Afterword: Watching, Waiting, Speculating

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Time has long been a reliable accomplice for technological control. In much of the Global North, human beings are deemed productive, and unproductive, in a discrete and atomizing matrix of labour time that is a relatively recent historical invention (Gregg, 2018). Diverse computational media – productivity dashboards, sleep trackers, border security algorithms for 'suspicious travellers' – shape temporality not merely as data but as moralizing demands (Thompson, 1967): to be punctual like a program, consistent like a perpetual motion machine, long-lasting like a battery. When modern statistical methods began to tether human beings to statistical models, from Adolphe Quetelet's *l'homme moyen* [the average man] (Desrosieres, 1998) to the rise of actuarial paradigms (Harcourt, 2007), this also provoked broader efforts to rationalize human behaviour and social phenomena into more calculable notions, from destiny to risk, luck to probability (Lears, 2003). The shape of technological time corresponds to the shapes into which human bodies are bent and broken, a process we call *efficient* – emblematized not only by the disciplinary factory (Foucault, 1995), but the transatlantic slave ship (Browne, 2015).

These logics divide human beings into unequal categories, those logics themselves being unevenly distributed across space and time. Technology does not temporalize global populations in a unified shift. Instead, it is instrumentalized for existing interests and power struggles. Yet such variation is exactly why critique must identify connections and resonances between these diverse contexts. Technologies of monitoring and judgement are often iterated on historically vulnerable groups before being rolled out into the wider public (Eubanks, 2018). The poor are often compelled to datafy themselves, using the same kind of machines that the more affluent accept voluntarily as luxury items (Gilliard and Golumbia, 2021). A focus on the everyday experience of surveillance and data – for Nepali migrant delivery workers in Malta (Kusk, Chapter 4, this volume), or for care workers and

their elderly patients (Meyer et al, Chapter 3, this volume) – reminds us that we must intersect critical analysis of how especially marginalized groups encounter 'AI' or 'algorithms' not as tools or design features, but as a restaging of existing social inequities and violence (Singh and Guzmán, 2022).

This efficiency does not manifest in the perfect synchronicity fantasized by tech utopias or dystopias, but in recursions and repetitions, delays and buffers, where the technical trips over the thick of the social. Just-in-time supply chains enact volatile rashes of waiting and rushing, hiring and firing, everywhere from manufactories to app delivery drivers (Kusk, Chapter 4, this volume). The business of selling crime data has incentivized decades of real-time security theatre, infecting the public with pervasive states of alarm and anxiety (McAlpine-Riddell, Chapter 5, this volume). The datafication of time does not result in more accurate behavioural predictions or an accelerated pace of labour, but cultivates subjects towards particular *rhythms* of clicking, reading, checking, responding (see Berry, 2011). Such cultivation is rarely as smooth as promised, even when the technology is 'successfully' rolled out across whole nations and industries. American truck drivers struggle, not only to meet the brutal pace of work enforced by new electronic monitoring technologies, but in daily efforts to overturn, sabotage, or bypass the myriad ways in these systems fail at their most basic functions (Levy, 2022). Pakistani national identification projects try to render Pakistan's citizens more legible, by standardizing away the deep historical complexities of citizenship and national identity in the region, thus producing new incidents of misrecognition and injustice (Hashimi, 2022). Gig workers and other precarious labourers around the world, are collectively organizing ways to reverse-engineer, deceive, and sabotage the software and its temporal logics imposed on them (cf. Iazzolino, 2023; Williams, 2023). It is precisely because these technologies are so fallible, that they are often accompanied by moralizing rhetoric that exhorts the measured to build affective attachments with the conditions of their measurement – to praise the hypnotic regularity of the factory robot, or to take pride and joy in the shape of self-tracked exercise data visualization (Bruun, Chapter 1, this volume).

To move and live to rhythm is therefore to take it on as *habit* – that puzzling passageway between choice and compulsion, discrete action and background condition. Habit, in the Deleuzian tradition, is socially 'contracted', but operated through the body (Bennett et al, 2013, p 8), which is crucial for hosting the repetition of action into habitual form (Lefebvre, 2004). In other words, it is an interface for configuring patterns of, say, alertness or attention over the longer term. Rhythm, as Vita Peacock (Introduction, this volume) observes through Lefebvre's rhythmanalysis, intersects space and time. It binds people to modes of being and living precisely by targeting the ambiguity between affect and cognition – which scholars of biometrics and biohacking technologies have explored in terms of 'somatic surveillance'

(see Berson, 2015; Hayles, 2017). In many of the monitoring technologies discussed in this volume, new practices of vigilance and surveillance take effect, not so much through singular moments of decision (which might perhaps be more easily noticed, theorized, negotiated), but through a creeping habituation of trivial or provisional arrangements into semi-permanent dispositions.

A rhythmic view of data and technology affords a certain elasticity in the relationship between humans and machines: spaces where intensified real-time monitoring is subject to some degree of user control, and integrated into human relations of care and cohabitation. Parental monitoring of children's movement data does not always lead to obsessive tracking, but new ways of coordinating timescapes between family members (Dungey, Chapter 2, this volume). Movement detection systems track people with dementia via live image feeds, reconfiguring expectations of a 'timely response' to falls and other incidents (Meyer et al, Chapter 3, this volume). The accepted/acceptable window of timely response or real-time feedback becomes a threshold for moral and legal responsibility (Stoiber, Chapter 6, this volume).

Yet, more often than not, this elasticity is obfuscated and disavowed through a broader, more mythological scale of technological time: a self-serving fiction of progress and prediction. Here, time moves as an arrow of teleology, in which newer machines supersede inferior ones (including those of flesh), and each and every social domain is progressively quantified into more rational forms of governance. Bodies are destined to be monitored and recorded with ever greater accuracy and frequency, while more distant and detailed future events become increasingly predictable through data – pulling and compressing distant futures into a present made to buzz with anticipatory zeal.

The mechanisms of justification and belief enabling this vision are, however, highly speculative and recursive. From policing and counter-terrorism to workplace surveillance, and from labour productivity metrics to self-tracking practices, systems of datafication regularly depend on the undertheorized hope that we can quantify future events and outcomes (see Molotch, 2012; Hong and Szpunar, 2019; Amoore, 2020) or, at least, that we will have such capabilities in the 'proximate future' just around the corner (Bowker, 2006; Dourish and Bell, 2011). Since its nineteenth-century reconceptualization as a broader force of historical progress, rather than craftwork or individual machinery (Marx, 2010), technology has increasingly loaned credibility and plausibility from speculative futures to justify investments and (mal) functionalities in the present.

Indeed, Silicon Valley's well known petri dish of startups, incubators, and seed rounds essentially functions as artisanal workshops for producing such futures, and hosting ritualized confidence games (Shapin, 2008; Kampmann, 2024), through which those futures may be valued and sold

(Polan, Chapter 10, this volume). Such startups then pitch narratives of fear and anxiety to clients like police departments or schools, arguing that they will be left behind by the inevitable advancement of technology – and that they must commit to ever more complex data collection infrastructures to keep up with the future terrorist, school shooter, or deviant (see, for example, Amoore, 2020). Yet many such systems run on fundamentally unproven conjectures: that facial features can be used to predict crime, or that young students' social media input can foretell depression (see Agüera y Arcas, et al, 2017; Stark and Hutson, 2022). Whole industries bloom within this temporality, in which action is always pre-emptive, proof is always deferred, and uncertainty is never quite dispelled.

The continued social dominance of teleological technofutures functions as what religious studies calls *cosmograms*: a tapestry of loose, backgrounded beliefs and attitudes beneath the wax and wane of individual heroes and stories (Hong, 2022). Even as Big Tech struggles to present new technological innovations, and entrepreneurs who talk big and wear turtlenecks are jailed for fraud, a broader sentiment endures that technology is ever condemned to 'progress', which we too are condemned to chase in its wake. Today, the renewed fantasies around artificial intelligence as a skeleton key to all social problems refreshes these narratives, for another temporary period of felt novelty. Luke Stark (2023) has shown how current-generation machine-learning applications are essentially bound to highly *conjectural* forms of reasoning – abductive, undertheorized, 'good-enough' connections between seemingly superficial indicators to build inferences. In many cases, the result is not truly radically new forms of knowledge, but an amnesiac resuscitation of never truly buried skeletons in the closet of the sciences – the eugenics of Francis Galton, the phrenology of Cesare Lombroso. The time of scientific or epistemic progress, in other words, is not secured by techno-optimist teleologies, but rather is subject to recursive loops of amnesia and relapse. We might recall Derrida's point that the archive conserves a past, but only by placing it in a future: 'If we want to know what it would have meant, we shall know only in the time to come' (1998, p x).

In this context, rhythm provides a quantifiable register for encoding bodies into legible data, even as it relies on countless human acts of anticipation, alignment, fudging, and stretching to maintain its apparent regularity. Writing about drum machines, musicianship, and automation, Jack Stilgoe (2023) writes, 'Rhythm is based on expectations. Rather than reacting to beats, we anticipate them.' Technological time takes on its oppressive quality not by eliminating human irregularity and qualitative complexity, but by overwriting those dimensions with the smooth fiction of total regularization: no blues, only the metronome.

Consider the emblematic case of the motion study, pioneered by Frank and Lilian Gilbreth in the early twentieth century – a story masterfully told

in Harry Braverman's (1998) history of labour and automation. Occasional collaborators with and rivals to their more hucksterish contemporary, Frederick Taylor, the Gilbreths sought to subdivide every piece of motion in the workplace into atomic, microsecond units called 'therbligs': a fantasy of human body and movement as a discrete sum of normalizable, interchangeable fragments (Braverman, 1998, pp 120–21). The swing of the arm towards the file cabinet, the two-and-a-half steps from conveyor belt to the pulley, was to be exhaustively recorded such that the average time taken could be calculated and, inevitably, optimized. The production of average time as a unit is rarely innocent, and often coupled with a moralization of the right amount of time one *should* take; the disciplining of motion into machine-readable, algorithmically predictable beats is often ideologized as a virtue. Frederick Taylor famously insisted that his numbers for how fast steelworkers should work were a scientific measure of a 'fair day's work' – never mind that less than 10 per cent of the experienced workers at the site could reach this rate (Braverman, 1998, p 71). Today, these principles are kept alive by dutiful corporate heirs like Amazon, which is exploring algorithmic systems to rotate workers to different tasks just before incurring muscular injury (Hong, 2023). The body is bent and broken until, one way or another, a semblance of regularity at the production line is maintained.

Today, we are caught amid new forms of temporalization that seek to regulate and moralize fleshly subjects. For instance, smart devices and wearables enable new times and spaces of surveillance: Swedish prisons deploy not only movement-tracking systems, but self-care apps promising cognitive therapy towards inmates' rehabilitation into society (Kaun and Stiernstedt, 2020). Some migrants to the US are required by Immigration and Customs Enforcement (ICE) to equip SmartLINK ankle monitors; wearers report having to 'bolt out of their seats' with each sound of the alarm, sweating and scrambling to scan their face in time (Shoichet et al, 2022; Ketter and Byler, no date).

Theories abound regarding these changing configurations of technology and bodies, although it is not always clear what is the symptom and what is the principle. Jonathan Crary (2013) suggests that late capitalism entails the end of sleep, a refusal to allow any time exempt from logics of calculative optimization. Han Byung-chul (2010) put the pulse on fatigue as the manifestation of unbounded productivity, in which the body is caught in an incessant activeness. The Classical Greeks abhorred empty space in their vases, filling them with patterns, tiny human characters, and phalluses, calling it *horror vacui*. Fatigue, in this sense, is late capitalism's temporal equivalent – a drive to fill every spare moment with action and output. Technological change plays its part in these waves of retemporalization. Many of the major focal points for investment and marketing hype in the last decade have involved seeding the physical world with a glut of cheap sensors for ambient

data collection (smart cities and homes), and building energy-guzzling infrastructures for massively scaled data collection and recombinatory analysis (the 'big data' revolution, now rebranded as the AI revolution).

The general effect of these efforts is not, again, to actually enact all-seeing eyes of objective and hyperrational control over bodies and time. That would require these technologies actually working as intended, and to the fullest extent of their solutionist promises, which is equivalent to forecasting a politician's historical impact based on their campaign advertisements. Rather than such smooth consistency, what we often find in these technologically retemporalized domains is greater *volatility*, lived forms of uncertainty and speculation for the affected populations. To return to earlier examples, the more granulated and 'optimized' algorithmic systems for delivery drivers become, the more difficult it becomes for the workers themselves to theorize and plan their own work and life (Chen and Ping, 2020; Shapiro, 2020). As data-driven surveillance systems move downstream, from state and enterprise clients to everyday homeowners and citizens, apps like Ring and Citizen essentially leverage their data to incite a pervasive nervousness about real-time crime (Bridges, 2021).

Such volatility – that is, irregularity of rhythm (see Lefebvre, 2004, pp 67–68) and its attendant pressures on ordinary life – demonstrates that the very effort to use data to render factories, schools, or cities more *predictable* to the manager often renders those same spaces more *unpredictable* to those who live and work in them. The subject is forced to adapt, not only by optimizing themselves to the rhythms of production quotas or automated notifications, but by constantly *speculating* about what these systems want from them. Thus, in the Amazon warehouse, the contemporary heir to Taylor's steelworks, the workers suffer not only from the punishingly high pace of work, but a pervasive and basic form of ignorance: 'You couldn't really tell, based on size, whether a box was going to be heavy or not when you went to pick it up. Your body and your mind never knew what to expect' (MacGillis, 2021, p 4). At the same microsecond scale at which the Gilbreths sought to measure and normalize worker movement, Amazon employees find that algorithmic systems are *depriving* them of this information. Rather than the gradual culmination of a hyperrational system, datafication constantly produces new temporal horizons of uncertainty and speculation, in which the citizen must toil to once again become legible to be eligible.

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