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Technics

GILL PARTINGTON

This chapter deals with work published in the field of Technics in 2003 and is divided into two sections: 1. Books; and 2. Journals.

1. Books

'**tech+nics** ('tɛknɪks) *n.* the study or theory of industry and industrial arts; technology' (*Collins English Dictionary* [1979]). If technics can be thought of as a distinct field of academic enquiry, it seems to be one defined more by fragmentation and diversity than by cohesion. The texts under review here are found variously under the headings cultural studies, history, anthropology, American studies, sociology, philosophy and even architecture, a list which illustrates first of all a disparity of approaches, but also indicates something of the mutable and promiscuous qualities of 'technology' itself. Occupying a disorderly set of disciplinary hinterlands, the technological refuses to constitute a stable or discrete object of study. Rather, in what follows, it exhibits messy entanglements in any number of other categories and other spheres of activity, materializing in unlikely places and assuming unexpected guises. In spite of their diversity, therefore, one theme that runs through these texts is that of (re)definitions: in various ways they complicate and deepen the question of what technology is (or is not), and what its relationship might be to categories such as 'nature' or 'the human'. An insistent preoccupation with academic disciplinarity, its structures, constraints and possibilities seems to accompany this. Existing methodological frameworks no longer appear adequate to interrogate technology's complex interactions with the world, and new disciplinary configurations, new shifts in perspective are called for in order to make visible the implications of technology at the level of the cultural, the corporeal and the cognitive.

William J. Mitchell's *Me++: The Cyborg self and the Networked City* follows his previous works, *City of Bits* and *e-topia*, in examining the implications of information technology for everyday life. It argues, much like these earlier volumes, that as the twenty-first century commences, we are compelled to live in, with and through technology like never before, and our lives are increasingly

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bound up with it. A global network of wireless technology and instantaneous communication is changing the way we think about ourselves and how we interact with one another. Such technologies thus bring about a new state of being, and new concepts of what it means to be human. 'We are not fully contained within our skins', claims Mitchell, and instead urges a re-imagining of the human as a 'spatially extended cyborg' (pp. 38–9). Not only do the technological prostheses of clothes, car, house etc. make the boundary around the self impossible to draw, but these 'successive artificial skins' (p. 8) are boundaries which are in turn cut across by networks and channels. The new technological subject is defined not only by reliance on technology but by interdependencies and interconnectedness. The 'Me++' that Mitchell envisions is a 'biological individual *plus* its extensions and interconnections' (p. 39).

The 'trial separation of bits and atoms', which characterised the early part of the digital revolution is now over, claims Mitchell. Information and matter, the physical and the virtual, can no longer be imagined as separate, but are now so profoundly implicated in one another that they effectively inhabit the same ontological sphere. With increasing frequency, 'events in cyberspace are being reflected in physical space and vice versa' (p. 3). This insistence on the interactions between virtual and physical space means that *Me++*, like *City of Bits* before it, represents an attempt to re-imagine not only human subjectivity but also our lived environment. Where human settlements have been conventionally imagined as enclosures, the digital city is more correctly seen as a network. Information and digital code, the 'new architecture of the twenty-first century' (p. 4), have transformed our relationship with our spatial environment. The new urban condition is one of fragmentation and dispersal rather than centralisation. However, this 'de-localization of our interaction with places, things and one another' (p. 31) is far from being a dystopian vision of the disappearance of community and shared values. The new 'global hyperconnectivity', as described by William Mitchell, involves instead the emergence of new communities and a 'widening moral circle' (p. 31).

Yet this ubiquitous interconnectivity has potentially negative as well as positive ramifications. Acts of global terrorism reflect the intensity of our engagement with technology just as surely as increased interpersonal communication. Surveillance too, is becoming an inescapable by-product of connectivity: Mitchell writes in sobering terms of the unavoidability of the increasingly unrestricted panoptic gaze of technology. Such cautionary and pessimistic passages sit uneasily with the book's overall sense of fascination with the possibilities of technology, however, and it's possible at times to detect a related ambivalence regarding issues of power, oppression and inequality. Embedded as we are in a series of technological complexes, writes Mitchell, 'each of us can play many different roles (some strong, some weak) at nodes within these complexes' (p. 9). Beyond this insight, however, there is little sense of what might position people in these unequal roles or, equally importantly, how they might alter their role, and reposition themselves in the technological matrix. The focus here seems to be fixed firmly on technology itself, rather than the nature of the workings of power. Such ambivalences seems to be due, in part at least, to a lack of consistent theoretical focus. Mitchell states that 'we shape our technologies and then our technologies shape us' (p. 6), yet this post-humanist, Foucauldian notion of technology as operating to constitute, shape

and discipline the subject is difficult to reconcile with humanistic statements made elsewhere, celebrating technology as a 'liberating extension to the body' (p. 2). However, perhaps such criticism is misplaced: this is not a book that seeks to engage in a prolonged debate with Foucault, or indeed any other of the post-structuralist theorists it cites. Its reference points are drawn equally from popular culture, film, science fiction and current affairs, and it self-consciously eschews the solemnity of academic theorizing. Describing a variation on the great seal of the United States, an eye in a pyramid scanning the entire globe, Mitchell writes of 'a panoptic diagram that would have left Jeremy Bentham gobsmacked and Foucault reaching for his deconstructor' (p. 201).

Such statements illustrate the precarious nature of the balancing act Mitchell attempts in this book. Published through MIT press, it ostensibly attempts to speak to a scholarly, academic audience while at the same time refusing to sacrifice its accessibility and populism. Unlike books in the popular science genre, it seems to locate itself within a milieu of cultural theory through references to Virilio, Foucault, Deleuze, Haraway, Baudrillard, yet it often seems to lack the intellectual rigour readers might be lead to expect from this. Its style is personable and at times anecdotal, often lapsing into fascinated description of technological innovations which, in the absence of a sustained methodological framework, do little to advance the book's thesis. Mitchell's accounts of the possibilities of nanotechnology, especially, are tinged with a sense of excitement which makes it hard for the book to retain a critical distance from the developments it describes. Such enthusiasm has a tendency to seem oddly dated, however: a reminder of the techno-euphoria which characterised the early 1990s, when the sheer novelty of the digital communications produced such celebratory studies as Howard Rheingold's *Virtual Reality* (1992) and George Landow's *Hypertext* (1990). Ultimately, *Me++* presents a highly readable and upbeat account of the digital revolution, but it is hard not to feel that, despite its scope and undeniable interest, the book may well fall short of its own ambition because of its failure to provide a sufficiently sophisticated argument to substantiate its at times sweeping claims.

While *Me++* focuses overwhelmingly on the present in its attempts to assess the impact of technology, other work has displayed a broader historical sensibility. Joel Dinerstein's *Swinging the Machine*, Elizabeth Shove's *Comfort, Cleanliness and Convenience*, and David E. Nye's *America as Second Creation: Technology and Narratives of New Beginnings* all examine the ways in which technologies have historically intersected with culture. Nye's book analyses the ways in which technologies have become 'woven into' national narratives in the USA (p. 1). Nye writes that, when European settlers first arrived in North America, the stories they told to make sense of themselves and their world came from their homelands. But, 'after the revolution, and particularly in the nineteenth century, Americans developed another way to understand their settlement of the western hemisphere: as the technological transformation of an untouched space' (p. 4). Technology thus becomes a key element in what he terms 'the national epic of self-creation' (p. 287). This epic, and the individual narratives which rehearsed it over and again, played a naturalizing role, 'providing justification for and after-the-fact vindications of their settlement' (p. 5). The axe, the mill, and later the canal and railroad, were invested heavily with significance by these narratives, and Nye sets out in this book to

examine precisely how these technological artifacts acquired what he terms their 'social meaning' (p. 2).

Using as its theoretical starting point Pierre Macherey's work on ideology and literature, Nye's study is an insightful and highly-readable piece of cultural history, which responds sensitively to a diverse range of sources including fiction, poetry, visual art, treatises and journals, unpicking their assumptions. Permeating these texts, he argues, is the notion of North America as an empty space, a continent awaiting settlement and cultivation whose land had simply 'lain idle' prior to the arrival of Europeans: it was a place which was 'unfinished and waiting to be improved' (p. 284). The cultivation of this empty continent, and the use of its resources was thus not only desirable but even morally necessary. Technology, in bringing out the potential latent in the land, represented a 'second creation', an improvement on God's initial creative act. The empty, uncharted space urgently needed to be partitioned out among settlers, and a grid needed to be imposed on the raw material of nature, in order to exploit its potential. The new narratives of the American settlers thus rejected English, Malthusian narratives of scarcity, overpopulation and the necessity of government control, and instead were based on ideas of limitless abundance, unfettered production and a free market.

But the assumptions behind this narrative of a second creation had largely lost their credibility by the early twentieth century, Nye writes, when tensions between these stories and the reality of settlement had become all too apparent. The geometric grid system of partitioning land was not egalitarian, as it had promised to be, since it ignored the specificity and variability of land. Equally importantly, in separating settlers it had resulted in social isolation rather than agrarian utopia. In addition, the free market ideals were very different to the reality of economic inequality and the monopolization of resources and wealth by a few parties. The assumption of the limitless abundance of nature was also difficult to sustain in the face of arid land in the western states, which needed state organised irrigation programmes to be fertile. By the late nineteenth century, the ideology of endless resources was opposed by counter-narratives warning of exhaustion, erosion and environmental damage.

Nevertheless, this notion of technology as central to the formation and existence of America is one that remains a pervasive force. In 1998, the discovery of ice on the moon prompted excited speculation about its uses, and even of the possibility of human settlement on the vast empty spaces of the lunar surface. So persistent are these technological narratives in American culture and society that it has taken most of the twentieth century to begin to seriously question them, Nye argues. However, he warns that even environmentalists' calls for the preservation of untouched 'wilderness' areas in the US, while they may seem to be a rejection of this ideology of second creation, in fact only succeed in positioning themselves in relation to it. This pristine wilderness is imagined as the preface to the process of technological development and expansion, as an empty space restored to its original natural state. The need to move beyond these narratives, with their simplistic duality of technology and nature is one which, Nye suggests, is difficult but necessary.

Elizabeth Shove's *Comfort, Cleanliness and Convenience: The Social Organisation of Normality* has a similar polemical edge to its argument. It asks some interesting and timely questions about how and why our supremely unnatural

modern living conditions have come to seem natural. Our expectations of the indoor environment, she writes, have shifted substantially in the space of a single generation. Yet, if household technologies such as central heating and showers now seem necessary, how did these undetected and subtle changes in expectation and practice come about? How do new technological arrangements come to be seen as 'normal'? This is a project which, as Shove acknowledges, involves focusing not on the novel and the exciting but on the mundane, in order to make visible 'the barely detectable gridlines of everyday life' (p. 2). It also involves negotiating a disciplinary gap. While sociology has well-formulated theories of consumption, these tend to look at the acquisition of goods and gadgets, rather than the gradual adjustment to their use, and thus do not cover the kind of 'inconspicuous consumption' of energy that she wishes to investigate (p. 2). Meanwhile, environmentalism has developed ways of theorizing energy usage, but these concentrate only on the usage of resources, and tend to take the notion of 'increasing demand' as a foregone conclusion rather than asking why, at a local level, demand for energy might grow. This project thus involves some methodological juggling, requiring Shove to 'revisit theories of consumption, technology and social change' (p. 4).

Shove's principal reference points are sociological, as her mentions of Giddens and Goffman—as well as her numerous charts and diagrams—testify. Yet she finds it necessary to borrow ideas from cultural studies, history and anthropology in order to fully investigate a fundamental 'reconfiguration of ideas, actions and habits' (p. 12). There is an unmistakable Foucauldian flavour to her uncovering of the changing historical and cultural meanings of the terms 'comfort' and 'cleanliness'. Initially defined as emotional or spiritual ease, the association of comfort with a physical state emerged only in the milieu of eighteenth-century consumption, when it came to be seen as the middle point between need and luxury. It has since become inseparable, Shove notes, from the technologies and physical artefacts with which it is associated. Similarly, notions of cleanliness have undergone huge changes: bathing was once considered a dangerous activity, since it was liable to open the pores and let in pestilential airs. Nineteenth-century discourses linking moral hygiene to physical cleanliness played a part in promoting the spread of bathing, and later still, the bathroom became a space of privacy, relaxation and leisure, and once a week baths have given way to the daily shower, necessitating the increasing consumption of water.

Drawing on an eclectic range of historical and contemporary sources, she shows the mechanisms through which certain practices and basic assumptions have been altered. Investigating the current ubiquity of heating and air-conditioning technologies, she argues that acceptance of variations in climate conditions, and the local means of coping with them, have given way to an expectation of consistency in temperature. The notion of a universal 'norm' was first propagated in the mid-twentieth century, by bodies with a vested interest, such as the American Society of Heating and Ventilation Engineers, who specified the parameters of the 'ideal' climate and reinforced their findings with scientific evidence. Moreover, once central heating and air conditioning began to be installed in American homes, they came to be expected as a standard feature. Across large parts of the world, Shove argues, the heating and cooling of homes has replaced traditional measures for coping with the climate. In this way, a mutual constitution of technologies and

users occurs, or, as Shove writes, technological devices come to 'script' their users' behaviours.

In her conclusion, Shove attempts to model this subtle escalation in technological consumption in terms of a various mechanical devices. Somewhat ironically, her explanatory models for technological change are themselves technological: pinwheels, cogs and ratchets. The ratchet, as she explains, enables forwards momentum while preventing any corresponding movement backwards. By designing homes for air-conditioning, in other words, American house-builders ensured dependency on it, since there was no way back once the expectation of climate control was built into the fabric of the house itself. She urges resistance to such ubiquitous norms, advocating the need for 'multiple meanings of comfort and diverse conventions of cleanliness' (p. 197). While this is a valid and necessary point, however, it seems at odds with her own explanatory technological metaphor of the ratchet, which implies that movement in any direction except towards the inexorable escalation of technological innovation and energy consumption is impossible.

Gender and Technology, a reader edited by Nina Leman, Ruth Oldenziel and Arwen Mohun, similarly examines technology as fundamentally embedded in social practices. And, much like the work of David Nye and Elizabeth Shove, it attempts to get away from a narrowly 'presentist' definition of technology, instead defining it in a much broader sense as the 'process of making and doing things, rather than a particular set of recent sophisticated artifacts' (p. 12). Such a broad conception of technology is necessary, the editors argue, since it allows us to consider which parts of the material world have been labeled 'technological' and why. The traditionally masculinized automobile is 'technological', unlike feminized artifacts such as beds, ovens, brassieres. This collection of essays, as its introduction states, takes as its focus the ways in which this boundary between masculine and feminine technologies has been constructed. It explores how the meanings of technology have been negotiated in relation to gender, and vice versa. The articles gathered here, focussing on North America between 1850 and 1950, thus seek to 'explore technology through the lens of gender and gender through the lens of technology' (p. 2).

Reflecting on the methodological implications of such a project, the editors insist on the necessity of interdisciplinarity. In a useful historiographical survey, they acknowledge the importance of pioneering work by Ruth Schwartz Cowan and Joan Scott, which first began to redress the omission of women from histories of technology in the 1970s and 80s. However, their field is still diverse and fragmented, they argue, involving scholarship from the history and sociology of technology, history, women's studies, and philosophy of science. The challenge of bringing these often disparate disciplines into conversation with one another is, broadly speaking, what the work in *Gender and Technology* attempts to do. Organised into four parts, the essays in parts 1 and 2 address the reciprocal articulations of gender and technology, while those in parts 3 and 4 provide more specific examinations of practices, industries and technologies. Mostly from the last ten years, these chapters are as a whole intended to provide an overview of recent thinking about gender and technology. They consider firstly what constitutes 'feminine' and 'masculine' technologies, in pieces by Judith McGaw and Ruth Oldenziel respectively. They also explore ways in which technologies are

situated, and the gendered meanings which come to accrue around them (for example Rebecca Herzig's study of the way the X-ray machine has been used for cosmetic hair removal, and Paul N. Edwards's study of the gendered identities which have grown up in computing cultures). Other articles cover the historical complexities of gender in the cigarmaking, meatpacking and dressmaking industries.

In a conclusion which assesses the trajectory of this work as a whole, as well as suggesting directions for future research, the editors advocate the continuation of work which foregrounds the notion of masculinity, rather than seeing it as genderless, and which analyses how the separate gendered spheres of technological activity have been constructed and institutionalized. They point out the need to see the home as one such site of technological activity, a move which not only resituates women as technological actors, but explains and accounts for the ways in which they have been conventionally 'written out' of histories of technology. They also urge an awareness of the connectedness of all phases of technology, rather than a concentration purely on its invention or use. Such an awareness, they argue, means crossing old boundaries, and reconsidering familiar gendered dichotomies of production and consumption, home and work. Finally, they suggest that attention needs to be paid to the body as a site of technological activity, through a study of reproductive technologies, as well as what they term 'technologies of identity' (cosmetics, clothes, and the technological reshaping of the human body). While they see the figure of the cyborg as a worthwhile theoretical touchstone in this endeavour, they argue that so far it has lacked historical specificity, and thus suggest the need for a 'prehistory of cyborgs', particularly one which takes gender into account.

Where *Gender and Technology* argues that the notion of 'the technological' cannot be understood without reference to the category of gender, in a parallel manoeuvre, Joel Dinerstein's *Swinging the Machine: Modernity, Technology and African American Culture Between the World Wars* shows how technology intersects with racial identity and politics. Dinerstein provides a refreshing new take on the well-worn subject of American modernity, arguing that that African American music and dance provided the primary means of cultural and aesthetic adaptation to the machine age. In the 1930s, while a white intellectual elite (Dinerstein cites Lewis Mumford's 1934 *Technics and Civilization* as an example) was claiming that humans were not yet at ease with technology, or even lamenting the enslavement of humans by technology, a vibrant African American culture was busy assimilating and stylizing machinic rhythms and aesthetics, notably in the form of big band swing and its associated dance forms. This process of technological assimilation owed its impetus to the persistence of a West African tradition in which music held a central ritual function: it integrated physical movement and social forces through dance, and made sense of the common environment by rendering it in sound. In the dance halls of urban America, music fulfilled similar social imperatives, Dinerstein argues, as African American artists began to integrate the rhythms of factory work and modern cities into a 'unifying cultural form of band swing' (p. 5). The big bands of the 1930s music 'streamlined' the raucous individualism of earlier New Orleans Jazz into a more fluid sound which owed something to the ethic of the production line. Its driving, syncopated rhythms reflected not only the increased tempo of industrialized life, but the

machine aesthetics of 'power, drive, precision, repetition, reproducibility and smoothness' (p. 19).

While the canon of 'machine age art' is conventionally assumed to belong to the Italian Futurists, Russian Constructivists and the German Bauhaus movement, Dinerstein claims we should shift our gaze from European high culture to the realm of African American vernacular culture if we are to fully understand how twentieth-century aesthetic forms came to appropriate technology. Such popular, populist cultural forms, while they may frequently have been the subject of critical enquiry in recent years, are usually examined from the point of view of sociology or musicology. Dinerstein retains an interest in these existing perspectives, but manages to combine them with an awareness of technology in an expanded and nuanced sense: ' "technological" here refers not only to industrial innovations and mechanical rhythms, but also to the ongoing changes in human perception brought on by the experience of modernity' (p. 7). This is a book that wears its methodology lightly for the most part, however: its analysis of popular music and dance is scholarly while at the same time being accessible and readable in its wealth of anecdotal detail. It manages to convey an enthusiasm and passion about its subject, while rigorously attempting the task of rehabilitating a set of cultural forms that are customarily (and dubiously) associated with essential, primal, instinctual rhythms, and seeing them instead as an expression of technology.

Put briefly, *Swinging the Machine* argues that, migrating in the early years of the century from southern poverty to the cities of the north and west, African Americans responded to their sudden immersion into an urban environment by constructing 'a functional culture for an industrial society' (p. 24). From early on in this process the train was stylized through the 'locomotive onomatopoeia' employed by blues guitarists, vocalists, boogie-woogie piano, tap dance and swing drummers (p. 25). Later dance forms elaborated this machine aesthetic. Dinerstein describes the metallic rhythms of tap dancers, the 'industrial organisation' of the Busby Berkley and Ziegfield Follies spectacles, whose chorus line dancers acted as cogs in a vast machine, and Lindy Hop dancers, whose dynamic movements required precise timing and control. All of these enact a complex interplay of bodies and technologies, and show how Americans had learned to 'swing their machine'. The subsequent appropriation of these black forms by white culture only testifies to its success as a prescient form for the machine age.

In the 1930s, an era characterised by economic depression and fears of mass unemployment due to technology, music—and especially big band swing—provided what Dinerstein terms a 'vernacular survival strategy' among African Americans, one which also proved appealing to disenfranchized whites. Big band music provided a crucial means of negotiating with technology: it 'humanized the cold, rational machine world created and fetished by technical, corporate elites in the early twentieth century' (p. 28). As such, swing music was part of an 'ongoing dialogue between white technology and black culture' (p. 21). Moreover, this dialogue, enacted initially by swing music, dance and other African-American forms, is now an established part of music practice: what he terms the 'the techno-dialogic' is now 'a crucial survival strategy embedded in American culture, a legacy of the need to maintain a dialogue between art and technology' (p. 322).

Dinerstein traces the prehistory of this 'techno-dialogic' back to the 1880s, and the African-American folk song 'John Henry', whose eponymous protagonist competes against the new technology of a steam drill with his own ten-pound hammer. John Henry wins, but only at the cost of his life. The moral of the story, Dinerstein states, is to 'learn to live with machines': machine aesthetics had to be integrated into everyday life and culture (p. 211). An imaginative reading of a Fred Astaire dance routine illustrates the fact that this integration was successfully achieved. In *Shall We Dance* (1937), Astaire (appropriating the African-American cultural form of tap-dance), stages a rematch between humans and technology, dancing against machinery in a ship's engine room, mimicking their rhythms and movements. Rather than compete directly against the machine however, Astaire instead shows how it can be reenergize the human body. The routine demonstrates what is effectively Dinerstein's central thesis: that US pop culture—and especially black culture—involved a set of sophisticated discourses around technology, asking again and again what it meant to be 'human' or 'machine'.

Modernity and Technology, edited by Thomas J. Misa, Philip Brey and Andrew Feenberg, is a collection of articles that has its origins in a workshop held at the Inversity of Twente in 1999, and brings together a diverse group of scholars drawn from philosophy, cultural studies, social theory, history, sociology and anthropology, in order to consider the complex articulations between the twin concepts of modernity and technology. Once again, disciplinarity is something which concerns both the editors and contributors, and indeed, this is a project which in one sense seems to centre around the difficulty of reconciling disparate disciplines in order to stage a comprehensive critique of technology.

As Thomas Misa points out in his introductory chapter, modernity and technology are concepts with a 'complex and tangled history' (p. 5). The idea of the modern seems inevitably to be bound up with the idea of progress and, more specifically, technological innovation. Modernity and modernization, as theorized in the realm of social theory by Durkheim and Weber, involves a linking together of notions of technology, industrial growth and desirable social and cultural changes. The term 'modern' is far from neutral, therefore, but is bound up with a certain set of assumptions: declaring a 'modern' period based on rationality and technological progress was, as Misa argues, a polemical act that defined who was 'in' and who was 'other' (p. 6). Similarly, technology is a notion that is weighted with a set of historical assumptions: the term 'technology' was only introduced into common English usage in the early part of the nineteenth century, and its current designation as either a set of devices or as an abstract force did not emerge until the second half of the century.

One primary aim of this volume is, as Misa states, to bring the two concepts of modernity and technology into dialogue with one in order to complicate them, to demonstrate that they are far from static, and to highlight their shifting meanings and ideological implications. While sociologists of modernity may have talked of technology, they have tended to make the latter an abstract and deterministic force. In such discussions, technology is an 'abstract, unitary and totalizing entity', typically counter-posed to other, more organic concepts such as tradition, the self, etc (p. 8). Misa singles out Habermas' opposition of 'lifeworld' and 'system' for criticism in this respect. Such ontological separation of the human and the technological is not a viable possibility, writes Misa, since we are always

enmeshed in systems. Everyday activities and experiences are mediated by technology, so there can be no retreat into a 'mythical non-technological past': modern society in all parts of the world is inevitably constituted through technological systems and networks which 'constrain and enable social and cultural formations' (p. 4). It is this messy embeddedness of technology in society that this book seeks to address. One of its principal themes, according to Misa, is that technology is not monolithic, and should be examined not as an abstraction, but in terms of its specific uses and appropriations. This is a project which seeks to examine individual technologies and social practices, and thus to move from the 'macro-level' to the 'micro'.

This micro-level analysis is one which is already familiar to practitioners of what Misa terms 'technology studies', who have always been antagonistic to an abstract view of technology, he argues. The task is therefore one of bringing together disparate disciplinary approaches. Where some disciplines have examined the 'technological shaping of society', others have concentrated on the 'social construction of technology'. The central aim here is to grasp both perspectives and develop new intellectual frameworks into which both can be incorporated: Misa thus proposes the 'co-construction of modernity and technology as a "methodological point of departure"' (p. 10). Despite these declarations, *Modernity and Technology* occasionally illustrates the potential pitfalls of attempting to forge a truly interdisciplinary approach to technology. The book's ambitious attempt to stage an inclusive dialogue between scholarly traditions whose conception of technology, and indeed whose whole way of thinking, are so diverse, threatens at times to result in a cursory treatment of certain theorists. Occasionally it can seem that the ideas of Lyotard, Heidegger, Foucault, and Derrida seem slightly compressed, and perhaps not explored in their full complexity.

The book is divided into three sections. Section one, concentrating on methodological issues, has essays from Philip Brey, Andrew Feenberg and Barbara Marshall which take up a variety of disciplinary angles, ranging across technology studies, philosophy of technology, and sociology. Brey and Feenberg express their intention to bridge the disciplinary gap between technology and modernity studies. Brey maps out the complexities of the field in painstaking detail before finally attempting to bring competing approaches together. Feenberg, in a similar spirit, tackles the legacy of Kuhn and Marx and attempts to stage a reconciliation between their approaches, claiming that we need to strike a balance between a priori theorizing on the one hand, and empirical studies of individual technologies on the other. In a slightly different vein, Marshall insists that the categories of modernity and technology need to be understood with the third category of gender. A sociological and feminist approach is necessary, she argues, to grasp the point that 'the technical is social and the social is technical' (p. 130). Her example is that of viagra and the bio-technologies of sex, which illustrate the production of the sexual body through both modernity and technology.

Section two, entitled 'technologies of modernity' examines specific historical technologies or 'sociotechnical systems'. Don Slater, for instance, describes how the Internet in Trinidad complicates categories of modernity and technology, Davis Lyon argues that surveillance technologies constitute modernity itself, while Junichi Murata analyses how western technology was appropriated by China and

Japan in the late nineteenth century, and in particular the ways in which it was perceived from a perspective of cultural difference. Section three, meanwhile, on the theme of 'changing modernist regimes' adopts a more prescriptive and polemical perspective. Concentrating on the practical and political, it suggests alternative ways of both using and thinking about technology, as well as alternative conceptions of 'modernity'. Davis Hess reconsiders the relationship between alternative and mainstream medical technologies, Johann Schot considers workers' modes of resistance to job-destroying technologies, and Arthur Mol evaluates changing meanings of modernity from the point of view of the ecological movement. The book thus seeks, as Arne Rip declares in its afterword, to tackle 'real-world issues' rather than confine itself to the academic realm.

Chasing Technoscience: Matrix for Materiality, edited by Don Ihde and Evan Selinger is another anthology, and again one that pays a great deal of attention to issues of methodology and disciplinarity. It is arguably the most ambitious of the books reviewed here, in that it attempts to simultaneously present both a history and overview of the current state of 'technoscience studies', and provide introductions to four of the most progressive practitioners in the field: Bruno Latour, Donna Haraway, Andrew Pickering, and Don Ihde himself. It follows an appropriately ambitious and complex structure, in which the first half of the book comprises interviews with, and articles by, these four figures, while the second half consists of essays focusing on various pairings of the featured theorists. By way of introduction, Ihde's opening essay attempts to map the fraught disciplinary territory. He warns that the book deals with 'a new, interdisciplinary field, with battlefields already littered with the corpses of arguments and publications' (metaphors which seem to be borne out in the remaining chapters) (p. 3). Undeterred, Ihde addresses the notion of 'technoscience', as well as gamely tackling the labyrinthine complexity of its historiography, and locating it in relation to a bewildering array of disciplinary near-neighbours. It marks the convergence, he argues, between a US-based philosophy of science, whose foundational text is Ihde's own *Technics and Praxis* of 1979, and a sociology of science which begins with Latour and Woolgar's *Laboratory Life*, also of 1979. Technoscience is thus situated on a disciplinary faultline between two contrasting approaches to technology, on the one hand philosophical and on the other sociological, which have traditionally had little to say to one another. Appropriately, a concern with interdisciplinarity is something which, in Ihde's view, the four figures share, in addition to a focus on the materiality of scientific practice, and a commitment to philosophical approaches.

Bruno Latour's contribution to the volume bears out these observations to some extent, but may not be the best introduction to his work for the uninitiated, since he resolutely refuses to be steered by his interviewers into any real clarification of his position, apologising instead for his lack of reflexivity about his own practices. His work is, he says, a 'mixture of enthnomethodology, semiotics and metaphysics', and a 'disgusting bricolage' of the conceptual, field work, and what are termed 'infra-arguments' (p. 22). Questioned about his influential 'actor-network theory', a framework based on a semiotics in which both humans and non-humans are potential 'actants', Latour makes the slightly perverse point that this Gramscian semiotic terminology is deliberately 'bad', and has no explanatory weight at all. Perhaps more helpful is Latour's subsequent chapter,

which delivers a scathing critique of an Anglo-US 'social constructivist' approach to science and technology. For Latour, this approach, with its monolithic and simplistic conception of 'the social' as the sole determining force in the development of science and technology, ignores the possibility that humans might share agency with other, non-human 'actants'. The technological world is never fully under the control of its maker, he insists.

Similarly critical of a social-constructionist approach is Donna Haraway, who argues that it imposes an unhelpful dichotomy between things which are 'natural' and those which are 'constructed'. Such a dichotomy is something Haraway has sought to deconstruct through the figure of the cyborg. In her interview, she discusses responses to her seminal *Cyborg Manifesto*, as well as arguing the need for a whole 'kinship' of such 'critical figures' (p. 52). In this vein, she talks about her use of the coyote, a trickster figure in Native American culture, which—like Haraway's cyborg and Oncomouse—'disturbs nature/culture ontologies' (p. 53). Similarly, she puts forward the notion that the dog, as reciprocal companion to humans, refuses to fit neatly into the category of either nature or culture. Dogs and humans have 'mutually invented' one another, she argues, and consequently the dog represents a particularly problematic form of 'otherness' (p. 140).

The question of problematizing boundaries between the human and its others is one which also concerns Andew Pickering, whose work focuses on the 'the intertwined evolution of the human and the non-human' (p. 101). Like Haraway, whose initial training was in biology, Pickering's practical background as a physicist has informed his approach to the study of science. In a combative interview with Caspar Bruun Jensen, Pickering describes how his early work, *Constructing Quarks*, was influenced primarily by an English social-constructionist perspective on the study of science. Subsequently influenced by the work of Latour, among others, Pickering now insists that the social cannot be considered a 'stable explanatory variable' (p. 87). This movement away from social determinism is reflected in Pickering's use of the term 'the mangle of practice', to express both the complex interplay of human and machine elements, and also the sense in which his investigations are focused on the specifics of material practice rather than at the level of the theoretical or the abstract.

This issue of materiality is one which preoccupies Don Ihde, whose background lies firmly in philosophy, a discipline which conventionally deals in abstract, metaphysical questions, and which has tended to display something of a dismissive attitude towards the study of science and technology. The old style of philosophy of science is on the wane, claims Ihde, and more interesting work is being done through anthropological, cultural and sociological studies of science. Nevertheless, Ihde's project centres to some extent around revitalizing and reinventing a philosophy of science based on the tradition of phenomenology which, he argues, has always concerned itself with the relationship between humans and their environment. Describing himself as a 'critical phenomenologist', Ihde wants to perform a philosophical interrogation of science which is not interested in abstract formulations, but which occurs at the level of praxis. His phenomenological object of enquiry is therefore the embodied, material specifics of scientific practice, and the ways in which humans and objects are modified through their encounters with one another.

This is a significant if sometimes challenging book, and one that brings together some important figures in an innovative way. The chapters exist in a lively dialogue with one another, and the resulting whole provides an illustration of some very current theoretical trajectories field of technics. One issue it does not tackle, however, are the ramifications of the term 'technoscience'. Don Ihde himself writes that the word implies that both science and technology inhabit the same domain. In conflating science and technology, however, the term is in danger of producing a definition of 'technology' which includes only those practices and objects that are recognised as being part of a institutionalised and privileged scientific milieu. In this sense, *Chasing Technoscience* seems to run counter to the methodology of much of the other work reviewed here, in particular Leman, Oldenziel and Mohan's reader *Gender and Technology*, which seeks to critique precisely this narrow conception of technology, and instead to ask the important question of why certain things are placed in the category of the technological while other, less culturally privileged things are not. If some of the years work on technics attempts to strategically widen the concept of technology by focusing on such unlikely and diverse artifacts as female underwear, axes, showers and jazz, *Chasing Technoscience* seems in danger of narrowing it, concentrating as it does on the activities of science and technology professionals.

2. Journals

Some of the year's most interesting and challenging writing on technics has appeared in journals. In particular, articles in some more theoretically aware journals seem to illustrate the growing influence, in the English speaking academic world at least, of the German theorist Friedrich Kittler, whose work constitutes an idiosyncratic cultural history of media technology. Kittler's term, *Aufchreibsysteme*, usually translated either as 'writing systems' or as the more Foucauldian 'discourse networks', designates not only writing technologies themselves, therefore, but the also the ways in these technologies have historically come to shape subjectivity, culture and modes of expression. Victoria Olwell's article, 'Typewriters and the Vote', (*Signs: Journal of Women in Culture and Society*, 29:i[2003] 55–83), builds on Friedrich Kittler's extensive investigations into the meanings of the typewriter, carried out first of all in *Discourse Networks* (StanfordUP [1992]) and then in *Gramophone, Film, Typewriter* (StanfordUP [1999]). Where Kittler's work had concentrated on the predominantly male subjectivity of the author, Olwell instead offers a fascinating analysis of the ways in which the technology of the typewriter acted to reconfigure female subjectivity in late nineteenth-century America. She begins with the fact that, at the turn of the century, the word 'typewriter' designated not merely the machine, but also its (female) operative. Typewriting manuals reinforced this idea of symbiosis by approaching the body as a machine: the skill of typewriting was to be learned 'mechanically', and the body to be thought of as an efficient piece of office machinery. This double meaning of the term is one that Olwell uses as an opportunity to investigate a set of historical articulations between a particular technology and its users.

The historical background of her narrative is, on one hand, the exponential rise in the employment of women as typists from the 1880s onwards, and on the other, the increasing calls for women's political enfranchisement that accompanied this. These well-meaning demands for female suffrage tended to construct women's political subjectivity in one of two contradicting ways: either in terms of an abstract and genderless universality, or in terms of essentially 'feminine' virtues. Either the female body was absent, or else it became the determining factor in that it produced a nurturing, caring and feminine nature. Olwell contends that the figure of the typewriter provided an alternative to these conventional and contradictory formulations, positing as it did 'the transformation of both the organic body and the body's psyche through their symbiosis with the machine' (p. 57).

To make her argument, Olwell reads the figure of the typewriter against two discourses: firstly, debates about new voting practices, and secondly, those concerning new writing practices. In the 1890s, she writes, the modern system of secret voting and official ballots replaced a previous unofficial and inconsistent election system, which had been subject to corruption and the coercion of voters. The new ballot papers placed an unprecedented importance on the voter's mark, made in secret, as a sign of the exercise of individual free will and citizenship. Significantly, for Olwell, such conceptions of the handwritten mark as a sign of authenticity and individuality can also be traced back to the development of the typewriter. Where older notions of handwriting had tended to see it as a 'performance of a social or mercantile character' (p. 67), in the late nineteenth century the 'typewriter affixed authenticity fully to the writing hand by creating a contrast' (p. 66). In turn, this 'fetish of the writing hand' defined typewriting in terms of difference: where the former represented an 'originary wholeness', the latter 'came to look like the Fall (p. 66). But, argues Olwell, this Fall represented also an crucial opportunity in that it opened up new spaces for unconventional female subjectivities which were not bound to established notions of 'the feminine'.

To illustrate this point, Olwell analyses a series of 'typewriter fictions': a late nineteenth-century genre of narratives about the new species of working woman. One such narrative, a piece of sensation literature from 1903 entitled *Confessions of a Typewriter*, concerns a young woman whose longing for independence leads her into office work. Exposed to an office environment, and thus to the constant attentions of male workers, she inevitably descends into the despair of a loveless marriage, before finding salvation in religion and coming to the realisation that her desire for independence was sinful. Olwell's psychoanalytic reading of the story shows how its ultimately moralizing message is undercut by a 'doubleness' stemming from the technological specifics of typewriting, and in particular the inevitability and expectation of errors in the typewritten text. While the function of the typewriter (in both senses) is to provide an exact copy, this 'manifest' text of the copy is implicitly accompanied by a 'latent' text comprised of inevitable errors. In this sense, claims Olwell, 'the double-voiced typewriter has it both ways at once: she has her saving redemption, and she encodes her protests, tool' (p. 71). This mechanical, doubled mode of writing and subjectivity thus contrasts with the supposed singularity and authenticity of the voting hand.

Olwell concludes with an analysis of another piece of typewriter fiction, *As told by the Typewriter Girl*, whose narrator, Madge, is the fastest typist in her firm, and

whose risque urban adventures were serialized in the Chicago press in 1898. Again, she claims, the narrative marks the space of a potentially disruptive female subjectivity operating outside conventional discourses of feminine selfhood. Characterised by its lack of narrative memory from one installment to another, and its recurring themes of mistaken identity and social reinvention, *As told by the Typewriter Girl* constructs 'a mobile subjectivity not anchored in the body but forged over and over again with each new return of the typewriter carriage'. The internalized technology of the typewriting machine alter not only grammar and syntax, but also the structure of narrative itself. And significantly, in this text, Olwell finds that the discourses of writing and voting intersect. Masquerading as a man in order to illegally cast a vote and win a bet with a male friend, Madge undermines 'the material culture of the liberal subject that the [reformed] ballot system instituted through its secrecy and its ideology of the authenticating hand' (p. 77). This technologized subjectivity of the female 'typewriter' is thus one that offered a critique of the dominant model of liberal, enfranchized and male citizenship. It suggests identity not as essence but artefact, 'created in the nexus of the material, the economic, and the social' (p. 57).

Geoffrey Winthrop-Young's article, 'Going Postal to deliver Subjects', (*Angelaki* 7:iii[2002] 143–58) provides both an example and explanation of what might be termed a 'Kittlerian' mode of media theory. Published at the very end of 2002, it combines an intriguing and challenging meditation on the cultural meanings of the postal system with a clear and at times entertaining overview of the field of recent German media theory, situating Kittler and his fellow theorists in relation to the major figures of French Poststructuralist theory. The bulk of Winthrop-Young's article is effectively an explication and critique of Bernhard Siegert's *Relays: Literature as an Epoch of the Postal System* (1999), a book which acknowledges its obvious debt to Kittler while at the same time indicating the new directions in which his theoretical insights might lead. Stretching the concept of 'writing system', Siegert explores how the technology of the postal system has shaped notions of literature and of subjectivity. 'In many ways' Winthrop-Young argues, Siegert's *Relays* is a 'rewrite of [Kittler's key works] in the "postal" voice' (p. 147).

The article begins, however, with a reading of 1947 Christmas film *Miracle on 34th Street*, in which a court case concerning the disputed identity of a character claiming to be Santa Claus is resolved by the intervention of the US postal service, who bring fifty thousand letters addressed to Santa into the courtroom. The delivery of these letters act as legal vindication of the central character's assertions: if the defendant is the recipient of Santa's mail, then he must indeed be the real Santa. This moment of festive cinematic schmaltz provides Winthrop-Young with a rather neat entry point into his own and Siegert's argument, suggesting as it does that 'there are no pre-existing, phenomenologically intact subjects located at either end of the postal network' (p. 144). What *Miracle on 34th Street* shows, in other words, is that identity does not exist independently of the postal network: rather, it is constituted through interpellation *into* this network.

But if the postal system has the power to tell people 'who and what they are by "addressing" them in the fullest sense of the word', such power is contingent on a particular set of institutions and material practices that had to be gradually implemented over time (p. 154). This 'delivery of identity' as Winthrop-Young

states, 'involves very specific postal-historical junctures' which Siegert's book attempts to trace (p. 155). One such crucial juncture occurred in the seventeenth century when the postal system was opened up to the public for the first time. This access to the post acted as an injunction to write, Siegert argues, and thus came to subtly transform the nature of subjectivity: every literate citizen became a potential letter writer and thus 'a miniature author, an origin whose words could be attributed to an individual inner self' (p. 148). This linking of writing and subjectivity is one that Siegert relates directly to the rise of literature as a cultural category in the ensuing period. Literature, in other words, is part of this 'postal regime'. And while this regime may be ending, superceded by a digital technological milieu, it is precisely this moment of transition that allows us to perceive its mechanisms for what they are: 'with the closing of the postal circuit... the threadbare quality of identity becomes increasingly obvious' (p. 155).

While it situates itself explicitly in relation to the work of Kittler, Winthop-Young argues that Siegert's book may owe just as much to its disagreements with another German theorist of media and communication. Jurgen Habermas's much-lambasted theories present literature as crucial to the development of a public sphere of democratized debate, and thus to the rise of autonomous individuals, liberated from the bonds of a feudal social hierarchy and able to engage in reasoned political discussion. Positioning himself in direct opposition to this argument, Siegert instead sees literature as 'a highly effective software program that, while appearing as the means and expression of human nature, is in reality a cultural inscription program that wires people in ever closer ways to the demands of state machines' (p. 150). In Siegert's formulation, the emancipatory potential of the public sphere is actually an imposed obligation to speak. The postal system provided, in other words, a disciplinary regime of power that compelled its subjects to speak, to send and receive letters. Such talk of disciplinary regimes highlights, of course, yet another of Siegert's theoretical influences. Michel Foucault's various historicizations of the subject form the foundation of Siegert's arguments, just as they do Kittler's work. Yet there is a discernible trajectory and evolution of ideas from one to the other, Winthrop-Young argues: 'If Kittler "grounds" Foucault by highlighting the medial practices that shape discursive and disciplinary regimes, Siegert provides a more focussed view of those medial practices by focussing on the changing regimes of the postal network' (p. 147).

More problematic and intriguing, perhaps, is the relation of Siegert's work to that of Derrida, whose 'postal metaphysics' are echoed insistently in Siegert's arguments, and whose book, *The Post Card: From Socrates to Freud and Beyond* (ChicagoUP [1987], first put forwards the notion that the subject may be constituted by its interpellation as a postal addressee (p. 154). Whereas for Derrida the point is an abstract and philosophical one, however, for Bernhard Siegert it is necessarily historical and material, contingent on 'a historically specifiable array of technologies and institutions that allow cultures to process relevant data' (p. 146). This discrepancy, for Winthop-Young, characterises the key point of departure of German media theory from the French poststructuralists to whom they are indebted. The question, for Kittler, Siegert and others, is whether 'the basic tenets of poststructuralism—despite their many overtures to technological matters—[are] ignorant and/or forgetful of the historically contingent medial and postal base that shaped them' (p. 146). German media theory suggests

that poststructuralism fails to perceive its own embeddedness in technology. Kittler has argued, for example, that Derrida's concept of a non-originary trace is effectively a philosophical abstraction of an actual technological phenomenon: Edison's 'phonographic stylus that engraves and retraces one and the same phonographic groove' (p. 153). Such critiques raise an important issue with regard to the established tenets of poststructuralist theories of language and meaning, as Winthrop-Young point out: 'how can we critically address the question of language if we do not fully take into account that our critique of language is based on the internalization or naturalization of certain representations of language?' (p. 153). Or, more succinctly: 'how can we talk about postal communication if our communication is based on the internalization of certain postal systems?' (p. 153). Winthrop-Young's question returns us to one of the central themes highlighted in the writings discussed in this review, and indeed what must be one of the key issues concerning the field of technics as a whole: in what ways is the category of the technological implicated in that of the human? And if, as it seems, the subject is constituted through and by its technologies, then from what perspective might our analysis of the technological take place?

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