

Do robots dream of becoming time poor?¹

What future for labour-times?

How many of us are on first name terms with a robot? Who is not time-poor?² These questions sum up conflicting prospects for life under the rule of capital into the twenty-first century. Automation threatens paid employment while we are being subjected to longer hours of more intense, if fragmented working periods within the same day. This combination is more than a paradox. Its transient manifestations have sustained accumulation processes throughout capitalism's 200-year existence.

So as not to be dazzled by the promises of wiz-bangery, this investigation begins, not with a machine but a tool,³ the short-handled hoe known as *El Cortito*. As an implement, it is no more efficient than a long-handled one. Californian employers chose the former because it let their overseers spot a field hand who stood up to take a break. In Germany, such farm labourers were *robota*, slang for slave. *El Cortito* ruined spines and inculcated servility until outlawed in 1974 after campaigning by the United Farm Workers Union. The choice and rejection of that hoe provide three keys to understanding mechanisation under capitalism: first, technologies are selected to discipline labour-times; secondly, the relative strengths of the contending classes determine how labour is controlled; thirdly, employers need not invest in machines as long as living labour is more productive of surplus-value. (516-7)

Marx's chapter on 'Machinery and Large-Scale Industry'⁴ explores how mechanisation, longer hours and intensifications of labour complemented each other during the half-century to 1867.⁵ Forty years ago, G.N. von Tunzelmann trumpeted the gains 'in economic history, not to speak of countless other disciplines' from giving that chapter the attention it deserves since Marx's

¹ Philip K. Dick, *Do Androids Dream of Electric Sheep?* London: Rapp and Whiting, 1968, which suffered from Ridley Scott's adaptation, *Bladerunner* (1982).

² Jonathan Crary, *24/7 Late Capitalism and the End of Sleep*, London: Verso, 2013; see my 'Making capitals tick', *Overland*, no. 172, 2003, pp.92-101.

³ Karl Marx, *Capital*, I, London, Penguin, 1976, pp.492-5; henceforth, references to volume I will be bracketed in the text.

⁴ cf F. Engels, 'Synopsis of Volume One of *Capital*', *Karl Marx-Frederick Engels Collected Works (M-ECW)*, vol. 20, London: Lawrence & Wishart, 1985, pp.300-8.

⁵ According to Hans-Joachim Voth, 'output growth was largely driven by additional labor input ... it was abstention from leisure ... that was at the heart of economic growth', *Time and Work in England 1750-1830*, Oxford: The Clarendon Press, 2000, p.234. Neither the content nor the citations in E.P. Thompson's 'Time, Work-Discipline and Industrial Capitalism', *Past & Present*, no. 38, 1967, suggests that he ever opened *Capital*.

analysis is spare and succinct ... Had his work acted as a springboard for serious research ... the years 1800 to 1860 would not have remained the dark ages of the stationary steam-engine. As it is his points have been forgotten ...⁶

To appreciate how much Marx helps us to understand about the first half of the nineteenth century still leaves us to work out what, if anything, his chapter on machinery might offer by way of a starting place to deal with the impacts from Artificial Intelligence, automation, computers, genetic engineering and robotics, for which 'technology' serves as an inadequate generic.⁷

To understand the needs of capital we must look behind job numbers and wage-cuts to burrow into labour-times. Employment and earnings are how we experience exploitation. Marx penetrates that surface to track socially necessary labour-times, universal labour-times, turnover times, production periods, working periods and circulation times, and is thus able to reveal how exactly it is that value is labour-time. (434) If bread could be baked in a twentieth of the time, he observes, its usefulness 'would remain quite unaffected. It would lose not a single particle of its use value even if it dropped ready-made from the sky.'⁸ That outcome is not true for the loaf's exchange-value because, were our daily bread to fall like manna, it could contain no labour-time and hence its making would not have added value to a prior hoard of values (capital).⁹ If it is lopsided to focus on job numbers and wage-rates at the expense of labour-times, it is no less a mistake to concentrate on the latter as if their extension and intensification can be isolated from the production of surplus-value to accumulate profits for expansion via the self-perpetuating circuits of money, productive and commodity capitals.¹⁰

Were quantum computing and robotics to usher in an era of use-values with no direct or immediate human involvement, could they still be considered commodities? Whether Marx's conceptualisation of value retains relevance if no living labour is present in use-values is a matter meriting more attention than is possible here. Marx would be amazed if they did since he equated 'historical', not with the past, but with the 'transitory', a rule he applied to concepts which 'are as little eternal as the relations they express.'¹¹

⁶ T.N. von Tunzelmann, *Steam Power and British Industrialisation to 1860*, Cambridge: Cambridge University Press, 1978, p. 8; von Tunzelmann acknowledges 'a similar statement by Nathan Rosenberg, 'Karl Marx on the Economic Role of Science', *Journal of Political Economy*, vol. 82, no. 4, 1974, pp.713-28.

⁷ David Noble, *Forces of production: a social history of industrial automation*, New York, Alfred A. Knopf, 1984.

⁸ Karl Marx, *A Contribution to a Critique of Political Economy (CCPE)*, Moscow: Progress Publishers, 1970, pp.20-21. (That is how marginalists imagine all commodities.)

⁹ A capitalist who monopolises its sale, however, could take a profit out of values already added elsewhere in the system.

¹⁰ Karl Marx, *Capital*, II, London: Penguin, 1978, chapters 1-4.

¹¹ Karl Marx, 'The Poverty of Philosophy', *M-ECW*, vol. 6, London: Lawrence & Wishart, 1976, p.166.

Leaving such conundrums aside, three political issues stand out. First, no matter how sophisticated technologies become, they are always an arsenal in the class struggle: (562-4)

Like every other instrument for increasing the productivity of labour, machinery is intended to cheapen commodities and, by shortening the part of the working day in which the worker works for himself, to lengthen the other part, the part he gives to the capitalist for nothing. (492)

Secondly, the installation of ever more machinery will continue to take 'a variegated medley of transitional forms', (602) as must the struggles we craft to hold back the onslaughts on living standards which are being stepped up *via* technologies, but not *by* them. Thirdly, Marx offers a strategic vision of machino-facture as representing 'a victory of man over the forces of nature but in the hands of capital it makes man the slave of those forces ...'. (569) 'The field of application for machinery would therefore be entirely different in a communist society from what it is in bourgeois society.' (515 n.33) Hence, a society built around the common ownership and control of productive resources will open pathways towards the 'development of human potentiality for its own sake, the true realm of freedom.'¹²

Flows and fractures

Assembly lines rely on co-operation in ways which deny the sociability that we otherwise associate with mutual aid. (508) Their continuity and regularity reinforce each other to ensure the extraction of more value within the same working period. (502) Fordism combines continuous flows on the production line with a morcellisation of labour.¹³ Charlie Chaplin's *Modern Times* (1936) gets their interdependencies dead to rights. Again, the explanation lies in the needs of capital. Continuous flow makes the labour-time purchased by the agents of capital match more closely production-times and thereby reduces the portion of necessary labour-time in the working-period against that of surplus labour-time. The briefer that gap, the greater becomes the volume of surplus-value for the capitalist to appropriate. (Chapter 7) That Fordism is rampant across Asia and Eastern Europe suggests that global capital is closer to being 'Proto-Fordist' than to becoming 'Post-Fordist'.

¹² Karl Marx, *Capital*, III, London: Penguin, 1981, p.874.

¹³ Karel Williams *et al.*, 'The Myth of the Line: Ford's Production of the Model T at Highland Park, 1909-16', *Business History*, vol. 36, no. 3, 1993, pp.66-87; Bruce Pietrykowski, 'Fordism at Ford: Spatial Decentralisation and Labor Segmentation at the Ford Motor Company, 1920-1950', *Economic Geography*, vol. 71, no. 4, 1995, pp.383-401; Daniel M.G. Raff, 'Wage Determination Theory and the Five-Dollar Day at Ford', *Journal of Economic History*, vol. 47, no. 2, 1988, pp.387-99; for perhaps the earliest instance of continuous flows see Neil McKendrick, 'Josiah Wedgwood and Factory Discipline', *The Historical Journal*, vol. 4, no. 1, 1961, pp.30-55. Similar uninterrupted processes revolutionised iron into steel; a remodeled chocolate factory reduced production time from 16 hours to 35 minutes.

From the 1980s, more managers applied just-in-time to production goods, including labour-power. They learned how better to assemble that unique commodity on an hourly or daily basis, often contracting the task out to body-hire firms. Yet it is the wage-slave who bears the cost of this 'flexibility' by being ever ready for broken shifts, gigs, or zero-hour contracts. Companies invest in improved communication and transport for the more rapid turnover of inputs and sales. (506) In like manner, the smart phone and the web are pivotal in the current waves of restructuring of work by keeping both casual and permanent labour-power on constant stand-by.

These shifts in assembling the 'conglomeration' of labour intersect with developments in the equipment to which it is applied, for example, from main-frames to desk-tops to lap-tops and then to i-pads. Despite the energy-guzzling 'cloud', the machine no longer aspires to the gigantic, (506-8) but masquerades as a tool. At the same time, the current pattern of assembling labour-power rehearses the situation where each operative became one more cog in a seven-storey textile mill, itself a machine for maximising the extraction of surplus-value; hands, in both senses, were made components of the machine known as a factory, now a network. (544ff.) Labour today is being conglomerated out of individuals and clusters until its vendors form one vast machine, not necessarily concentrated spatially, yet more than ever under centralised ownership and direction.¹⁴

Platforms

The chat around UBER fails to grasp its game plan by ignoring that the cost of providing its fixed-constant capital¹⁵ is not 'shared' between the company and its partners. UBER exemplifies the assembling of a network of operatives who contribute their own equipment in smart and mortgaged vehicles. Such arrangements are as venerable as cottage weavers and remain as prevalent as out-workers with their own sewing machines taking in materials from firms which thereby avoid rent on sweatshops. The first difference is that the exploitation is now organised on-line; and the second is that the labour provides a commodity in the form of a service rather than a physical object, or delivers a commodity produced by wage-slaves elsewhere in the food chain. UBER's business model, apart from its tax dodging,¹⁶ reconfigures the dodge that the Coca-Cola Company perfected from the 1890s by franchising its bottling operations. UBER's 'secret ingredient' is its app.¹⁷ UBER

¹⁴ Marx defines 'industrial' in terms of a centralisation of ownership and control and the concentration of resources, notably a conglomeration of labour, *Capital*, III, p.349.

¹⁵ For why a jet-liner in flight is fixed capital while its fuel is fluid capital, Karl Marx, *Capital*, II, London: Penguin, 1978, p.242.

¹⁶ Brian O'Keefe and Marty Jones, 'Uber's Tax Shell Game', *Fortune*, November 2015, pp.49-56.

¹⁷ Nick Smicek does not get it, *Platform Capitalism*, Cambridge: Polity, 2017; see my *The Essence of Capitalism*, London: Profile, 2001, chapter 5.

could afford the switch to driverless cars¹⁸ only if enough of its ‘partners’ took out loans to supply those machines, the first generation of which will be much more more expensive and less reliable than their successors.¹⁹ (528) Otherwise, the burden for that fixed-constant capital would fall to UBER. Grappling with operating losses of \$4.7bn in 2017, UBER’s new CEO still has to be convinced that the company can continue to develop vertical-lift-off aircraft as well s driverless cars.²⁰ Were the company to go public, its founders could use the funds from ‘cashing out’ its stock-market valuation of \$50bn, but the corporation then would become liable for more tax, and be carrying the wear and tear on the prime fixed asset, the vehicles. Either outcome would deflate that \$50bn somewhat. UBER boosts its extraction of value not just by mistreating its partners but by getting its capital equipment from them for free. Protesting labour conditions and being transfixed by communications technology will never penetrate to the forms of capital and the circuits for its accumulation that UBER acknowledges by skating over.

Alternatively, UBER’s founders could sell their stock and avoid the bother of running a business²¹ by parking their take with a fund like Blackrock (327) which manages \$US17 trillion on software known as ALADDIN for Asset Liability and Debt and Derivative Investment Network.²² Global capital is not ruled by ALADDIN although much of it runs on that platform; nation-market-states are subject to its algorithmic trades.²³ Blackrock and their kind came to occupy this pivotal place after excess capacity in production blew out to excess latent capital. This financialisation compounds the turmoil in employment as corporates chase quarterly profit results, the ‘L’ in long-term standing for loser.²⁴ Most of the money that flies around the world at the speed of light is a means of payment, often for speculative trades. Such money-of-account is far from the money-capital that goes on production capital so that wage-slaves can add value to their accumulated past labour, that is, capital.²⁵

Threats and promises

¹⁸ Hovering over the likelihood of driverless vehicles is the 2013 quip of PayPal’s Peter Thiel: ‘We wanted flying cars, instead we got 140 characters.’

¹⁹ Marx, *Capital*, II, pp.154 and 157.

²⁰ Sheelah Kolhatkar, ‘Taking the Wheel’, *New Yorker*, 9 April 2018, pp.50-59.

²¹ As Engels notes in Marx, *Capital*, II, p.137.

²² *Forbes*, 26 December 2017, pp.52-4; \$17 trillion is 7 percent of assets in the world.

²³ David Peetz and Georgina Murray, ‘Restructuring of Corporate Ownership in Australia through the Global Financial Crisis’, *Journal of Australian Political Economy*, (JAPE), no. 71, 2013, pp.76-103.

²⁴ *The Economist*, 16 December 2017, p.???, 10 March 2018, p.60.

²⁵ Marx, *Capital*, II, chapter 4; see my ‘What happened in Globalisation’, *JAPE*, no. 51, 2003, pp.115-26.

If cover stories count for anything, the Robot remains a star turn.²⁶ Alarm bells about that a third of jobs will disappear by 2030 ring out against lullabies that new ones will, as always, pop up behind our backs.²⁷ A report from McKinsey & Company late in 2017 gives the more probable figure that about 15 per cent of existing work will be done by machines by 2030, affecting some 800 million people. That prognosis is not the same as claiming that there will be 800m. more unemployed.²⁸ (555)

McKinsey also found that a third of the tasks being performed by sixty per cent of today's employees could have been automated before now. Why they were not is apparent from the accompanying image of a robotic arm's making sashimi. Investing in that device would benefit an outlet with a huge turnover. For as long as most raw fish is bought from small or medium shops, with freshness as its selling pitch, the capital cost of a robot will be too high when compared with living labour. In addition, each outlet would need to buy two robots in case of a break down. Who could afford to leave so much capital idle when it is cheaper to summon another casual should one call in sick?²⁹

Luddites: the Big Lie

Fears of permanent mass unemployment recur with each wave of innovation and restructuring. One response from 200 years back commands attention because its misrepresentation is used to disable proletarian resistance to any technology impinging on labour's share of the value that we produce, or on the quality of our lives. The Big Lie is that Luddites smashed machines under the delusion that they would thereby secure their livelihoods forever. The truth is that they were class conscious, selective in the machines they attacked, breaking some as a way of punishing their owners.³⁰ Moreover, the Luddites hit out at only certain devices. They thrashed and murdered Masters, singling out wage-cutters, especially swindlers who paid in kind ('truck') rather than in cash. Another provocation was the exorbitant rent on looms, exacted even from cottagers who owned

²⁶ John Lanchester, 'The Robots are Coming', *London Review of Books*, 5 March 2015, pp.3-8; 'The Future of Work', *Nature*, v. 550, 19 October 2017, pp.315-29; Shielah Kolhartkar, 'Dark Factory', *New Yorker*, 23 October 2017, pp.70-81; Jim Chalmers and Andrew Charlton, 'The Robot Race', *The Monthly*, November 2017, pp.24-33; James Surowiecki, 'Robotocalypse NOT', *Wired*, vol. 25, no. 9, 2017, 2017, pp.62-9; four articles in the *New Internationalist*, November 2017, pp.10-26.

²⁷ David Gruen, 'The Future of Work', *Policy*, vol. 33, no. 3, 2017, p.3; the sogginess of this well intentioned Deputy Secretary of the Australian Treasury is a miracle of insightfulness compared to the prize idiocy from John Brumby, erstwhile Anti-labour Party (ALP) premier of Victoria, and now chair of Centre for Workplace Leadership: 'We all know the workplace is changing and one of the big drivers is because the world itself is changing so profoundly.' *Sydney Morning Herald*, 2-3 May 2015, Business, p.10.

²⁸ *Canberra Times*, 12 February 2018, pp.38 and 40.

²⁹ For robo-baristas in Starbucks, Alana Semuels, 'Iron Chefs', *The Atlantic Monthly*, vol. 321, no. 1, 2018, pp.25-8.

³⁰ To inflict the maximum harm on their enemies with minimum harm to themselves, Australian Aborigines drove flocks of sheep over cliffs; the 'Captain Swing' rural protestors burnt hayricks in the early 1830s without supposing that they were ensuring their futures. Kevin Robins and Frank Webster, 'New Technology and the Critique of Political Economy', Lev Levidow and Rob Young (eds), *Science, Technology and the Labour Process*, volume 2, London: Free Association Books, 1895, pp.9-48.

their own.³¹ Employers also played at being ‘Luddites’, opposing the factory-system because it drove them to the wall and deprived them of the opportunity to screw the cottagers dependent on them for equipment, credit, raw materials and sales.³² Luddites are pictured as dills because they were anything but. Their methods were the most effective on offer before the development of communism and an organised labour movement in the 1820s. The British state knew it faced a broad and deep revolt against class rule when its agents made machine-breaking a capital offence and, in 1810-12, dispatched 12,000 troops to suppress ‘General Ludd’, more than it had fighting Bonaparte in Spain and Portugal.³³ We should all be Luddites by recognising class rule rather than technology as the threat, not just to jobs but to a ‘moral economy’. The weavers’ families rose up to retain control over the means and conditions of applying their labour and not endure the experience of having their capacities traded as things.

Consolation prizes

Advocates of unbridled implementation of technologies run the line that earlier alarms about mass unemployment did not come to pass. This conventional wisdom presumes that past behaviour is a guarantee of future performance. New things happen: otherwise no robots. Secondly, the promise that job losses will be but ‘temporary’ suppresses how they blighted generations of weavers after the 1820s, and process-workers and miners since the 1980s. Thirdly, the bearers of good news skim over how the creation of new opportunities to sell one’s labour-power so often has been bought at the cost of ever more immiserisation. Put sharply, ‘the choice in some jobs will be between being replaced by a robot or being treated like one.’³⁴ In the less than likely scenario of new jobs becoming available for all comers, the past 250 years of expanding capital have demonstrated that one consequence of technological change is often a deterioration in the quality of the experience of paid work. Opportunities for creative labour shrivel. The ‘constant revolutionising’ of the equipment for accumulating capital ‘mutilates’ and ‘cripples’ when it does not ‘degrade’, ‘destroy’, ‘torment’, ‘deform’, and ‘distort the worker into a fragment of a man.’ (482, 799) Fourthly, the restructures that have weakened the working-class since the 1980s continue to increase impoverishment relative to the wealth of capital.

³¹ J.L. Hammond and Barbara Hammond, *The Skilled Labourer, 1760-1832*, London: Longmans, Green, 1919, pp. 157-63; M. Thomis (ed.), *Luddites in Nottinghamshire*, Thoronton Society, Research Series, no. 26, London: 1972, pp. 12-3, 21-2, 33 and 62; J. de L. Mann, ‘Clothiers and Weavers in Wiltshire during the Eighteenth Century’, L.S. Pressnell (ed.), *Studies in the Industrial Revolution*, London: Athlone Press, 1960, pp.66-96.

³² J.D. Chambers, *Nottinghamshire in the Eighteenth Century*, London: P.S. King, 1932, pp.129-36.

³³ John Cannon (ed.), *Oxford Companion to British History*, Oxford: Oxford University Press, 1997, p.599; Marx misrepresents them, *Capital*, I, p.554.

³⁴ *Economist*, 31 March 2018, p.13.

Marx demolishes the 'consolation' hypothesis that job losses are but a 'temporary inconvenience' (557-8) by pointing out that any money-capital 'set free' by no longer paying wages to those displaced by machines would have to go into purchasing the larger volumes of raw materials, semi-finished goods and ancillaries consumed by those new machines. (565) At most, only a slice of the variable capital saved could underwrite new jobs for the 'temporary' victims of machino-facture. The consolation hypothesis again exposes a failure to distinguish the three circuits and three forms of capital:³⁵ '...the movement of the total product ... cannot be explained by being simply presupposed.'³⁶ A scientific treatment of the demand for labour will start from its sale in time units of labour-power, an exchange which turns labour into variable capital.

Marx provides six clues about where new jobs had come from by 1867: 1. the need to make machines brought more work to machine-shops until they too were mechanised (565-7); 2. effective demand from population increases (??); 3. novel materials which called forth allied and auxiliary industries (573); 4. the commodification of household necessities (517-8); 5. fashioning luxuries³⁷ for the agents and personifications of capital out of larger profits (573); 6. unproductive labour paid out of the same source, so that in 1861 Britain had over a million domestic servants, more employees than in mining and textiles combined. (574-5)

There is no general equilibrium to which employment levels might return. The shifting proportionalities between the three forms of capital destabilise the system in order to drive accumulation. Moves toward order and discipline inside each workplace pitch and toss against the 'perennial Gale of Creative Destruction'³⁸ from a competitive system pervaded by 'chance and caprice' and thus prone to crises which clear pathways for expanded reproduction: 'This is not a defect, but, on the contrary, it makes this form the adequate one for a mode of production whose laws can assert themselves only as blindly operating averages between constant irregularities.' (196) The likelihood of the 'temporary inconvenience' of unemployment is as great from the next meltdown as from robots, or even from increased automation.

Hi! Tech

Doom-sayers and cheery optimists proceed as if our futures will be determined by technical fixes, an error which allows both sides to hide from the key determinant, namely, the need

³⁵ For the muddle over the forms of capital, Marx, *Capital*, II, p.177 and chapters 10 and 11; Marx, *TS-V*, I, pp.85ff.; von Tunzellan flounders in chapter 8 because he has never opened volume II.

³⁶ Marx, *Capital*, II, p.469.

³⁷ for productivity in the luxury trades, Marx, *TS-V*, III, Moscow: Progress Publishers, 1971, pp.40-51 and 349-51.

³⁸ Joseph Schumpeter, *Capitalism, Socialism and Democracy*, London: George Allen & Unwin, 1943, pp.82-3.

that capital has to expand if it is to exist. Upheavals in both the labour and the valorisation processes signify more than changes in the instruments of production.³⁹ Vulgar economists sever mechanisation from class relations. Vulgar Marxians subordinate those relations to technology, snaffling a sentence or two from the 'Preface' to *A Contribution to the Critique of Political Economy*.⁴⁰ For Marx, any line of causation will run in the opposite direction since '[t]echnology ... lays bare the process of the production of the social relations ...' (493, n.4) For better or for worse, job numbers and the quality of working lives will be decided by the relative strengths of the contending classes.

A parallel mistake is to confine technological change to the realms of the mechanical despite biological, chemical, managerial, mental and social innovations continuing to help machines to reach their full potential as instruments for maximising surplus-value.⁴¹ Catalysts speed up turnover times and otherwise cheapen commodities for further processing or consumption, for example, textile bleaches by 1800 (505) and quick-drying Duco in the 1920s. Soft technologies, now lauded as 'intangibles', are far older than steam engines, with none more potent than co-operation leading to workshop divisions of labour, both cost-free to capital. (508) Around 1812, Charles Babbage and John Herschel promoted Leibnitz's symbolic notation for the calculus: 'One could learn to become a scientist, but not to make discoveries', crucial for engineers.⁴² That school children were taught how to solve binomial equations in an hour brought further cost-free benefits to capital, as does all science.⁴³ (508) Aside from veiling swindles, railway managers figured out accounting methods for the depreciation of fixed capital, (528) a key concern in mechanisation.⁴⁴ Transformation in the structure of ownership, from six-person partnerships to the multi-

³⁹ Donald MacKenzie, 'Marx and the Machine', *Technology and Culture*, Vol. 25, No. 3, 1984, pp.473-502.

⁴⁰ Marx, 'Preface', *CCPE*, pp.20-21; Arthur M. Prinz, 'Background and Uterior Motive of Marx's "Preface" of 1859', *Journal of the History of Ideas*, vol. 30, no. 3, 1969, pp.437-450; and this snatch from *The Poverty of Philosophy*: 'The hand-mill gives you a society with the feudal lord; the steam-mill, society with the industrial capitalist.' *M-ECW*, vol. 6, p.166. Rodney Hilton disproved the former by locating the hand-mill in the class struggle between lords and serfs, 'Feudalism in Europe: Problems for Historical Materialists', *New Left Review*, 147, 1984, pp.87-8; it is truer to say that the industrial capitalist gave us the steam-mill, von Tunzellan, chapters 1, 2 and 7. Beyond dispute is Marx's statement a few pages later: 'The hand-mill presupposes a different division of labour from the steam-mill.' *M-ECW*, vol. 6, p.183. That requirement is as true in the workshop as it is for national and social divisions of labour. The 'Introduction' to the *CCPE* is the best counter to the crudities extracted by vulgar Marxians from its 'Preface', pp.188-217.

⁴¹ Kenneth J. Arrow, 'The Economic Implications of Learning by Doing', *The Review of Economic Studies*, vol. 29, no. 3, 1962, pp.155-173.

⁴² Katherine Neal, *From Discrete to Continuous, The Broadening of Number Concepts in Early Modern England*, Kluwer, Dordrecht, 2002, pp.103-7; J.M. Dubbey, 'The Introduction of the Differential Notation to Great Britain', *Annals of Science*, vol. 19, no. 1, 1963, pp.37-48; Babbage joked that he had promulgated D-ism over Dot-age.

⁴³ Marx, *T-SV*, I, p.343.

⁴⁴ Marx, *Capital*, II, pp.249-52; David Solomon, *Studies in Costing*, London: Sweet & Maxwell, 1952, pp.33-41; John J. Glynn, 'The Development of British Railway Accounting: 1800-1911', *The Accounting Historians Journal*, vol. 11, no. 1, 1984, pp.103-118; M.C. Wells, *Accounting for Common Costs*, Sydney: Sydney University Press, 2006.

divisional corporation, will continue to prove as significant for the expansion of capital as Carbon3D devices.⁴⁵

Widgets

Mechanisation delivers more commodities while each unit carries a smaller portion of value. (510-2). Next-to-no value is transferred from a machine itself and that sliver of past labour becomes ever thinner as declining amounts of living labour go into its production, thanks to the mechanisation of machine-making. Firms, therefore, must sell ever more widgets even to maintain their take of surplus-value. Any thought of maintaining initial high rates of return on investments for the system as a whole was abandoned long ago. However, each new production method allows its initial controllers to take above-average rates of profit from 'labour of a higher degree'. (530) That advantage lasts only until competitors follow suit, whereupon profits are again equalised – before the next innovation. This roundabout compels the first movers to pump out product, selling to the max before their march is stolen back. (528, n.65 and n.66) The value of the past labour remaining in all fixed capital then falls to the social average that is being transferred after the spread of the new generation of machinery.⁴⁶ Fears of being burdened with above-average costs from fixed-capital speed up its turnover times. (528) This impetus lent substance to Moore's Law of accelerating innovation and collapsing unit prices. Military contracts bear the high first-run production costs of technologies to assist their commercialisation at rates competitive with wage labour.

Although Marx identifies capital-in-general as the object of his critical analysis of political economy throughout *Capital*, (763) he delves into its particular manifestations. (588) By breaking the impact from large-scale industry into five sub-sections, he shows how exactly its spread can both effect and affect other kinds of production. (786) His delineation and meshing of different rates of change retain significance because labour is always subjected to further mechanisation at uneven speeds.

Colonising the home

Here is a question: what happens when wage-slaves are turned 'from buyers into non-buyers'? (567) Were a tenth of the current workforce to be without paying jobs by 2030, while the effective demand of a majority of those still employed shrinks as the result of a consequent squeeze on wages, how could even the mite of value transferred to the 'monstrous collection of commodities' (125) be turned into the profit required to fund the next generation of robots, and still deliver the revenues for luxurious living among their

⁴⁵ Geoff Colvin, '21st century corporation', *Fortune*, November 2015, pp.39-47.

⁴⁶ Marx, *Capital*, II, pp.243, 248-52, 254 and 258.

owner-controllers? Each capitalist dreams of paying no wages: capital-in-general needs wage-slaves who are not only kept anxious to buy, buy, buy – but are also able to pay.

Rosa Luxemburg underestimated the inventiveness of the agents of capital by assuming that they could relieve a glut from over-production only by exporting the excess to their colonies.⁴⁷ They did that, but they also overcame some of the barriers to realisation by colonising households,⁴⁸ as Marx had glimpsed in the interaction between the agricultural revolution and large-scale industry which ‘conquers the entire home market’ (908-13), and then in the commodification of household needs once wives and mothers undertook paid work outside the home in the 1820s. (517-8 and 599ff.) These exceptional demands evolved into mass marketing, of which advertising is but the outward sign,⁴⁹ adding a further counter to the law of a tendential fall in the rate of profit.⁵⁰ By making advances on wages, Mr Moneybags industrialised consumer credit, pedaling ‘fictitious variable capital’. Hire-purchase became a universal human need, though not an inalienable right.⁵¹ The implosion of 2006-9 came in part from postponing a crisis from over-production until it erupted as a debt-fuelled crisis of ‘over-consumption’.

Reserve armies

The prospect of substantial disruption to patterns of employment directs attention to the reserve army of labour. Marx’s map of its deployments charts its interplay with the active army: ‘If the exploitation of the workers already employed does not increase, either extensively or intensively, then additional labour-powers must be enlisted.’ (727) The reserve components within the active army are more vital to the extraction of surplus-value than is any of the four components of the reserve army. (794-7) Because the active army is ‘job ready’, its members offer the agents of capital opportunities to intensify the application of labour-power for which they have already paid. In addition, this ‘compression’ of labour time (534) overlaps with pressure on those active wage-slaves to supply more absolute surplus-value by sacrificing unpaid ‘free time’⁵² in the hope of holding onto their jobs. The

⁴⁷ Rosa Luxemburg, *The Accumulation of Capital*, London: Routledge and Kegan Paul, 1951, pp.363ff.

⁴⁸ Michael A. Lebowitz^[SEP], ‘Capital and the Production of Needs’^[SEP] *Science & Society*, Vol. 41, No. 4, 1977/1978, pp.430-447.

⁴⁹ See my *The Essence of Capitalism*, chapters 8, 9 and 14; Merle Curti, ‘The Changing Concept of “Human Nature” in the Literature of American Advertising’, *Business History Review*, vol. 41, no. 4, 1967, pp.335-57. In the 1920s, Freud’s nephew worked on manipulating desire and the Behaviourist J.B. Watson on conditioning reflexes.

⁵⁰ Marx, *Capital*, III, Part Three.

⁵¹ Martha L. Olney, ‘Credit as a Production-Smoothing Device: The Case of Automobiles, 1913-1938’, *The Journal of Economic History*, vol. 49, no. 2, 1989, pp.377-391; Lendol Calder, *Financing the American dream: a cultural history of consumer credit*, Princeton, NJ: Princeton University Press, 1999.

⁵² ‘Free time’, remarks Dallas Smythe, has the same status as ‘free world’, ‘free enterprise’, ‘free elections’, ‘free speech’, ‘free flow of news’ (p. 14), and one can now add, ‘free trade’ – all built around the wage-slavery of ‘free-d labour’.

‘Communications: Blindspot of Western Marxism’, *Canadian Journal of Political and Social Theory*, vol. 1, no. 3, 1997, p.14.

active army thereby reduces its own average hourly rate of pay, adding downward pressure on real incomes for all wage-slaves, active or not.⁵³ This ratcheting between labour-times and average real wage-rates is one determinant for the pace of introducing new devices, methods and materials. When broad and rapid mechanisation lowers average wage-costs, their fall puts a brake on the next bout of investment in fixed capital (528) – until competitive pressures kick in. (515-6 and 582) No obstacle, of course, is insurmountable, any more than a crisis can be permanent.

Compression

Given the prevailing degree of ‘compression’ in the active army of labour, it is hard to see how coming generations of labouriness-saving equipment can repeat its effects during the 1820s and 1830s when power-driven machines allowed for the employment of many more women and children, as well as for the extraction of longer hours out of adult males. Intensifying the application of labour during paid and unpaid hours is again approaching natural and social limits. Snorts of cocaine will not overcome the mental and physical limits on screen jockeys to bear ever more intensive and extensive applications of their labour. (516-27)

If moments are the elements of profit, (352) where are the ‘pores’ (534) in the working day when time-poverty pervades so many areas of life? The NCOs of capital (549) monitor staff computers for keystrokes per minute;⁵⁴ Amazon has patented a wrist-band which tracks the hand movements of warehouse workers and uses vibrations to nudge them into being more efficient; marketers train customers to act as unpaid overseers for food and parcel deliveries; women on process lines and at call-centers wear nappies because they are not allowed to take time out to relieve their bladders.⁵⁵ Female participation rates can be as high as they have become because of laboriousness-saving appliances within households, for example, washing-machines, obtained on hire-purchase, and because of part-time domestics. Refrigerators placing grocery orders will no more overcome time-pressures on women employees than getting time-stretched hubbies to share the housework – unless they lose their paid work. The totality of these supports is as nothing compared with the industrialised ‘domestic’ services from packaged foods and clothing. Unlike the unproductive million British domestics in 1861, the hundreds of millions who feed and clothe us today are productive of surplus-value, colonising at home, by commodifying inside our homes.

⁵³ Virginia Sole-Smith, ‘Getting Jobbed, The real face of welfare reform’, *Harper’s Magazine*, October 2015, pp.51-55.

⁵⁴ Esther Kaplan, ‘The Spy Who Fired Me’, *Harper’s Magazine*, March 2015, pp.31-41.

⁵⁵ Marc Linder and Ingrid Nygaard, *Void When Prohibited*, Iowa City: Fanpihua Press, 2003.

Several of the conditions associated with the reserve army are now being experienced throughout the active army.

Services

At the moment, the obstacles to intensification and extension from 'weak bodies' (526) are gaining significance through two changes in the provision of services for social and for commercial purposes. Both are well underway throughout the global economy, and neither is 'caused' by Neo-Liberalism, that still great idea for global corporates.⁵⁶ The first development is yet another bout of colonising at home to meet the need that capital has to expand, in this case, by taking over the supply of social services, from aged care to toll-roads. Because these investments must turn in the average rate of profit to keep attracting funds, the state apparatuses monitoring delivery redefine 'quality' downward, encouraging self-regulation. Labour productivity in the social service sector remains difficult to improve because the needs of students and patients are almost impossible to standardise, and not easy to mechanise.⁵⁷ Headway has been made on the administrative side, with welfare recipients made to wait longer to contact fewer staff and by contracting the cleaning of government buildings to wage-cutting body-hire.

Corporate capital has also shifted the time-costs to its customer, from the self-service store in the 1930s to check-outs scanning bar-codes; swipe-cards on mass transport; ATMs; on-line banking and ticketing. An advance on the bar-code is radio-frequency identification (RFID), which reduces stock-taking time for 10,000 items from fifty-three hours to two, with a twenty percent improvement in accuracy. At 25 U.S. cents per item, RFID suits higher-priced stock but not groceries where 25 cents is close to the profit.⁵⁸ Again, capital's decision to mechanise is a matter of balancing the availability of cheap living labour against the cost of investing in past labour (fixed capital). (570) Even where aggregate wages are high as a percentage of total outlays, earnings are among the lowest for most employees,⁵⁹ giving less incentive to spend on machines (past-labour). The scales tip one way if higher minimum wages are legislated, and the other way if greater production volumes, or further innovations, reduce the price of units.

IKEA's externalising assembly times to the purchaser reduces its losses from the circulation expenses by dispatching flat packs instead of unwieldy furniture.⁶⁰ In passing a

⁵⁶ Karl Marx, 'The German Ideology', *M-ECW*, vol. 5, London: Lawrence & Wishart, 1976, p.24.

⁵⁷ William J. Baumol, *The cost disease: Why computers get cheaper and health care doesn't*, Yale, NJ: Princeton University Press, 2012; *Performing arts, the economic dilemma: a study of problems common to theater, opera, music and dance*, New York: Twentieth Century Fund, 1966; *Economics of academic libraries*, Washington, DC: American Council on Education, 1973.

⁵⁸ *Wall Street Journal*, 17 August 2016, p.???. There is an *RFID Journal*.

⁵⁹ Wal-Mart employees get by on food stamps, Catherine P. Mulder, 'Wal-Mart's Role in Capitalism', *Rethinking Marxism*, vol. 23, no. 2, 2011, pp.246-63.

⁶⁰ Marx, *Capital*, II, pp.225-9.

portion of the labour process onto its customers, however, IKEA surrenders the surplus-value that its wage-slaves would have added when assembling its products. The firm therefore seeks to retain as much valorisation as it can by selling only through its own outlets.

Meanwhile, three years of laboratory experiments in Singapore to get two robots to assemble IKEA's 'Stefan' chair failed,⁶¹ for the very reason that keeps our brains plastic. Computers do not have bodies to interact with the rest of the world. Hubert Dreyfus gave the example of how we respond to hearing that 'George Washington was in the Capitol'; because we have a body like Washington's, we do not need to be told that 'so was his left foot'. A computer cannot know that fact without being told.⁶² Engineers, therefore, have to supply all the minutiae that we absorb from our '*human sensuous activity, practice*' as beings in the world.⁶³ Moravec's paradox that installing physical dexterity into robots is harder than teaching a computer how to check-mate comes as no surprise to students of Engels on 'The Part Played by Labour in the Transition from Ape to Man'.⁶⁴

The state rarely calls in sick

Today's production and circulation would be unrecognisable to those who read *Capital* in 1867. Airfreight, genetically modified canola, plastics and nuclear power make the recognition that Marx and Engels give greater pertinence to a 'constant revolutionising' of the instruments of production.⁶⁵ By contrast, social relations are close to where they were before 1917, with the sixty years up to 1990 confirming the Hungarian joke that real existing socialisms are the shortest road to capitalism. Nonetheless, the perpetual expansion of capital-within-capitalism has called for the relentless renovation of its state apparatuses, repressive and ideological, The result is a greater than ever monopoly over the means of violence,⁶⁶ cloaked in ADMASS, and legitimised by the internalising of 'terror' among Netizens atomised on anti-social media. The Defence Advanced Research Projects Agency (DARPA) developed the Internet through which the National Security Agency spies on domestic dissent. DARPA is funding BrainComputerInterFace (BCIF) to hack into brains, as is the CIA's Intelligence Advanced Research Projects Agency (IARPA), around a project

⁶¹ *Economist*, 21 April 2018, pp.12 and 69.

⁶² Hubert I. Dreyfus, *On the Internet*, Abington: Routledge, 2009, pp.16-20.

⁶³ Karl Marx, '[Theses on Feuerbach]', *M-ECW*, vol. 5, p.6; John Hoffman, *Marxism and the Theory of Praxis, A critique of some new versions of old fallacies*, London: Lawrence & Wishart, 1975, chapter 5.

⁶⁴ Frederick Engels, *The Dialectics of Nature*, Moscow: Progress Publishers, 1964, pp.34-6 and 172-86.

⁶⁵ Karl Marx and Frederick Engels, '*The Communist Manifesto*', *M-ECW*, vol. 6, p.487.

⁶⁶ Raffi Khatchadourian surveys the ethical debates, 'The Doomsday Invention', *The New Yorker*, 23 November 2015, pp.64-79.

with the acronym BRAIN (Brain Research through Advanced Innovative Neurotechnologies).⁶⁷

Because all human practices are transitory, exactly how the state agents of capital contain antagonistic class relationships is also subject to ‘constant revolutionising’ as they calibrate the advantages, or otherwise, from an overt dictatorship in place of the covert dictatorships prevalent in the West.⁶⁸ Fascism became the form of overt dictatorship to beat down revolutionary challenges across Europe up to the 1950s. Today, rulers fear Populist breakouts from the two-party regime by workers seeking retribution for job losses and degradation in the ‘iron cage’ at work.⁶⁹

24-hours play

With the end of the post-war trough in unemployment by the mid-1970s,⁷⁰ the Left let slip our concern with the quality of work to focus on jobs for all and to mitigate attacks on entitlements. Our demands for the essentials that paid employment can provide should never marginalise our insistence on being able to apply our capacities in ways which ensure sociable and creative work as one strand among the sensuous activities that can keep us human.

Moreover, neither class can win on the economic front without promoting its claim to represent the interests of our species. By succumbing to economism, we lost the moral imperative, our strategic polestar, essential for energising mass action. Technologies will contribute to civilisation as social enrichment only if their applications allow free time for mental and moral enhancements. To Marx’s appreciation that ‘... the reduction of the working day is the basic prerequisite’⁷¹ for freedom, we must add the demand to decompress those hours in order to improve the quality of sleep, sex, sport and socialising.⁷² On such a platform, we can head towards a system where to be a productive worker is no longer either a misfortune or a stroke of luck, (644) but the desired human condition.

⁶⁷ Tim Requarth, ‘Mind Field’, *Foreign Policy*, no. 214, 2015, pp.53-59; Diana Kwon, ‘Self-Taught Robots’, *Scientific American*, March 2018, pp.26-31. Systems Theory came out of weapons research in the 1940s, Peter Galison, ‘The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision’, *Critical Inquiry*, vol. 21, no. 1, 1994, pp.228-266.

⁶⁸ David Rockefeller charged his Trilateral Commission with promoting representative democracy to counter participatory democracy, Holly Sklar (ed.), *Trilateralism*, Boston: South End Press, 1980, pp.295-323; for a 200-year perspective, Sandra Halperin, *War and Social Change in Modern Europe, The Great Transformation Revisited*, Cambridge: Cambridge University Press, 2004.

⁶⁹ ‘Editorial’, *The Economist*, 20 February 2016, p.7; Wolfgang Streeck, ‘You need a gun’, *London Review of Books*, 14 December 2017, pp.25-6.

⁷⁰ Walter Korpi, ‘The Great Trough in Unemployment: a Long-term view of Unemployment, Inflation, Strikes and the Profit/Wage ratio’, *Politics and Society*, vol. 30, no. 3, 2000, pp.365-426.

⁷¹ Marx, *Capital*, III, p. 959.

⁷² Michael Marmot, *Status Syndrome, how your social standing directly affects your health and life*, London: Bloomsbury, 2004.

Reserve army needs a reserve fund see Marx, *Capital*, I, pp.
Proportionalities v II, chapter 15, p.
organic composition