

ESSAY REVIEW

Computing as sugar? The sweet and the bitter of social histories of computing

Janet Abbate and Stephanie Dick (eds.), *Abstractions and Embodiments: New Histories of Computing and Society*

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In 2005, year of the first YouTube upload, historian of science Michael Mahoney argued, 'Whereas other technologies may be said to have a nature of their own and thus to exercise some agency in their design, the computer has no such nature.'¹ In the next breath, Mahoney argued that the computer *does* have a nature, but that it is 'protean' and 'what we make of it'.² To a student born in 2005, now exiting young adulthood into a world of some 14 trillion or more YouTube videos (many of which, no doubt, inform their education), this claim may sound strange. The computer is ... what ... we ... make of it? A curious student might squint. Who are 'we'? Did he mean historians? Workers? Women?

Abstractions and Embodiments, a 2022 volume from the Studies in Computing and Culture series at John Hopkins University Press, peers into the abyss beneath Mahoney's claim, which informed a turn away from intellectual and engineering histories of computing and toward its social and material histories. Under the dedicated eye of co-editors Janet Abbate and Stephanie Dick, contributors question presumed binaries between theory and practice, control and liberation, universal and particular, mind and body, abstractions and embodiments. The volume's twenty papers consider an eclectic set of historical episodes as entanglements of social *and* technical relations, 'A specific configuration of some peoples' minds and other peoples' bodies' (p. 439). Junior and senior readers alike will find accessible material in many of the collections' 8,500-word papers, a number of which argue against their subject remaining a 'footnote' to dominant narratives (pp. 209, 236, 258, 402).

Mahoney's dictum comes out bruised. The papers in this volume indicate that digital computing is protean or versatile in the way that, say, sugar is. Each is an ingredient that finds ubiquitous use in our modern world. Each can serve as a masking agent to obscure the true taste of things. Each, importantly, has a discernible – rather than indiscernible – flavour to it, in that particular uses and effects recur frequently enough to suggest a distinct atmosphere or profile. One begins to feel that although, yes, the computer

¹ Michael S. Mahoney, 'The histories of computing(s)', *Interdisciplinary Science Reviews* (2005) 30(2), pp. 119–35, 122.

² Mahoney, *op. cit.* (1), p. 122.

could in principle be what ‘we’ make it in the future, historically ‘we’ have made it do one or another thing persistently (for example redistribute labour, entrench political ends, control media and so on). Its exact profile remains to be mapped, but this volume makes a significant contribution in that direction. Like sugar, computing appears to make us sick, as excellent chapters by Elizabeth Petrick (on the computers as ‘prothesis’) and Laine Nooney (on computer pain) chronicle. Although you wish they might not, the editors stop short of spoon-feeding the reader any single consolidated essence of computing – it is not all about users, origins or the Cold War – even if those influences figure here.

One immediate value of this book is its introduction, which provides a much-needed snapshot of recent analytical trends in the social history of computing. The editors joke, ‘What is the history of computing except the history of everything?’ (p. 10). Rather than try hands around this too-large tree, they trace key roots and branches, fielding perspectives from scholars from various career stages. As the book’s subtitle makes plain, it takes stock of our *New Histories of Computing and Society*. One takeaway is that histories of ideas and engineering have not been rendered irrelevant by the take up of social histories of computing since the 2000s. On the contrary, such approaches invite integration as the field continues to mature. ‘Rather than seeing the historiography of computing as a linear progression from a fixation on hardware to a focus on software and finally people’, they argue, ‘it may be better described as a spiral, with some historians returning again and again to old topics, actors, and to the machine itself but with new levels of analysis and new questions’ (p. 5).

The book is split into two sections, ‘Abstractions’ and ‘Embodiments’. The first ten chapters examine the origins and/or shifting influence of touchstone theoretical, technical and policy abstractions. These papers deepen our understanding of decentralization and the information highway (Aidinoff), the black web browser (Brock), the bricolaged computer ‘clone’ (Švelch), the online lurker (Kushner), Y2K (Loeb), formal semantics in early European computer science (Kaighin Astarte) and the first ‘product support’ workers at Microsoft (Halvorson). Each is strong enough to stand alone. A handful leap out as ripe for teaching. De Mol and Bullynck’s ‘What’s in a name? Origins, transpositions, and transformations of the triptych algorithm–code–program’ summarizes how the meaning of these and related terms shifted with the invention and maturation of the digital computer. Soon after its introduction in 1961, for example, the term ‘software’ was used to reference instances of programming as a commercial product. We learn that Ramo-Woolridge likely reframed its products as ‘software’ to avoid a hardware ban imposed on it to avoid monopoly, a crafty rhetorical manoeuvre that sheds light on one of the many ways in which commercial prerogatives have become naturalized in the digital age, a subject that Nooney’s excellent new book *The Apple II Age* also exhumes.³

Two other papers in the ‘Abstraction’ section stand out as valuable teaching material, although a case could be made for papers beyond that. One is Gerardo Con Diaz’s ‘Scientology online: copyright infringement and the legal construction of the Internet’, which chronicles how the 1995 court case *Religious Technology Center v. Netcom* made the Internet a distinct entity in US copyright law. Obscene fortunes have been made on the back of that ruling, which positioned the Internet as tantamount to a ‘swap meet’ in which service providers could escape liability for the naughty copyright infringements of their ‘users’. This chapter provides students with a digestible introduction to ‘the twenty-six words that created the Internet’, for example Section 230 of the 1996 Communications Decency Act, which – to rippling consequence – allows social media

³ Laine Nooney, *The Apple II Age* (Chicago: University Chicago Press, 2023).

platforms to host and moderate content with immunity (unlike, say, newspapers).⁴ Equally, Tiffany Nichols's 'Patenting automation of race and ethnicity classifications: protecting neutral technology or disparate treatment by proxy?' explores how a set of US patents for the automation of race and ethnicity classifications (for instance, via surnames) have entrenched racial subjugation since 2015. 'There are fewer and different ethnic categories listed in the [Verizon] patent than used on the census', she explains, 'yet the invention still uses census records to predict the ethnicity category through name data' (p. 109). Nichols's invocation of the Critical Race Intellectual Property framework to convey 'how intellectual property law protects whiteness as property' speaks to histories that digital computing cultures are imbricated within, rather than fitting around. It also speaks to one of the many thresholds explored in this section wherein the move from abstraction to instantiation belies a distinct political character in computing technologies, even if that character is as an accelerant toward a preset direction, as with kids and sugar.

The book's second half explores embodiments. It opens with Lisa Nakamura's celebrated paper 'Indigenous circuits: Navajo women and the racialization of early electronic manufacture,' reprinted within a decade of its initial run in *American Quarterly*. As a measure of its status, Nakamura provides a preface acknowledging the history of computing's material turn in the early 2010s, 'A turn that took race and gender into account as one of its preconditions' (p. 231). In the wake of this turn, one can begin to see all that has been mobilized to make computing ubiquitous today. As Nakamura recounts, in the early 1960s Fairchild Semiconductor International, Inc., seized on tax incentives and minimum-wage exceptions on Navajo land to cut labour costs and compete in the emerging consumer market for computers. They marketed the decision with razzle-dazzle, calling it a template for industrial-cultural symbiosis, one that leveraged 'innate racial and cultural traits' like 'Indian craftsmanship' (pp. 239, 242). Nakamura points to a template others would follow. 'Fairchild's trajectory of sourcing labor domestically from female [Navajo] workers of color in the sixties, to outsourcing in the seventies, and eventually to offshoring in Asia was a path followed by many other electronics companies' (p. 236). From this vantage, Moore's law may say more about supply chain management than it does about engineering.

In 'Embodiments', various papers chronicle a set of ironies related to the industry's economic history. As Elyse Graham elucidates, despite their self-fashioned punk personas, many hackers in the late 1980s came from 'upwardly-mobile, middle-class ... two-computer homes' (p. 393) and targeted groups like the FBI in hopes of getting paid by those organizations, not resisting them. In 1960s Britain, Mar Hicks investigates how Stephanie Shirley postured as 'Steve' to employ hundreds, if not thousands, of talented work-from-home women technologists driven out of the office by sexist exclusion in industry. In 1960s Singapore, per Jiahui Chan and Hallam Stevens, officials at Nanyang University successfully solicited monies from a wealthy alumnus to self-fund a domestic computer culture and pedagogy, all while the country itself opened its doors to manufacturing and assembly processes for US companies like Fairchild. In 'Engineering the lay mind: Lev Landa's algo-heuristic theory and artificial intelligence', Babintseva constructively decentres AI histories from the West by showing how Landa, a Soviet educational psychologist, theorized algorithms as mind-ordering procedures rather than a means to organize a computer. That Landa fled to America in the 1970s to remake himself as a corporate and government personnel trainer speaks to the ways in which computers have historically meant *business* regardless of whether it was machines or bodies being programmed.

⁴ Jeff Kossseff, *The Twenty-Six Words That Created the Internet*, Ithaca: Cornell University Press, 2019.

Ironies can also be understood as tensions. Insightful papers by Petrick and Nooney speak to the limits of human-computer hybridity in ways that only history can. 'Probably not since the automobile has there been a technology that has so insistently reorganized how we use our bodies in day-to-day practice', Nooney argues (p. 429). Petrick explains that strain on eyes, wrists and skeletal systems is familiar to those most accustomed to prosthetics, a term that has been sanitized of its painful rehabilitative dimensions. Such tensions extend to racial constructs too. In 'Inventing the black computer professional', Kelcey Gibbons chronicles attempts in the 1960s to change employers' attitudes and place black computer specialists in jobs. Five chapters later, in 'Broken mirrors: surveillance in Oakland as both reflection and refraction of California's carceral state', Cierra Robson characterizes what she calls racialized surveillance capitalism in the creation of the Domain Awareness Center in Oakland, a sprawling multimillion-dollar surveillance system used to target communities of colour following California's release of non-violent offenders. Robson argues that digital redlining in the early twenty-first century shows that 'data becomes more profitable when the capital it collects is not only economic but also political' (p. 375). These multi-decade tensions of pain versus value or employment versus subjugation bring us closer to understanding a political economy that Nooney positions thus: 'Who had the freedom to build their world and who was saddled with enduring it' (p. 420).

Taken start to finish, the evidence in this volume suggests that, like sugar, computing has an underappreciated adhesive quality to it. It sticks things together, be it humans to machines, surveillance to socialization, or abstraction to embodiment. In combination with its tempting flavour, this characteristic has given computing an unsavoury tinge. Outcomes, we learn, have often been more bitter than was promised. Insofar as this is a historiographical problem – that the *social* history of computing remains, even after all that has occurred, relatively new – we are lucky to have this excellent volume. The science and industry of computing emerges as a more diffuse, more global, and far more material set of technologies than is implied by cliché watchwords like 'digital revolution' or 'Silicon Valley', which project illusions of frictionless futures, not stasis. For a student in 2045, reflecting on theory from 2005 or today, it will hopefully be clearer whether computing is what 'we make it' or whether its ecological, physiological and political dimensions have, like sugar, a distinct quality to them, a momentum inherited from Enlightenment-era fragilities for certainty, or from human physiological consumption habits developed over deep time.

Computing's ecological toll is one quality that is sure to grow more pronounced. This volume would have benefited from a chapter or two on this subject. Nathan Ensmenger and Tung-Hui Hu receive credit in the introduction for pioneering environmental approaches in the 2010s, but that subject nags at the intersections between abstractions and embodiments in ways that, say, scholars in discard studies are ahead of historians of computing in addressing. Neighbouring volumes like *Your Computer Is on Fire, Just Code* and *A New History of Modern Computing* and the *BJHS Themes* issue on *Histories of Artificial Intelligence* provide complementary analysis in this respect, offering students a multi-volume watermark of all that the social history of computing could or should entail.⁵ This is a significant collective accomplishment and one that we should celebrate and build upon. To that end it is meaningful that Hu, Ensmenger, Paul Edwards, Mel Hogan,

⁵ Thomas S. Mullaney, Benjamin Peters, Mar Hicks and Kavita Philip (eds.), *Your Computer Is on Fire*, Cambridge, MA: MIT Press, 2021; Jeffrey Yost and Gerardo Con Diaz, *Just Code*, Baltimore: Johns Hopkins University Press (forthcoming); Thomas Haigh and Paul E. Ceruzzi, *A New History of Modern Computing*, Cambridge, MA: MIT Press, 2021; Syed Mustafa Ali, Stephanie Dick, Sarah Dillon, Matthew L. Jones, Jonnie Penn and Richard Staley (eds.), *Histories of Artificial Intelligence: A Genealogy of Power*, *BJHS Themes* 8 (2023).

Theodora Dryer, Anne Pasek and others deepening our environmental histories of computing have much to gain from this volume, which presents versions of the social that integrate variantology, trade norms in Eastern Europe, computer pedagogy in 1970s Singapore, US legal history and critical technocultural discourse analysis.

It is perhaps Xiaochang Li's paper 'The measure of meaning: automatic speech recognition and the human-computer imagination' that future students will recognize as their history. Li connects mid-century theory by the American psychologist and technophile J.C.R. Licklider (author of 'Man-computer symbiosis' in 1960) to research within AT&T and then at IBM on acoustic classifications, recognition proxies and signal processing. 'IBM's approach of data-intensive statistical modeling reframed speech recognition as a purely computational process that was distinct from, it not outright antithetical to, human perceptual faculties and linguistic expertise', she writes (p. 355). This development in the history of knowledge engineering prompts unease when considered alongside the contemporary journalistic frenzy over machine learning, the long-term impact of which is often cast as inevitable. That this frenzy occurs as (because?) journalism's traditional business model has recently imploded in America is suggestive of a broader historical move in which technophiles engineer profit from the reduction of human perceptual faculties and expertise to, in this case, 'content' accessed via proprietary statistical models. By rejecting the value of human faculties in favour of mere signal processing, Li's actors unwittingly laid stones in the conceptual foundations that undergird this implosion.

If there are new social histories of computing that reassert its essential lack of agency, such clarity would lend much to our evolving conversation about the space between abstraction and embodiment. Generative AI need not become mainstream to tilt perceptions of authority away from human expertise and toward statistical recognition, as IBM did. Coupled with related moves away from tenure and toward more precarious positions for early-career scholars, one fears an era in which historical craftsmanship is reduced, like journalism, to content moderation. This would be a profound loss as AI is simultaneously used to corrupt historical records with half-truths and outright denials via deceptive text, photos and videos, particularly around genocide. One hopes that generative AI abuses will go the way of asbestos, but it may well go the way of computing by becoming a sticky, invasive, ailment-inducing contact high that, other than those things, has no agency of its own (so long as you remove people from the equation).