalkulás 1945–1961* [*Two Agrarian Revolutions in Hungary: Democratic and Socialist Agrarian Transformation 1945–1961*] (Budapest: Akadémiai Kiadó).

Oreskes, Naomi (2003) 'The Role of Quantitative Models in Science', in C. D. Canham, J. J. Cole & W. K. Lauenroth (eds), *The Role of Models in Ecosystem Science* (Princeton: Princeton University Press): 13–31.

Pető, Iván & Sándor Szakács (1985) *A Hazai Gazdaság Négy Évtizedének Története 1945–1985* [*A History of the Four Decades of the Domestic Economy 1945–1985*] (Budapest: Közgazdasági és Jogi Könyvkiadó).

Porter, Theodore (1994) 'Objectivity as Standardization: The Rhetoric of Impersonality in Measurement, Statistics, and Cost-Benefit Analysis', in A. Megill (ed.), *Rethinking Objectivity* (Durham: Duke University Press): 197–237.

Porter, Theodore (1995) *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton: Princeton University Press).

Preston, Alistair M., David J. Cooper & Rod W. Coombs (1992) 'Fabricating Budgets: A Study of the Production of Management Budgeting in the National Health Service', *Accounting, Organizations and Society* 17(6): 561–93.

Quattrone, Paolo (2004) 'Accounting for God: Accounting and Accountability Practices in the Society of Jesus', *Accounting, Organizations and Society* 29: 647–83.

Rafael, Vince (1993) 'White Love: Surveillance and Nationalist Resistance in the U.S. Colonization of the Philippines', in A. Kaplan & D. Pease (eds), *Cultures of United States Imperialism* (Durham: Duke University Press): 185–218.

Robson, Keith (1992) 'Accounting Numbers as 'Inscription': Action at a Distance and the Development of Accounting', *Accounting, Organizations and Society* 17(7): 685–708.

Scott, James C. (1998) *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven: Yale University Press).

Simmel, Georg (1990) *The Philosophy of Money,* Second enlarged edition (London: Routledge).

Slonim, V**.** (1922) 'Russian Scientists in Quest of American Efficiency', *Bulletin of the Taylor Society* VII(5): 194–97.

Star, Susan Leigh & Martha Lampland (2009) 'Reckoning with Standards', in M. Lampland and S.L. Star (eds), *Standards and their Stories* (Ithaca: Cornell University Press): 3–24.

Strathern, Marilyn (ed.) (2000) *Audit Cultures: Anthropological Studies in Accountability, Ethics, and the Academy* (New York: Routledge).

Thévenot, Laurent (1984) 'Rules and Implements: Investment in Forms', *Social Science Information* 23(1): 1–45.

Thomas, Robert (1994) *What Machines Can't Do: Politics and Technology in the Industrial Enterprise* (Berkeley: University of California Press).

Thompson, Grahame (1987) 'Inflation Accounting in a Theory of Calculation', *Accounting, Organizations and Society* 12(5): 523–43.

Thompson, Grahame (1991) 'Is Accounting Rhetorical? Methodology, Luca Pacioli and Printing', *Accounting, Organizations and Society* 16(5/6): 572–99.

Thompson, Grahame (1998) 'Encountering Economics and Accounting: Some Skirmishes and Engagements', *Accounting, Organizations and Society* 23(3): 283–323.

Viola, Lynne (1996) *Peasant Rebels under Stalin: Collectivization and the Culture of Peasant Resistance* (New York: Oxford University Press).

Vollmer, Hendrik (2003) 'Bookkeeping, Accounting, Calculative Practice: The Sociological Suspense of Calculation', *Critical Perspectives on Accounting* 3: 353–81.

Weber, Max (1958) *The Protestant Ethic and the Spirit of Capitalism* (New York: Charles Scribner's Sons).

Willmott, Hugh (1996) 'Thinking Accountability: Accounting for the Disciplined Production of Self', in R. Munro & J. Mouritsen (eds.), *Accountability: Power, Ethos and the Technologies of Managing* (London: International Thomson Business Press): 23–39.

Wise, M. Norton (1995) 'Precision: Agent of Unity and Product of Agreement, Part III – "Today Precision Must be Commonplace"', in M.N. Wise (ed.), *The Values of Precision* (Princeton: Princeton University Press): 352–61.

Womack, James P., Daniel T. Jones & Daniel Roos (1990) *The Machine that Changed the World* (New York: Simon and Schuster).

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