Economy and Society

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/reso20

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To cite this article: Guus Dix (2020) Incentivization: From the current proliferation to the (re)problematization of incentives, Economy and Society, 49:4, 642-663, DOI: 10.1080/03085147.2020.1774256

To link to this article: https://doi.org/10.1080/03085147.2020.1774256

Economy and Society Volume 49 Number 4 2020: 642–663
https://doi.org/10.1080/03085147.2020.1774256

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Abstract

Incentives are so widespread and seemingly so insignificant that we might simply take them at face value and fail to ask how we can account for their emergence and proliferation. Building upon Foucault's notion of 'problematization' as a mode of reading history, this paper questions the taken-for-granted place that incentives have come to acquire in our current reflections and practices. To do so, it returns to the late nineteenth and early twentieth centuries when American mechanical engineers and social scientists turned the behaviour of factory workers into a managerial problem and began to design new instruments to incentivize them. The shift from the current proliferation of incentives to their past opens up a genealogical space that invites us to explore the contingent shifts in meaning and use of incentivization as a framework to understand and govern human behaviour over the course of the twentieth century. Such a shift opens up an analytical space too. The return to early instances of incentivization allows us to compare labour incentives with labour discipline and to tease out some of the similarities

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and differences between these two ways of wielding power on the shop floor – and possibly beyond.

Keywords: incentive; discipline; power; labour history; mechanical engineers.

Introduction

Incentives have found their way into the language with which we understand human behaviour and have permeated the instruments we use to govern ourselves and others. They are pivotal to the justification of bonuses in finance as well as to accounts of their alleged perverse effects; they proliferate in editorial comments, presidential addresses, policy documents and economic self-help books; and they bind folk explanations of human action to technical debates in economics and psychology. Incentives are so widespread and seemingly so insignificant that we might simply take them at face value and fail to ask how we can account for their emergence and proliferation. This paper problematizes the taken-for-granted place that incentives have come to acquire in our current reflections and practices.

The value of 'problematization' as a Foucauldian mode of reading history hinges on establishing a link between problems of the past and present while simultaneously avoiding presentism (Castel, 1994; Ossandón & Ureta, 2019). Problematization, as Foucault (1996, 1997a, 1997b, 2001) conceived it, has two sides. As 'historical problematization', it refers to instances in the past where certain kinds of behaviour came to be seen as problematic for specific individuals or social groups. Foucault and those inspired by him studied the emergence of that 'problematic' behaviour in minute detail, with particular attention given to the notions and instruments introduced to understand and alter it. As 're-problematization', meanwhile, it refers to the attempt to turn something that is currently perceived as more or less self-evident into something that we might wish to reconsider. These historical instances are thematically, analytically or genealogically linked to issues that (should) concern us today – even when the exact connection between the past and the present cannot be entirely fleshed out.

To account for the current proliferation of incentives, the paper begins with a systematic overview of their place in contemporary practices. The following two sections then deepen our understanding of problematization. The first section contextualizes the historical problematization of incentives that took place in the late nineteenth and early twentieth centuries in the United States. At that time, American mechanical engineers and social scientists began to problematize the behaviour of factory workers and to design new instruments to incentivize them. The second section shows how historical distance makes it possible to re-problematize incentives. The shift away from the present brings a distinct lineage of expertise into the picture and invites us to revisit our conceptualization of power on the shop floor. The paper is centred around three early instances of incentivization. In the first case, mechanical engineers and social scientists discerned a motivational problem in the day rates and piece rates dominant at the time. In their search

for enticement on the industrial shop floor, they reconfigured basic wage incentives into several more sophisticated methods of remuneration. In the second case, the engineers problematized workers' – and foremen's – lack of insight into their own performances and the problems that hampered them while at work, leading to the design of new techniques to chart, compare and stimulate human performance and to facilitate cooperation in signalling and solving problems. In the third case, they problematized the monotony, disinterest and discontent seemingly inextricable from industrial work, leading them to try to increase workers' interest in their own work and bring out their 'creative faculty' and the 'opportunity for self-expression' through non-pecuniary means. The concluding section of the paper then focuses on the re-problematization of incentives, arguing that a shift from the present to the past opens up a genealogical space that invites us to explore the contingent shifts in meaning and use of incentivization as a framework to understand and govern human behaviour over the course of the twentieth century. Such a shift also opens up an analytical space to compare labour incentives, on the one hand, with labour discipline, on the other, with the return to early instances of incentivization providing a useful way in which to tease out some of the similarities and differences between these two ways of wielding power on the shop floor – and possibly elsewhere.

The proliferation of incentives

Incentives have proliferated over the past four decades as a term to understand human behaviour and as an instrument through which to act upon it. In the private sector, business commentators have championed the use of stock options to incentivize managers to act on behalf of the short-term interests of the shareholders. In defending the interests of the financial industry, these commentators draw on economics in general, and agency theory more in particular, to argue that wealth creation for shareholders and for society as a whole go hand in hand (Dobbin & Jung, 2010; Engelen *et al.*, 2011, pp. 74–75; Fourcade & Khurana, 2013, pp. 148–153). After the 2008 financial crisis, interestingly, incentives also figure prominently in critical accounts of such compensation policies blaming them for favouring the short-term benefits of financial institutions over the long-term tenability of the economic system (Seager & Wearden, 2008; Taleb, 2011). Firms that are active in the so-called platform economy equally evoke incentives and nudges – a recent offspring of behavioural economics (cf. Thaler & Sunstein, 2008) – to deal with their 'employees'. A firm like Uber, for instance, has developed an algorithm to induce drivers via predictive messages that tell them to go to certain places, to accept one more ride or to enter zones where demand exceeds supply at a given moment. The lure of potential financial gain and the game-like features of the app are designed to incentivize action (Rosenblat, 2016; Rosenblat & Stark, 2016, p. 3771).

Beyond private sector management, incentives also have become a key ingredient of neoliberalism as a policy discourse and practice (Brown, 2015; Crouch,

2011; Streeck, 2014). From the 1970s onward, this economic style of reasoning centred on incentives and efficiency was integrated into mundane bureaucratic decisions and practices in the United States (Berman, in press). The trust in incentives is evident, for instance, in fiscal policies that try to foster economic growth and economic independence by rewarding top income-earners through lower taxes while cutting back on wages and benefits for those at the bottom of the income ladder (Crouch, 2011, p. 76; Prasad, 2012; Rodgers, 2011, pp. 202–207; Streeck, 2014, p. 67). In primary and secondary education, teachers have been incentivized to enhance the performance of their pupils with a bonus directly related to the latter's test scores while children also have been directly incentivized to apply themselves at school through a range of 'pay-for-grades' programmes (Dix, 2019; Grant, 2012, pp. 111–114). Incentives were crucial, too, in the intense debates in the United States on healthcare reform in the 1980s and 1990s. They were part and parcel of the toolkit to discuss and enact reforms in health insurance, hospital organization and organ transplantation (Ashmore *et al.*, 1989; Hacker, 1997; Healy, 2006). Recent healthcare policies show that incentives remain important to this day in attempts to reconfigure the relationship between practitioners, patients and managers (Araujo *et al.*, 2018). And they are at the heart of 'health bribes' (Sandel, 2012, pp. 55–60) such as the use of vouchers to stimulate mothers to breastfeed their babies and the offering of cash rewards for patients who lose weight or take their prescribed medication (University of Sheffield, 2015).

The use of incentives to understand and govern others has been concurrent with pleas to incentivize oneself. From the 1990s onward, authors in the 'economics-made-fun' genre have led people to understand everyday life as, at root, a series of incentive problems (Aydinonat & Vromen, 2015). In their international bestsellers *Freakonomics* and S*uperfreakonomics*, Levitt and Dubner (2011, p. xii; 2005) evoke the rudimentary idea that 'people respond to incentives' to place drink-driving, financial crises, murder, cheating sumo wrestlers, climate change and street prostitution under the same heading. Subsequently, economists claimed that their insights were of practical relevance, too. Cowen (2008) promises the reader of *Discover your inner economist* that (s)he will learn how 'to use incentives to fall in love, survive your next meeting, and motivate your dentist'; *Carrots and sticks*' author Ayres (2010) invites people to 'unlock the power of incentives to get things done'; and Levitt and Dubner's (2014, pp. 6, 12, 16–17) latest offer is to 'retrain your brain' and assist you to 'think like a freak' on the basis of the conviction that 'incentives are the cornerstone of modern life'.

From the proliferation to the historical problematization of incentives

In a reflection on the wider significance of incentives-infused economic thinking, Dobbin and Jung (2010, p. 33) conclude that it has simply 'colored the air we breathe'. In other words, incentives might be so close to us nowadays that we

no longer notice their importance – let alone their historical specificity. They have become a neutral term to grasp why individuals behave as they do and come naturally when we speak about desired behavioural changes. This paper problematizes the current predominance of incentives in our (self-)understanding and (self-)management. It does so by expanding upon the double meaning of 'problematization'. As 'historical problematization', it refers first and foremost to past instances of 'thought', which can be defined as 'the motion by which one detaches oneself from [what one does], establishes it as an object, and reflects on it as a problem' (Foucault, 1997a, p. 117). This paper returns to the late nineteenth century when a specific group of individuals – American mechanical engineers and social scientists – began to reflect on the behaviour of industrial workers and managers as a problem that should be understood in terms of incentives.

Such instances of thought are instigated by very concrete social, economic and political developments. More in particular, Foucault (2001, p. 172) argues that 'a given problematization is not an effect or consequence of a historical context or situation, but is an answer given by definite individuals'. The answer of the engineers and social scientist was given in the 'context' of persistent labour troubles on the factory shop floor and of the shifting economic opportunities and constraints that they themselves faced. The mid-1880s are known in American history as the Great Upheaval due to the rapid rise in labour unions, the appearance of nation-wide strike waves and the violent suppression of organized labour. The manufacturers' experience with – or fear of – labour turmoil proved fertile ground for managerial experiments to undermine the cooperative ethical codes and practices of the workers and disrupt the 'foreman's empire' on the work floor (Montgomery, 1989, pp. 171–213; D. Nelson, 1995, pp. 35–43; Nicholson, 2004, pp. 115–123; Rodgers, 1998, p. 10). Manufacturers did so in range of ways. They enrolled individual craftsmen to hire cheap workers by the day; standardized the tasks to dispossess the workmen of their accumulated skill and knowledge; provided welfare services inside and outside the factory to ameliorate dissatisfaction; and called upon armed gang bosses and federal troops to break strikes and demonstrations (Montgomery, 1989; D. Nelson, 1995, pp. 99–118; Nye, 2013). The Great Upheaval disrupted cherished representations of economy and society, too. An earlier generation of American social scientists could still consider the conflict between labour and capital as a typical 'European' phenomenon. But that position became more and more difficult to sustain with the coming of open and violent industrial conflicts in the United States. In addition, the idea that individuals would have to work for a wage only temporarily in a trajectory that led to a self-owned enterprise – held dear by many (middle class) Americans – became controversial as well. It was clear by now that wage labour would be a permanent condition for many and that 'the majority must be subordinates for life' (E. D. Jones, 1915, p. 210; cf. Rodgers, 1978, pp. 7–15; Ross, 1991, pp. 22–50).

The American mechanical engineers and social scientists responded to this historical context in a specific way. In a series of management debates, treatises

and experiments, they began to problematize factory workers' behaviour as well as the current organization and management of factory work. They did so by bringing a series of protracted problems of motivation, efficiency and conflict to the fore and by designing instruments of incentivization as a solution. The engineers became more directly involved with issues of management in meetings and debates at the American Society of Mechanical Engineers (ASME). ASME was controlled by a minority of professional engineers but open to managers and manufacturers with little or no expertise in engineering. The changing economic context of mechanical engineering after the American Civil War made such an alliance between business and professionalism vital. The era of the shop culture, where engineers had the prospect of eventually leading their own small enterprise as an entrepreneur, had made way for one of big firms that did not offer the same opportunities for independence (Aitken, 1985, pp. 35–37; Layton, 1971, pp. 35–38; Meiksins, 1996, pp. 66, 73). When it came to the career perspectives of the engineers the 'mobility route to elite positions in American society was to leave pure engineering' and turn from mechanical problems to managerial ones (Calvert, 1967, p. 231). The engineers did not stand alone. At the time, sociologists and economists were very much orientated to non-academic audiences – business, government, or organized labour – and did not consider the advocacy of (management) reform as a threat to their objectivity (Fourcade, 2009, pp. 69,79; Furner, 1975; Ross, 1991, pp. 26–30). Though less involved in day-to-day factory operation, these social scientists debated and amplified the ideas and instruments developed by the engineers.

For the analysis of my three historical cases, I consulted the major outlets where the new experts on industrial management debated their proposals and experiences. For the engineers, these outlets were the *Transactions of the American Society of Mechanical Engineers*, the *Bulletin of the Taylor Society,* the *Bulletin of the Society to Promote the Science of Management* and *The Engineering Magazine*. For sociologists and economists, these outlets were *The Annals of the American Society of Political and Social Science*, *American Journal of Sociology, The Economic Journal*, *American Economic Review, Journal of Political Economy* and *The Quarterly Journal of Economics*. For authors that were central to my cases, I supplemented these sources with books, pamphlets, lectures and letters they wrote.

Historical problematization as re-problematization

More than a return to the past, problematization as a method seeks to also be relevant 'in the context of the current political problematic' (Foucault, 1997b, p. 294). One key line of argument here is that people respond to specific situations in their place and time but that, 'at a certain point, the answer may become so general that it also becomes anonymous' (Foucault, 2001, p. 172). At that point, the original context resides in the background and the answer itself becomes more-or-less taken for granted. Because historical

problematization recentres attention to these contexts, Foucault (1996, pp. 462–463) argues, it is inevitably an act of 're-problematization', for what at first seemed natural or inevitable is now bound up with a very particular historical trajectory.

This paper returns to three early instances of incentivization in order to re-problematize the current proliferation of incentives. It does so in two distinct ways. First, it opens up a genealogical space that make incentives lose their current a-historic self-evidence. Today, economists play a dominant role in incentives' proliferation throughout the public and private sectors. As such, this paper aligns with a wide range of studies where economics is singled out as a key source of expertise in policymaking and everyday market practices (Callon, 1998; Hirschman & Berman, 2014; MacKenzie et al., 2007). Zooming out, however, economics re-appears as only one of the branches of expertise involved in the process through which incentivization became taken for granted in our understanding and management of human behaviour. This brings genealogical questions into view that this performativity literature often leaves out (for an exception, see Hirschman, 2016). How did economists manage to appropriate certain concepts and devices, and what did they include and exclude in doing so? Or, for the cases addressed here, how did they turn a 'particular' problem on the shop floor into a 'general' problem of (self-)management and (self-)government? A full-fledged genealogy of the incentive is clearly beyond the scope of a single paper. But the focus on early instances of incentivization makes it possible, in the concluding section, to tentatively carve out a distinct lineage of expertise that contributed to the production of generality over the course of the twentieth century.

Historical problematization also opens up an analytical space that enables us to re-problematize the ways in which we have come to look at power nowadays. The comparison between labour incentivization and labour discipline is insightful in that regard. Both preceding and following on Foucault's (1995) seminal *Discipline and punish*, social historians and historical sociologists have analysed how, in the eighteenth and early nineteenth century, factory owners and managers problematized workers' 'indiscipline'. The problems they articulated varied from wandering from one job to the next; sticking to irregular working habits; attending traditional feasts and festivities; forming unwelcome collectives; and taking tools, products or 'waste' back home from the shop floor (Godfrey, 1999, pp. 57–58; Gutman, 1973, pp. 544–547; McKendrick, 1961, p. 32; Pollard, 1963, p. 255; Thompson, 1967, pp. 72–76). Factory owners sought the solution to these problems in disciplinary techniques of workplace surveillance and normalization. They rewarded workers for compliance but predominantly punished them for breaches in the desired order. A worker would be fined, fired or sent to workhouses for low product quality as well as for transgressions of behavioural norms (e.g. gestures, jokes, playing games and aimless wandering) (Beckert, 2015, pp. 147, 153; Biernacki, 2001, p. 183; Biggs, 1996, pp. 51–52; Clark, 1994, pp. 131–132; Nye, 2013, p. 213; Rodgers, 1978, pp. 23–24). Compared with this focus on discipline, the place of incentives has been under-emphasized

in this historical and sociological literature on power. A closer look at incentives makes it possible to analyse similarities and differences between discipline and incentivization on the shop floor and provides an interesting starting point to extrapolate to modalities of wielding power more broadly conceived.

Reconfiguring wage incentives: The search for ways to entice industrial workers

The American engineers and social scientists troubled by US industrial turmoil in the late nineteenth and early twentieth centuries first problematized existing methods of remuneration. Though their solutions differed, they started from a shared assumption about current wage methods: both day rates and ordinary piece rates were seriously flawed in keeping workers motivated. In a day-rate system, neither workers nor foremen had any real incentive to excel because a surplus of effort did not pay off. Simple piece-work systems seemed to offer a way out here. Unfortunately, they were often badly constructed and removed all incentives to exertion through intermittent rate cuts. These wage methods thus suffered from serious defects and led to the kinds of conflicts that they were meant to eliminate (Drury, 1922, pp. 53–55; Mixter, 1915, p. 15; Richards, 1904, pp. 74–75; Roland, 1896b, p. 833; Schloss, 1905, p. 595; Taylor, 1895, pp. 861–864).

Profit-sharing was the first technique designed to ameliorate these defects. According to sociologist Paul Monroe (1896, p. 686, emphasis in original), profit-sharing should be understood as any 'arrangement under which both employers and employees receive, in addition to their wages, a *predetermined* share in the profit'. The moral strength of profit sharing, another sociologist (Giddings, 1887, p. 368) added, was linked to its 'sound theory of the ethics of distribution'. It rewarded every productive worker 'according to the real worth of his services to society' and limited his ambition only by 'his own physical, mental, and moral powers'. According to its advocates, profit-sharing was not just a morally defensible wage method. It was also effective in motivational terms because it ensured that workers always acted 'under the stimulus of immediate gain' (Aldrich, 1887, p. 236). In the late nineteenth century, profit-sharing advanced steadily in Great Britain, France and the United States (Bemis, 1893; Kinley, 1891). As an officer of the Association for the Promotion of Profit Sharing, Nils Nelson (1887, p. 392) praised it for the way it valued the 'self-assertion of energetic spirits, whose exceptional ability, or industry, or energy enable them to earn more, and by their tact to get more, of the product than their fellows'. As a St. Louis businessman, he introduced profit-sharing to find that his workers no longer engaged in 'strikes, lockouts, violence, and class antagonism' but became 'active partners' instead who would 'rather keep at work than stop' (N. O. Nelson, 1887, pp. 388, 390, 393). Managers of The Procter & Gamble Company in Ivorydale, Ohio, could corroborate this experience. Their soap, candle and glycerine workers

went on strike in 1886 and quit their jobs in high numbers. Profit-sharing initially met with indifference but feelings of discontent and distrust did make way, after a few years, for feelings of mutual interest and cooperation. With the factory rooms full of placards that reminded and enticed the workers to excel, strikes disappeared completely and the turnover level was low (Howerth, 1896, pp. 44, 53, 56).

Mechanical engineers were most vocal in criticizing the moral underpinnings of profit-sharing. Though it sounded like a fair technique to get motivated and cooperative workers, they argued that individuals would receive an increase in income for fluctuations in profit – due, for example, to an economic boom or to good investment choices – for which they were not responsible (cf. Towne, 1889a, 1889b). To accommodate such concerns, Henry Towne, engineer and president of the Yale and Towne Manufacturing Company, developed an alternative wage incentive method called 'gain-sharing' in which the exact contribution of workers to increased production could be determined. For that system, administrators should first divide production costs into factors within the workers' sphere of influence and factors where no such influence was possible (Towne, 1889b, p. 603). Subsequently, they would only receive a share in the firm's profits for a more economical use of material and more efficient working methods – or 'gain' as Towne dubbed it. To keep the workers motivated until they received their fair share, each shop provided feedback on their savings on the production costs via

> … a suitable blank, preferably under glass, on which can be entered each month the net results of the system during the preceding month, and including a statement of the *rate* of dividend earned since the beginning of the contract year. The stimulus thus given to the interest of the employee is very marked. (Towne, 1889b, p. 606, original emphasis)

With their interest visually and materially stimulated, workers would long for the special dividend envelope that was given at the end of the year and turn that longing into a further incentive to exertion.

Such discoveries did not surprise engineer Frederick Halsey. Two years after Towne's proposal, Halsey published his critique of both profit- and gain-sharing as failing to motivate workers and address their individual ambitions (Schloss, 1898, pp. 100–102). According to Halsey (1891, p. 758), the public display of efficiency gains was not enough to keep the worker motivated until the end of the year because the 'incentive cannot be as great […] as under [a system] which pays out the extra earnings week by week'. Moreover, Halsey (1891, p. 757) doubted whether gain-sharing really induced the individual worker to be more efficient as it was, at root, a group reward:

> An active, energetic workman cannot have the same incentive to increased exertion under a system which divides the results of his efforts among a dozen lazy

> fellows at his side that he would have under one in which his earnings depend on himself alone.

Because the contribution of an individual worker to the overall yearly profit was but small, the content of the dividend envelope depended crucially on the exertion of others. Halsey's challenge was therefore to develop a system that simultaneously 'furnishes incentive and insures day wages' (Knoeppel, 1915, p. 29). A key idea of his 'Premium Plan of Paying for Labor' was to pay workers in two separate parts. Workers would receive a fixed, daily wage for a fixed amount of work, which was based on the average results in the recent past (Halsey, 1902, p. 363). In addition, each worker would be able to earn a flexible premium on top of his daily wage, based on the number of production hours he managed to save. A system of individually distributed time tickets enabled the foremen to calculate the premium.

This flexible or premium rate was modest so that the rise in labour costs would not be too sharp and no future wage cuts would be required (Drury, 1922, pp. 64–67). Because the bonus was based on individual production and distributed on a weekly basis, Halsey believed he had found a better wage incentive system than had the engineers before him.

The success stories claimed by the advocates of wage incentivization can be counteracted with numerous stories of failures. Many American firms, for instance, abandoned profit-sharing after a while for lack of productivity increase and continued trouble on the shop floor (B. Jones, 1892, p. 617; Kinley, 1891, p. 502; Monroe, 1896, pp. 699–709). Despite his high expectations, Towne dropped gain-sharing in his own factory when he discovered that the 'long period between divisions of gain' and the 'small incentive to close application on the part of the foremen' weakened the connection between effort and reward (Roland, 1896a, p. 408; cf. D. Nelson, 1995, p. 53; Towne, 1921, p. 2; Rodgers, 1978, p. 62). Halsey's premium plan became popular in the United States and England but was also deemed too costly for owners of smaller firms and expected to lead to broken promises when firms, for reasons of competition, would have to cut the premium rates in the end (Drury, 1922, pp. 69–70; Hathaway, 1929, p. 201).

Charting performance, charting problems: Stimulating shop floor cooperation and emulation

The failures of reconfigured wage incentives did not surprise mechanical engineers who rivalled Towne and Halsey in their claim to management expertise. Frederick Taylor, the inventor of scientific management, attributed the lack of success to the exclusive focus on remuneration as the solution to labour problems. According to Taylor (1998 [1911], p. 14), 'management of initiative and incentive' was doomed to fail because it wrongly assumed that the choice over working methods should be left to workers (initiative) who were guided in that choice

by a financial reward (incentive). According to Taylor and his disciples, wage incentives were a necessary ingredient of an encompassing management system – but not a sufficient one. Henry Gantt, one of Frederick Taylor's first students at Midvale Steel Company, integrated the incentive into more sophisticated techniques to visualize and communicate human performance. He designed a series of performance charts that aimed to change the interaction between workers and managers by changing the incentives that surrounded them.

Between 1898 and 1901, Gantt worked as an assistant to Taylor on a big consultancy project for Bethlehem Steel. In that capacity, he studied the best ways to optimize the use of machines and human labour to prepare the full-scale introduction of scientific management. Two years into his assignment, Gantt discovered that the output of workers had hardly increased. The consulting engineers, he thought, had completely failed to secure their cooperation due to their exclusive attention to factory optimization. This was the impetus to develop his own 'task and bonus plan' in which a worker was paid a fixed wage with an extra sum of 50 cents when he completed the daily task. Similarly, the foreman received a bonus for all workers who managed to earn theirs (Gantt, 1919, p. 107; E. D. Jones, 1916, p. 279; Kanigel, 2000, pp. 237–238, 351–353). This plan, Gantt (1902, p. 358) argued, would furnish an 'automatic incentive for men to work up to their capacity and to obtain from the machines the product which they are capable of turning out'.

In the years thereafter, Gantt fully integrated that 'automatic incentive' into a more encompassing series of performance charts (Alexander, 2008, pp. 90–92; Gantt, 1903, pp. 1323–1324; Petersen, 1991). On these so-called Man Record Charts, individuals were given their own row and each row was divided into six columns that represented the days of the working week. Gantt's initial proposal was to use different colours and marks to visualize the performance of the workers but these were replaced by lines and letters by Gantt's disciple and popularizer, Wallace Clark, (1942 [1922]). Each of the columns or daily spaces came to represent the amount of work that a worker should accomplish that day. When a worker produced only 40 pieces instead of 50, for instance, the line was drawn through only 80 per cent of the width of the column. The foreman then visited the shop floor to find out why the worker failed to accomplish his task. To make the visual representations of failures more meaningful, the possible reasons for a delay were grouped into a number of classes. Each class had its own specific symbol such that the foreman had only to fill in the appropriate symbol in the portion of the daily space left open. The letter 'G', for instance, made clear that the delay was due to a 'green' worker (i.e. a machine operator who lacked manual dexterity because he or she was inexperienced).

At the end of the week, the foreman added together the number of pieces produced by a worker over the preceding days and drew a somewhat heavier line just beneath the daily lines for that worker. As the men were listed one below the other and grouped together by the name of the sub-foreman under whom they worked, it was now easy for the foreman to see, at a single glance, which individuals were

the most and least productive. Subsequently, the foreman drew a somewhat heavier line beneath the name of each sub-foreman by calculating the weekly production of all workers under his control. These lines represented the performance of the sub-foremen, i.e. their respective ability to solve the problems encountered by their workers. Finally, the heaviest line drawn on a Man Record Chart represented an average of the work performed by all groups of workers under the guidance of the different sub-foremen. This line was placed just below the name of the foreman responsible for the whole shop.

The Man Record Chart was meant to travel with the foremen through the entire plant and thereby transform the behaviour of managers and workers as well as their interaction. Three effects stood out. First, the graphical representation of the workers by the thin lines below their names enabled the foreman to classify the workers. The so-called 'long-line workers' were satisfied with the official recognition of their talents while 'short-line workers' tended to be conscious of their inferiority and were 'usually the backbone of strikes and discord' (Clark 1942 [1922], p. 36). This new classification would bring legitimacy to management decisions. The workmen seeing long-line colleagues being promoted understood, by the use of charts, that the decision was based on facts and not on impressions, favouritism or special privilege. Yet they simultaneously knew that, if factory work decreased, management would fire short-line workers first. This acted 'as a powerful stimulus to the unskilled, and all who have any ambition try to get into the bonus class' (Gantt, 1919, p. 165; cf. Clark 1942 [1922], p. 42; Gantt, 1917, p. 12; Trabold, 1922, p. 148).

Second, the charts would bring the foreman in line with managerial purposes, since what was a tool for the foreman to direct his subordinates could also become the instrument that enabled the superintendent 'to compare the ability of his various foremen to get work done' (Clark 1942 [1922], p. 43). Just like with the short-line workers, the chart made visible which foremen were incapable of removing the obstacles that hampered efficient production. There was no place for a foreman with too short a line in management's ambition to 'build up an organization composed of men who have proved their ability to produce' (Clark 1942 [1922], p. 43; Gantt, 1919, p. 170).

Finally, the charts were directly communicated to the workers 'with the idea of developing their ambition and their interest' for each worker would appreciate 'the opportunity to watch his own progress from day to day' (Clark 1942 [1922], p. 33). Frequently, those unable to earn a bonus on a regular basis would assist their foreman in the discovery and elimination of the obstacles that hampered the production process. The results of securing that assistance were beneficial: 'with a bonus as an incentive, and a proper instructor, a very fair proportion of the unskilled finally succeed in performing a task that was at first entirely beyond them' (Gantt, 1919, p. 151). That success was not just due to individual ambition and interest but also had a clear collective dimension:

> The fact that under this system, everybody, high and low, is forced by his co-workers to do his duty (for someone else always suffers when he fails) acts as a

> strong moral tonic to the community, and many whose ideas of truth and honesty are vague finds habits of truth and honesty forced upon them (Gantt, 1919, pp. 170–171).

When presented to the worker in the right fashion, the Gantt chart was equally a top-down device for workers' self-management and mutual control.

Small technical interventions could have big consequences. For a long time, Gantt (1919, p. 26) suggested, labour and capital were 'formed with the idea of using force only' and demanded as much as possible for themselves while, at the same time, blocking the other's demands. Yet, if industry were to 'progress from an era of force to one of equity', then the adversaries should look for a new state of industrial equilibrium founded on an 'intelligent selfishness […] which shares the benefits equitably among those helping to obtain them' – and that was exactly what the visualization and reward of human performance would bring. The charts were small but powerful techniques that afforded 'substantial justice to the employee' and thereby had the potential to bring peace between labour and capital (Gantt, 1902, p. 341). Yet potential and practice were often miles apart. Through the consultancy work of Wallace Clark, the Gantt chart did spread to various public and private sector organizations but simultaneously met with severe opposition from workers, unions and managers (Wren, 2015). As a consulting engineer, Gantt himself experienced serious difficulties with the managers at both Sayles Bleachery and Joseph Bancroft & Sons (D. Nelson, 1995, pp. 75–76). The firm where it all started did not escape controversy either. In 1918, the National War Labor Board ordered the abolishment of the bonus rates at Bethlehem Steel for having 'a serious detrimental effect on the production of war materials' (as cited in Montgomery, 1989, p. 228).

Working with non-financial incentives: Creative contentment and industrial discontent in pulp and paper-making

Yale economist Irving Fisher (1918, p. 559) was worried that the soldiers who returned from the trenches of the First World War would find nothing but monotony at work. As president of the American Economic Association, he called upon his colleagues to 'find ways of putting real 'pep' into the worker – for his sake as well as others' (Fisher, 1919a, p. 18). That objective could only be reached when economists and psychologists would cooperate to better understand the fundamental human instincts, beyond those of self-preservation and making a living, that drove the workman as he 'not only longs for more pay, but he hungers and thirsts for other things which he cannot formulate, because so largely unconscious' (Fisher, 1919a, pp. 17–18; cf. E. D. Jones, 1915, p. 222; Morgan, 1920, pp. 210–211). Waiting for that cooperative endeavour, Fisher primarily relied on the work of Robert B. Wolf – an industrial manager and writer – not on academic economists or psychologists.

Wolf graduated as a mechanical engineer from the University of Delaware in 1896 and spent some years in the New York State and New England pulp and paper mills thereafter. The practical knowledge about the machinery was valuable yet Wolf (1917a, p. 4) considered his familiarity with the workman's point of view an even greater asset. After his promotion to general manager of the Spanish River Pulp & Paper mills in Sault Ste. Marie, Ontario, Wolf began to use that familiarity to address two protracted problems in the industry. The first and most urgent problem was that of labour unrest. On his arrival as a manager at Spanish River, 'there was a strike on, and pickets surrounding the yards' (Fisher, 1919b, p. 89). Added to the discontent among the workers was a problem of idiosyncratic working methods where 'a man judged the cooking operations by the "feel" of the digester and the relief valve, and based his judgment as to when the digester should be blown upon the color of the liquor, and the smell' (Wolf, 1917a, p. 5). Summoned by the owner to simultaneously tackle labour unrest and the mediocre product quality, Wolf began to look for ways to increase the interest of the workmen in the production process.

Wolf's experiment was to teach the operators of the different paper mills a standard method of cooking by charting the 'performance' of the pulp to increase the strength of the fibre. Through graphical charts on the bottom of the cooking records, a workman could follow the temperatures and pressures inside the vats during different phases of the chemical process. The effects of continuous charting were not only visible in the increased quality of the pulp (Wolf, 1915, p. 5). The constant interaction between the graphical representation of the pressure inside the vats and the calibration of the cooks also enabled the latter to gradually determine 'the ideal standard cooking chart' and, in doing so, 'began to take a keen interest in their work, as they were in reality following an ideal which they recognized to be the true ideal in order to get the best quality of pulp' (Hutchins, 1920, p. 233; Wolf, 1917a, p. 5).

With workers well-informed about the production process and already interested in the job at hand, Wolf turned to the performance of each individual operator. By calculating the extent to which the actual temperature and pressure in the vats approximated the ideal temperature and pressure curves, Wolf could identify the ability of the operator in question to work up to standards. When the calculation of worker efficiency would become an accepted and continuous practice, it would be possible for management to see how well individuals did over time and in comparison with each other. The results of all these calculations were subsequently put into a series of Progress Records where one could easily gauge the performance of all cooks in a particular department.

As a third and final step, these Progress Records were directly communicated to the cooks. This element of bringing the records to the attention of those who were recorded was vital to Wolf's strategy to increase the engagement of the cooks in the production process. 'This brings out what we call the creative

faculty of the man to the fullest extent; he is able to really enjoy his work by being given opportunity for self-expression' (Wolf, 1917a, p. 6). These publicly displayed Progress Records were a major device for cooks' self-expression and self-government. They allowed the workers to see their own contribution to the production process and assess their performance over time. Moreover, the listing of workers one below the other facilitated comparisons with fellow cooks by which a 'spirit of emulation [was] built up which [made] each man desire to do good work of his own free will' (Wolf, 1915, p. 5; cf. Tead, 1920, pp. 176–177).

At first, the experiment was not met with great enthusiasm. The workers resisted the abandonment of traditional working methods. Wolf particularly highlights one of the cooks who most fiercely opposed the whole idea because he was thereby 'tied down to cooking (as he expressed it) with a lead pencil' (Wolf, 1917a, p. 5). After two years, however, that very same cook was a big supporter of the new way of working and even moved up the ranks to become foreman of the digester house. The case of the reluctant-worker-turned-enthusiastic-foreman was not unique. Wolf (1917a, p. 6) said he could give many more examples of employees who 'have changed from men doing negative, destructive work to men doing positive, constructive work'. Even beyond the narrow confines of the work place, men have 'changed their habits of living, decidedly for the better, simply because they were being given opportunity to find joy in their work' (Fisher, 1919b, p. 89).

The performance charts of Henry Gantt and Robert Wolf were much alike. Nonetheless, there was a big difference. Gantt still relied on monetary rewards because he thought that 'selfishness' was the 'dominating characteristic of mankind' (Gantt, 1917, p. 12; cf. Towne, 1889a, p. 618). Wolf (1917b, p. 19) stressed that 'the desire to find self-expression in creative work' should be taken as 'the dominant emotion of the human heart'. The creative worker who progressed over time and came to occupy a high place in the ranking could not claim any material benefit nor did he need such additional rewards. The use of 'non-financial incentives' was sufficient because the sole inducement came from the 'desire to produce actuated by internal motives' (Wolf, 1918a, p. 925, 1918b). In a broader sweep, Fisher (1918, pp. 561–562) extrapolated from the experiments with the pulp and paper worker to a number of 'great fundamental human instincts' such as self-expression, self-sacrifice and loyalty that must be satisfied to make a man's life successful. In an almost Marxist turn of phrase, Fisher (1918, p. 562) noted that the instinct of workmanship was 'subtly abstracted from industrial life through specialization of work and division of labor' and that the worker was hence no longer 'able to visualize his part in the product'. The system of charts that Wolf introduced enabled the individual workman to see his contribution to the product: 'Just as in baseball, we are interested in the score; and just as in school, students find grades an incentive, so the workmen were stimulated by having and making a record' (Fisher, 1919b, p. 89). Reinvigorating factory work with older work ideals, the charts that represented the chemical process of the pulp and their own performance gave

industrial workers 'an opportunity for such expression as the artist or handicraftsman enjoys' (Fisher, 1919b, p. 89).

Re-problematizing incentives: Conclusion

At the end of the nineteenth and the beginning of the twentieth centuries, mechanical engineers and social scientists brought a series of protracted problems of motivation, efficiency and conflict to the fore. As a new group of management experts, they problematized the behaviour of industrial workers and managers and turned to financial and non-financial incentives as a solution. This paper, however, does not engage in historical problematization for its own sake. The main aim of revisiting certain instances in the past is to turn something we take for granted now into something we might wish to reconsider. Two specific contributions stand out in the reproblematization of incentives.

First, historical problematization opens up a genealogical space that enables us to trace a distinct lineage of expertise on incentives. One key development immediately springs out when we compare the current proliferation of incentives with the early instances of incentivization: incentives have travelled from the circumscribed space of the industrial shop floor to a very wide range of political and managerial practices. The 'generalization' or 'universalization' of incentives was made possible by a series of efforts to stretch the cognitive boundaries of incentivization until it became the encompassing and relatively taken-for-granted framework that it is today. This genealogy would lead us to subsequent expert groups that have appropriated the term and put it to new uses. Contemporaneous to the engineers, for example, socialist writers and intellectuals began to embed incentives in their critique of capitalism as a political and economic system and extrapolated to a future society that would incentivize people in a totally different manner (Bevir, 2011; Egbert & Persons, 1952, pp. 169–173; Quint, 1953). In the interwar period, psychologists, anthropologists and sociologists shifted the attention from systemic issues back to the shop floor. They brought complex emotions, nervous tensions and basic group attitudes to the mix and advocated techniques that better 'adjusted' workers to current industrial conditions (Gillespie, 1993; Rose, 1999). Postwar economists, finally, reinvigorated the debate about socialism and capitalism as rival systems of allocation. Bringing more systemic issues back in, though in a totally different way, they eventually began to see the world as populated by 'principals' who had to incentivize 'agents' to overcome instances of information asymmetry (Lavoie, 1985; Lee, 2006; Mirowski & Nik-Khah, 2017). Even though a full-fledged genealogy is beyond the scope of this paper, incentives already lose some of their current self-evidence by historicizing them.

Second, the cases' distance from the present allows us to see that 'incentives' are not a neutral term to deploy in speaking about human action. They are part of definite relationships of power whereby one party tries to get a cognitive and instrumental

hold of the behaviour of another. The analysis of the early instances of incentivization, hence, opens up an analytical space to explore how we see and conceptualize power on the shop floor and in other organizational and political settings. The comparison with disciplinary power is an interesting one in this regard. An even earlier generation of factory owners and managers operating in the eighteenth and early nineteenth centuries had problematized workers' 'indiscipline' by focusing in particular on their irregular working habits, traditional customs, self-organization and inclination to steal (Godfrey, 1999; Gutman, 1973; McKendrick, 1961; Pollard, 1963; Thompson, 1967). They introduced disciplinary techniques of workplace surveillance and normalization and a series of punishments for breaches in the desired order (Beckert, 2015; Biernacki, 2001; Biggs, 1996; Clark, 1994; Nye, 2013; Rodgers, 1978). Those traces of disciplinary power are still very visible in the cases discussed here. The charts developed by Gantt and Wolf, for one, clearly relied on workers' (self-)surveillance of their performances and also subjected them to strict time schedules. At the same time, however, there was a new set of concerns in the sophisticated attempts to incentivize workers and foremen. Less geared towards strict docility (cf. Foucault, 1995, pp. 135–169) – but still targeting the productive subject – the engineers and social scientists were looking to cultivate labourers' willingness to work, creative faculties, desire for self-expression, source of contentment, development of ambition and 'intelligent selfishness'. Furthermore, less geared towards punishment (cf. Foucault, 1995, pp. 73–103) – though still punitive when needed – they spent their energy developing and experimenting with strategies of emulation, cooperation and enticement. While it is impossible to make strong claims about incentivization as a general framework to understand and govern human behaviour on the basis of three historical cases, a substantive engagement with the genealogical trajectory of incentives outlined previously makes it possible to explore how incentivization developed beyond the confines of the industrial shop floor over the course of the twentieth century – and whether it remained closely tied to discipline or emancipated as a more distinct and autonomous modality of power.

Acknowledgements

I would like to thank Jens Beckert, Gregory Ferguson-Cradler, Tod van Gunten, Jacob Habinek, Dan Hirschman, Sebastian Kohl, Andrea Mennicken, Bernike Pasveer, Kiran Patel, Chris Rea, Laura Sawyer, Fran Tonkiss and three anonymous reviewers for their critical and constructive comments. The paper also benefited from discussions with participants of the STS Summer Harvest at Maastricht University, the workshop 'Historicizing 'the economy'' at Harvard University and the SES research group at Leiden University. I am grateful to Meghann Ormond for carefully proofreading the manuscript for grammar and spelling errors.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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