

# Social Technology

Maarten Derksen and Anne Beaulieu

## INTRODUCTION

The term ‘social technology’ has little currency in reflections on society and the social sciences. It appears to assume distinctions that have become increasingly problematic: between social and material technology, society and nature, human and non-human. It has become common to emphasize the extent to which the two sides of such dichotomies are interwoven, the difficulty in teasing them apart, or the outright impossibility of making the distinction. Hybridity, heterogeneity and cyborgs are the current catchwords in social theory. If the term ‘social technology’ is used at all, it is as a heuristic, accompanied by an explicit disavowal that it refers to a separate category. Thus, Shapin and Schaffer distinguish three technologies of fact-making in their study of Robert Boyle’s experimental physics – material, literary and social – but add that ‘each embedded the others’ (Shapin and Schaffer, 1985: 25). Pinch et al. (1992) are equally ambivalent. They first define as ‘social’ any technology that, although it may incorporate material artifacts, ‘has its origins in the social sciences’ (1992: 266) and is intended to change human behaviour. However, they go on to reassure the reader that they do not want to resurrect ‘old fashioned’ distinctions, and that

the issues raised by their analysis may apply to all sorts of technology (Pinch et al, 1992).

Nevertheless, we believe the term ‘social technology’ can be used to probe key philosophical, political and empirical issues that are papered over when it is avoided. We want to reintroduce the question of the distinctiveness of the social, not as an a priori category, but as an empirical phenomenon that is articulated in certain technological assemblages. We accept the common dictum that ‘all technology is social’, but add that technologies can be differently social. In other words, we propose the term ‘social technology’ as an invitation to study differences, rather than as a category of technologies defined by an essential ‘humanness’. We further motivate our use of ‘social technology’ in relation to the work of Michel Foucault, Bruno Latour and the scholars they have inspired.

## THE DISSOLUTION OF THE SOCIAL

Reflection on the practical role of social science has been dominated since the 1970s by Michel Foucault and authors drawing on his work, such as Paul Rabinow, Nikolas Rose and Ian Hacking. Without pretending to do

justice to this large and growing corpus, we select a few themes that are particularly prominent. First, Foucault emphasized the intimate bond between social science and modern forms of government, phrased most succinctly as ‘governmentality’. Political power is exercised through knowledge of the human mind in general – its mechanisms, strengths and weaknesses – of the distribution of individual capabilities, shortcomings (including mental illness and deviance), preferences, opinions and attitudes in a population. This knowledge is obtained and deployed through techniques that act on the mentality and behaviour of individuals, groups and populations. This is the entwining of ‘power/knowledge’. Second, this mode of governing, of ‘the conduct of conduct’, is not confined to politics, but has spread from the state into every domain of social life, including notably the management of the self by the self. Neoliberal societies in particular require citizens to be autonomous and regulate themselves (Dunn, 2004). The techniques of the self that the social sciences offer – tests, therapies, training programs etc. – help to fulfill this ‘duty to be free’. Third, discipline and self-discipline take place to an important extent through a ‘microphysics of power’: the meticulous manipulation and distribution of bodies, creating lines of sight, directing the gaze, separating or grouping individuals, restricting or guiding their movements. Fourth, power is productive. It does not primarily constrain or suppress subjectivity, it produces subjects. Its disciplinary techniques demand or suggest ways of being, and make them possible, mandatory, or desirable.

In recent years, the attention of scholars in the Foucauldian mold has increasingly turned to ‘bio-power’. Paul Rabinow for instance has argued that through the new genetics, a ‘truly new type of autoproduction’ (Rabinow, 1992: 241) will emerge, a form of self-fashioning he calls ‘biosociality’. Increasingly, group and individual identities and practices will focus on knowledge of genetic risks and the medical interventions to alleviate or overcome them. As a result, both the catego-

ries of ‘nature’ and ‘the social’ (and ‘culture’) will be dissolved. The dichotomy of nature – as that which simply is – and culture – that which stands outside nature – is rendered unstable. ‘Nature is no longer behind us as a necessity. Nature is ahead of us with a horizon of new and immense possibilities’ (Bertilsson, 2003: 125). The result is a ‘politics of life itself’ (Rose, 2001). Thus, the category of the social seems to dissolve, and technologies that stem from the psy-complex (Rose, 1985) are fast becoming irrelevant, as the self comes to be defined in biomedical terms.

According to Bruno Latour, the dichotomy of social and natural (and related conceptual pairs) was always misleading. He and other scholars around Actor-Network Theory (ANT) have called for recognition of the social nature of things/the natural world. Distinctions made between the social and the natural are always post-hoc, and best considered accomplishments rather than matters of fact. This approach has been labeled non-dualist, and seeks to problematize the role attributed to this dualism in the formation of modern society – Latour’s quip, we have never been modern, is a familiar summation of this approach. The notion of ‘social technology’ seems problematic in the light of ANT. Any technology is ‘social’, according to ANT. To understand our present societies, we must recognize them as ‘collectives’ made up of humans and non-humans, as ‘sociotechnical imbroglios’ (Latour, 1994). Societies are the result of heterogeneous engineering, tying together artifacts, people, texts, plants, animals, substances and other kinds of actants into networks. Moreover, typical of technology is the redistribution of roles and functions among the actants in a network. There is thus no essentially human role or function that people perform in society, nor is there a corresponding non-human contribution of artifacts. There is no non-social technology.

A famous example of this approach to technology is the door-closer analyzed by Latour (1992). Onto this mundane artifact is delegated the task of closing the door after one has entered through it, thus providing a more dependable, mechanical solution to

a problem that before was solved morally. A human skill and obligation (to close the door) has been delegated to a non-human. However, mechanical door-closers prescribe certain competences on the part of their users, such as the strength needed to operate them, that are often beyond the capability of children, people carrying heavy objects or elderly people. Thus, door-closers and their users (and non-users) are part of a collective in which the roles of humans and non-humans have been redistributed, and it is impossible to define a priori the 'material' and 'social' aspects of this technology.

### 'SOCIAL TECHNOLOGY'

Rethinking the dichotomy of nature and culture has been of tremendous importance in reflecting on our current ways of living, as evidenced by the many studies of biopower inspired by Foucault and the studies of technology revitalized by ANT. An unfortunate consequence, however, has been a relative neglect of technologies that are not built around devices. Foucauldians increasingly focus on biotechnology; in ANT, 'technology' refers to objects (see, for example, Michael, 2000; Latour, 2005). The importance of material technology is clear, but many roles and functions are fulfilled by primarily human means. The door problem, for example, is sometimes solved by employing a doorman, because they have qualities specific to people.<sup>1</sup> In other words, we use different kinds of technology in different circumstances. Similarly, that the self is increasingly defined in biological terms, and acted upon with biomedical techniques, is undeniable, as are the implications for social theory. The 'fascination and alarm' (Brown, 2003: 185) evoked by the life sciences, however, should not obscure the continued importance of technologies stemming from the social sciences. Practices such as genetic counseling can be considered a social technology that sustains the further geneticization of health, through its social function in

sustaining forms that emerge from the life sciences. (Rose, 2001; Brunger and Lippman, 1995).

Second, the ascent of the life sciences and associated technologies may not render all dualism obsolete. Whereas Rabinow sees 'the dissolution of the category of "the social"' (Rabinow, 1992: 242; see also Bertilsson, 2003; Haraway, 1991) as the likely result of the recent developments in biotechnology, Ian Hacking (2005) has recently argued that the manipulability of the body that is on offer creates an everyday Cartesian dualism. Our bodies appear as objects the more we can intervene in them. Hacking is quick to emphasize that he does not promote a 'material' dualism of mind and body, nor does he think that Descartes himself intended to do so. The duality is of two increasingly different sets of practices, two ways of talking and of representing with respect to ourselves. Hacking's analysis of the revival of Cartesianism is similar to our approach of 'social technology': an interest in distinctions that appear in our experiences and practices as both resource and constraint, without according them a transcendental status.

Our focus on the distinctiveness of the social as an empirical phenomenon is not fundamentally at odds with ANT. We do not intend to contribute to the modern project of purification (Latour, 1993), of dividing the world into humans and their relations on the one hand, and nature on the other. On the contrary, we will show that versions of humanness and sociality, sometimes distinctly unnatural, are produced in heterogeneous practices. We call such practices 'social technology', not because they involve a specific category of techniques, but because they raise the issue of the specificity of the social. We look for such technologies along three vectors that seem especially promising.

1 Technologies from the social sciences. Faculties of social science turn out large numbers of graduates each year, schooled in a panoply of techniques for investigating and manipulating the mind and behaviour of other people. This is first of all an intriguing aspect of the social sciences to explore because hardly any analyses of such technology

- as technology have been done using the concepts and theories of technology studies. Second, traditional issues in the philosophy of the social sciences, such as reflexivity or the double hermeneutic, appear in a new light when approached as technological challenges or affordances.
- 2 Technologies that consist entirely or predominantly of human action. Without assuming that there is anything essentially different about human action, it is worth investigating its particular qualities as a component of technology. Human action, for one thing, often ties a technology to its context in culturally specific ways. This invites a comparison with the role of predominantly material technologies in building and stabilizing 'collectives'.
  - 3 Technologies that depend on social interaction for their constitution. A web-based chatroom, for example, only functions if there are people chatting in it. An election only works if there are voters turning up. Open source software only gets developed if there is a community of programmers engaging with it. This matters at all kinds of levels, and not just in terms of their 'use' by individuals.<sup>2</sup> While the point might again be raised that all technologies modulate social behaviour in some form, considering technology that *is intended* to do that raises interesting points that tend to disappear when we lazily cling to the 'everything is social' idea. To take but one example, social software platforms are interesting because they exploit and enhance the human capacity for, and interest in assigning meaning, for classifying, for recognizing and evaluating patterns, which in turn enriches the possibilities of these platforms to deliver interesting material to the users, etc. Thus, the concept of 'social technology' allows a study of human qualities, without assuming a priori a human essence.

In the following, we offer three case studies that illustrate the concept of 'social technology': priming and automaticity research; surveys, polling and focus groups; and social software platforms.

### PRIMING: PEOPLE AS MACHINES

Paradoxically, attempts to treat people as machines are among the most revealing social technologies, in that they tend to raise

the issue of the specificity of the social. In 1748, Julien Offray de La Mettrie published *L'Homme Machine*, in which he extended Descartes' thesis that animals are soulless automatons to human beings. (La Mettrie, 1748) The idea that people are machines has subsequently inspired many grand schemes of social engineering. The Scottish businessman Robert Owen, for example, turned the concept of *L'Homme Machine* into a Utopian engineered community for the workers in his cotton mills. These 'living machines' (Owen, 1972: 74), as he called them, could be delivered from vice and poverty, if provided with proper care and education, based on accurate knowledge of their nature. Children in particular – 'passive and wonderfully contrived compounds' (1972: 34) – were to be the target of rationally designed education that would mould their character.

Utopian social engineering, as Popper (1966) called it, has fallen out of favour, with the demise of the Soviet Union often referred to as proof that it doesn't work and should not be tried again. Yet *L'Homme Machine* has survived and still provides the philosophical backdrop of many technologies in social science. A recent example is priming and automaticity research. 'Priming' concerns the way recent or current experience influences people's perceptions and behaviour, although they are not aware of it. In an experiment that the field considers classic, participants are first shown a series of strings of words, and asked to construct grammatical sentences out of each. They are told this is a 'language proficiency experiment'. When the participant leaves the laboratory after completing the task, a confederate of the experimenter records the time it takes him or her to walk the corridor to the elevator. In the experimental condition, the garbled sentences contain a number of words that are related to old age, such as 'worried', 'Florida' and 'knitting'. They are, in the words of the researchers, part of 'the elderly stereotype' (Bargh et al., 1996: 236). Participants in the experimental condition, unaware that they had been primed, walked slower than those

in the control group. Similarly, priming with a briefcase instead of a rucksack makes participants work harder, and priming with rudeness makes participants more prone to interrupt someone.

Priming is the central technology in a psychological paradigm called ‘automaticity theory’. Its proponents regularly engage in philosophical reflection, putting the results of priming studies to use in arguments concerning consciousness and free will (Bargh, 2008). Although usually stopping short of claiming that we are nothing but automatons, priming is used to show that we are much less in control of our actions than we like to think. Automaticity research is a social technology in that it raises fundamental questions regarding humanness: how and to what extent can human behaviour be controlled, and who does the controlling? If people are machines, who or what operates them? Its primary answer is that substantial control lies outside the subject. The automaticity paradigm stands in a long tradition when it equates automaticity with passivity. Robert Owen wrote that children have ‘that plastic quality’ that can be moulded ‘to have any human character’ (Owen, 1972: 34). A century later his claim was echoed by the behaviourist John Watson, who boasted he was able to turn ‘healthy infants’ into any kind of professional he chose (‘even beggarman and thief’) if he was given ‘his own specified world to bring them up in’ (Watson, 1930: 82). The power that the situation has over human behaviour was also the basis of Skinner’s Utopian scheme, *Walden Two*, which matched Owen’s in its optimism and grandeur (Skinner, 1976). Education and behaviour modification have long been the technologies most associated with *L’Homme Machine*. The automaticity paradigm appears to go in a different direction: it has been criticized as a return to behaviorism (Kihlstrom, 2004), but its version of passivity is different. Like behaviourism, it takes aim at consciousness and free will, but it is not committed to educability. With cognitivism, ‘living machines’ have become too complex

to be molded. Instead, they can be played by modifying the situation.

To fully appreciate the philosophical relevance of priming research, however, it pays to examine more closely the technology itself. The priming effect requires a careful distribution of information and misinformation. As in most social-psychological research, participants must not be told what the experiment is about, or what hypothesis is being tested. Instead they are told a cover story, the ‘language proficiency experiment’ in the example I described earlier, or the description is kept so vague as to be uninformative. Alternatively, priming researchers may use subliminal presentation, where the priming stimulus is presented very briefly, so that the participant remains unaware of its identity or meaning. Additional measures may be necessary: in the example above, participants were given a false debriefing after the ‘language proficiency experiment’, and the confederate who subsequently timed their walk to the elevator (using a concealed stopwatch) was positioned so that he appeared to be waiting to talk to someone in another office.

To produce automatic behaviour, in other words, requires carefully controlling the participant’s awareness. This control itself cannot be applied automatically: like most experiments, priming studies require a lot of tinkering to be made to work. Even when control is effected by means of devices, such as the computers that produce the subliminal stimuli, it is advisable to include ‘awareness checks’ in the set up, to make sure participants are not ‘tipped off’ (Bargh and Chartrand, 2000). These are in effect moments of interaction with the aware agent, where reliance on awareness is essential in order to establish its limitations, and this resource has been used in some of the more reflexive studies in this area (Jack and Roepstorff, 2002; Sip et al., 2008). Thus, priming research is framed by procedures and concepts – deception, awareness and so on – that are at odds with the idea that people are automatons at the mercy of the situation. Automaticity in priming research is

accompanied by the shadows of autonomous, aware and obstinate individuals.

Resistance is also evoked when automaticity theory is applied. One such application is the Implicit Association Test (IAT), a technique that probes people's implicit, unconscious association between categories of concepts, and is used mainly as a research tool for assessing individual differences. The IAT is a sorting task, in which participants have to sort stimuli by pressing keys on a keyboard. In a typical example (Nosek et al., 2006) the items are male or female faces, and words with a 'good' or 'bad' meaning. In the critical phase of the test, stimuli from both dimensions are presented simultaneously. Response latency and number of errors are taken to be an indication of the strength of association between categories: if participants for example manage to correctly sort male faces combined with positive words quicker than they do contrasting presentations, they are thought to implicitly associate men with good things, regardless of their explicitly stated attitudes.

Like every psychological test, the IAT requires that it is designed and administered in precisely circumscribed ways that take into account what is known about the capabilities and proclivities of participants. Among the more urgent issues is 'faking'. The IAT is explicitly intended to counter the participant's capacity to resist measurement. Indirect measures such as the IAT 'reduce the likelihood of deliberate faking by obscuring what is being measured, how it is being measured, or limiting the ability to control the response content' (Nosek et al., 2006: 275). A number of studies have attempted to measure to what extent, and under which circumstances, the IAT is 'fakeable', and have found that it holds up well in this regard, provided participants are not too experienced with the test, and are not told how they can control their scores. However, researchers also realize that attempts<sup>3</sup> to fake may actually be a sincere effort to control one's automatic associations: an authentic wish not to be misogynist, for instance (Nosek

et al., 2006: 276). An artifact has become a subject in its own right. This appears to be a growing trend: resistance and control, which were actively marginalized before, are now moving into the centre of automaticity researchers' attention. (*Social Psychology and the Unconscious*, 2006) The object is more and more to study the 'mixtures of automatic and controlled features' of behaviour (Bargh, 2007: 3). Doing so is also seen as a route to the application of automaticity theory outside research contexts. Specifying exactly what role awareness plays in consumer behavior, for instance, is a first step towards aiding 'consumers in controlling and improving their decisions' (Chartrand, 2005: 209). Likewise, the insight gained into 'the interplay of automaticity and control in close relationships' must now be put to work in answering the question how and when control can be exerted over relationship processes (Chen et al., 2007: 164).

Thus, lurking behind *L'Homme Machine* of automaticity theory, there is a different, more controlling and aware kind of subject, that has been brought out into the open as the paradigm develops and finds application outside the lab. This shift from mechanical objects to controlling subjects has also occurred in behaviourism. Karen Baistow has argued that the period between 1960 and 1990 saw the emergence of an 'autonomous, self-managing behavioural subject' (Baistow, 2001: 311), as techniques of behaviour modification found widespread use in therapies, training courses and other efforts to help people manage themselves and be 'in control' (2001: 324). The spread of behavioural techniques was accompanied by a transition in theory. Skinner's fully mechanical, environmentally determined human being was gradually replaced by a subject that was aware of its reinforcers and exerted some control over the contingencies of its behaviour (Bandura, 1974). At the same time, behaviourists scaled down their view of social technology, endorsing the application of behaviourist principles in the form of black-boxed 'pure techniques' that could be

employed without any specialist knowledge. In this way, behaviour modification became compatible with 'neo-liberal political rationalities concerning regulated autonomy' (Baistow, 2001: 325).

Priming is an example of the way technology can create, enable, and even depend on resistance to it.<sup>4</sup> In their efforts to produce objective, mechanical behaviour, automaticity researchers simultaneously create the opposite: an autonomous subject with free will. The priming effect comes paired with awareness, the automatic processes occur in tandem with control processes, automaticity gives rise to discussions of 'free will' (demarcated but not entirely obliterated), and as the theories and technologies of priming and automaticity research move further from the laboratory, they turn into techniques, tools to be deployed by people in control of themselves, of their relationships, or of others.

Galton implicitly ascribed to his respondents the ability to accurately gauge their own and others' memory and intelligence. The social sciences, psychology in particular, have tended to be very skeptical in this regard. The demarcation of expert, social scientific methods and knowledge from those of lay people – including other scientists – has been a constant in their history (Coon, 1992). Yet the questionnaire has found widespread use as an instrument to elicit all kinds of information from people, preferably about matters they *can* be considered experts on: their own opinions, views and preferences. Similar technologies include focus groups, and various types of interview. They illustrate the three vectors that we have introduced earlier: they often originate in the work of social scientists, they partly depend on human action, and they work to constitute the social.

## SURVEYS, POLLING AND FOCUS GROUPS

Whereas priming and automaticity research is interesting because of the resistance that it reveals, our second case shows among other things the paradoxical effects of cooperation and adoption. It concerns a set of techniques and procedures to gather information about people's behaviour, opinions, preferences and so on, that date back at least to Francis Galton, among whose many inventions is the self-report questionnaire. Trying to support his theory of hereditary genius, Galton sent an extensive list of questions to 192 distinguished Fellows of the Royal Society, and received 104 in return (Galton, 1874). The respondents answered questions on their psychological qualities – memory, energy, intelligence – and those of their relatives. From the answers Galton drew the conclusion that his thesis, that genius is hereditary, a matter of 'nature' rather than 'nurture', was largely correct.

## History

In her history of American survey research, Sarah Igo asks the question: 'In what ways is a society changed by the very tools employed to represent it?' (Igo, 2007: 4). Three developments that characterize the rise of mass surveys in the twentieth century make this question especially pertinent. First, this rise involved a shift in focus. Whereas nineteenth century social studies had focused on criminals, degenerates, the urban poor, and other deviant and marginal groups, in the twentieth century attention shifted to normal, typical or 'average' Americans. A mass public became visible. Second, social studies were increasingly dominated by social scientists and their methods and vocabularies, rather than by the bureaucrats and reformers that had surveyed society in the nineteenth century. A crucial technique was the representative sample, 'as important to the social sciences in the twentieth century as the telescope was in the sixteenth', according to Thomas Osborne and Nikolas Rose (1999: 383), who traced some of its genealogy. Third, surveys did

not only make the American public visible to social scientists, marketers, and politicians. Through the mass media the results of opinion polls and market research also reached the people whose opinions and preferences had been measured. Mass surveys seemed to offer the public a mirror in which it could see itself. Each could measure their opinions and behaviours against those of others, and know how average or unusual one was with regard to them. Thus, these surveys, and the media attention they attracted, created a self-conscious mass public.

### **Looping**

Surveys blur the demarcation between expert and lay knowledge that is otherwise so important to the social sciences. In surveys, Igo notes, 'the public is simultaneously object, participant and audience' (2007: 4). Rather than a hierarchical relation between object and representation, surveys create a circular relation between them. The result is what Ian Hacking has termed a 'looping effect': the object and its representation, the class and the classification, 'emerge hand in hand' (Hacking, 1986: 228). Mass surveys created a mass public in and by the process of measuring it. The average American that the surveys presented became available as a role to be adopted or rejected, thus feeding back into new surveys. Similarly, Osborne and Rose argue that the opinion poll was instrumental in creating the phenomenon of a public opinion. '(T)he existence of questionnaires and surveys themselves promote the idea that there is a public opinion "out there" to be had and measured' (1999: 387). As a consequence, people come to feel the need to have 'opinions',<sup>1</sup> learn to formulate them in the appropriate way, and use the results of earlier polls to do so. Polling constitutes sociality as much as it describes it.

The looping effect and other reflexive phenomena raise the question whether they are particular to the social sciences and their 'objects' (people).<sup>6</sup> In Hacking's formula-

tion, looping arises because people may care about the way they are classified, whereas natural kinds are insensitive to what is said about them.<sup>7</sup> Osborne and Rose on the other hand emphasize that the creation of new phenomena (such as public opinion) makes the social sciences more similar to the natural sciences. What is different is the speed at which this happens: creating new kinds of humans is a slow process compared to production of phenomena in the laboratories of the natural sciences. The question has recently been taken up by Roger Smith (2005). His thorough review of the reflexivity literature is relevant to our purposes because it advocates a pragmatic, technological view of the issue. Smith too argues that reflexivity does not point to a fundamental ontological difference between humans and other objects of science. After all, 'knowledge understood as practice, as technology, manifestly changes the world' (2005: 13). Knowledge is part of the world, and science in particular has wrought enormous changes in the world, including in the objects it studies. Attempts to distinguish the social and natural sciences on the basis of reflexivity moreover fall prey themselves to reflexive thinking: Foucault for instance turned reflexivity on itself and placed the attempt to use it to ground human uniqueness in a historically specific 'regime of truth'. Instead of ontologizing reflexivity, Smith proposes a pragmatic approach. 'What separates the natural sciences and the human sciences is not the claim that human beings have language or soul, or that only they change with knowledge, but that it is part of the human sciences (and humanities) *to make the reflexive process self-conscious*' (2005: 17; emphasis in original).

We agree with Smith that the search for ontological foundations of human uniqueness serves little purpose, and that looping processes are interesting in themselves, whatever science they involve. But we also believe that it is misleading to speak of 'the reflexive process', as Smith does. Yes, all knowledge changes the world, but reflexive processes may involve very different

technologies. Our term ‘social technology’ tries to capture some of these differences, without fixing them in ontology. Some of the techniques involved in harvesting opinions illustrate this point.

### ***Techniques, skills and craft***

According to Deborah Coon (1993), late-nineteenth and early-twentieth century introspectionist psychology held a ‘techno-scientific ideal’. Psychologists trained themselves to become machine-like parts of their experiments, so as to form one mechanical whole with their wood-and-brass instruments.<sup>8</sup> But at the same time, being a good subject was a craft that could not be learned from a book. ‘Craft’ and related concepts regularly crop up in social scientific handbooks and manuals to point to skills, ways of doing or being, that cannot be formulated in rules and thus can only be vaguely indicated by the books and manuals themselves. Conducting an interview for example is an activity that can be standardized and regulated to a large extent, but always requires skills on the part of the interviewer that escape formulation.

One of the most important skills may be termed the management of spontaneity. In his study of the epistemology of focus groups, Javier Lezaun (2007) notes the conflicting demands placed on the moderator. Moderators must resolve a tension inherent in the focus group method: they must encourage a lively conversation that allows each member to express authentic, individual opinions, but must prevent the formation of a collective. Doing so requires the moderator to balance control with empathy, artificiality with naturalness. The training manuals and handbooks that Lezaun studied emphasize that moderating is an art, embodied in the person of the moderator, but not fully transferable as standard routines and techniques.

Among the most important objectives of the moderator’s art is the ‘proper management – the incitement, orientation and taming

– of [the members’] reflexivity’ (Lezaun, 2007: 136). When participants become too aware of the artificial nature of the group, of the experimental setting, of the moderator or of the presence of other observers behind a one-way mirror, they may start to sabotage the process. In their efforts to prevent this from happening, however, moderators must take care not to seem directive, or to draw too much attention to themselves. ‘(N)on-direction needs to be actively engineered into the behaviour of the moderator and into the responses he elicits from the research subjects’ (2007: 138). The focus group, in other words, must be managed to spontaneously produce individual opinions. This requirement is not restricted to focus groups, but is part of many social scientific technologies. Administering psychological tests (Derksen, 2001) and conducting interviews also require unobtrusive directivity, in order to encourage a spontaneous and authentic show of subjectivity. Crucial is the development and maintenance of good ‘rapport’, a ‘comfortable, cooperative relationship’ (Keats, 2001: 23) between researcher and respondent.

Polling, surveys, focus groups and interviews illustrate the value of the three vectors we formulated in the Introduction. Their development owes much, though certainly not everything, to social scientists; human behaviour is an intrinsic part of their functioning; and, third, they modulate sociality. Regarding this last aspect, it is noteworthy that each of these technologies depends on a conception of what social relations are or should be. Lezaun for example argues that focus groups are typically meant to produce what he calls ‘an isegoric situation’ (Lezaun, 2007: 140): one in which each individual member is allowed and encouraged to express opinions in equal measure, but hierarchy, coalitions and in particular the formation of group opinion are prevented as much as possible. In other words, the focus group embodies a particular kind of social order, one that privileges the individual and considers the group as a tool that must not

become an end in itself. Our last case study illustrates a similar version of sociality, produced in a novel way.

## SOCIAL SOFTWARE PLATFORMS

Our third case study addresses a set of emerging social and cultural forms. We examine a social networking technology, namely the photo-sharing platform Flickr. This case is especially interesting because it highlights how digitally-mediated interactions have become significant as a social phenomenon, one which is addressed in the social sciences as object, context and tool of study.

A key feature of social networking technologies is the built-in functionality that enables users to represent themselves and to articulate links to other users. Ongoing sociability is a key feature of social software (Fuller, 2003). The self and one's relations to others – two core concerns of social science – are therefore inscribed and foregrounded in these settings. This can be done through filling in a personal profile (name, hobbies, photo and witty self-description) that appears on a webpage, and by designating other users of the system as friends or acquaintances, thereby linking one's own profile to that of others. Another defining element is that besides personal profiles, Flickr also supports the provision of content created by users. While Flickr focuses on photography (and more recently on video), similar systems also exist for sharing music, texts, videos, scientific articles, etc. These systems furthermore make use of traces that are generated by the use of the system and of its content – whether this be tagging of material by users, download statistics, user preferences or ratings. In other words, 'content' is also used as a resource for sociality in these settings (not just user profiles) (Lange, 2007). Social software platforms are therefore highly iterative: representations of users, contents, and use are made visible in these platforms, and are all used to

further structure the functioning of the sites. In Flickr, for example, the platform's most interesting photos are selected based on the preferences of users, while the preferences of some users weigh more heavily because of the particular place they occupy within the networks elaborated between users, photos, comments and number of 'views' for certain photos.<sup>9</sup> While the specific configurations vary across platforms, the elements of user profiles, of 'user-generated content' and the use of self-referential traces are defining features of the so-called 'Web 2.0' applications. These constitute important sites of sociality that draw on and feed the social sciences in significant and complex ways.

### *The web as field and lab*

The use of online social networks and social software for social scientific research is still in development. While no definitive archeology of this approach to social science can yet be written, a number of trends are nevertheless visible. Among these is a significant reconfiguration of how the social sciences make their object. Namely, the web as a setting is being configured in a way that draws attention to and problematizes an important distinction in the social sciences: the field versus the lab (Gieryn, 2006). A growing body of work conceptualizes platforms such as Flickr, YouTube, Digg or Facebook as settings that combine features that have traditionally been attributed in a mutually exclusive way to either the lab or the field. These web-based settings are considered to be a place to observe naturally occurring, bottom-up types of behaviour of interest to social science. The web as a setting is therefore contrasted to artificial settings for social science research such as interviews, focus groups or surveys. This approach assumes that the platforms constitute a setting in which various social behaviours take place, be they identity construction, or the constitution of social forms like communities, cliques, friendships, celebrity, gift-giving.

These settings are also examined as sites of politics, commerce, citizenship and culture (Bruns, 2008; Jenkins, 2006; Kim and Yun, 2007; Surowiecki, 2005).

Yet, the platforms are not only valued as sites where social behaviour occurs, but they are also considered valuable because of the way in which users and their activities are mediated. Because user profiles, interaction and many other kinds of activity on these sites leave traces, the mediated aspects of these settings align them with a 'laboratory' approach, where behaviours could traditionally best be recorded or measured. These sites therefore also have features of the 'lab', where phenomena produce traces (Knorr Cetina, 1999; Rheinberger, 1997), which can then be 'harvested' for analysis. These sites are therefore valued as sources of 'naturalistic behavioral data' (boyd and Ellison, 2007). As research contexts such parts of the web are therefore, somewhat paradoxically, ideally natural and ideally available for scrutiny. This paradox is sustained by a view of digital media as transparent and of social software as self-contained spaces, in which the whole of a social form can be apprehended.

The sheer numbers of participants and the impressive volume of content on these platforms are potent arguments for the social sciences to pay attention to these sites. This strong presence makes it all the more important to examine what makes them such good sites of study. The seeming paradox in what makes these sites attractive is also telling of assumptions in the creation of social science objects. These sites bring together what were traditionally seen as mutually exclusive features of knowing about the social: behaviours were either spontaneous and natural, or amenable to measurement through mediation. Whereas these were generally mutually exclusive aspects, social software brings them together. In this light, it becomes crucial to see what new configurations of objects this will bring to the social sciences, and what kinds of new knowledge claims will follow (Beaulieu, 2004; VKS, 2008).

One emerging trend that sustains this characterization of social software as a site for the study of the social, is a strong tendency to see digital media as transparent and discrete:

'Flickr is transparent: every username, every group name, every descriptive tag is a hyperlink that can be used to navigate the site, and unless it has been designated private, all content is publicly viewable and in some cases modifiable' (Lerman and Jones, 2007).

The materiality and structuring effects of social software as technologies therefore risk being underestimated, if they are only ever leveraged as a source of empirical data about human behaviour. Furthermore, by taking these platforms as self-contained sites, other practices and behaviours that take place around these sites may be missed, though they can be an important component of the social forms of interest – for example, meet-ups at photogenic spots of photographers who know each other through Flickr groups play an important role in shaping their interactions in the Flickr platform. In developing these approaches to the study of social software, social scientists would do well to draw on the ample tradition of reflexive critical work that interrogates methodological assumptions. Finally, these traces can themselves become resources for users (rather than only traces), who assign particular meanings to them. By taking into account how the traces of sociality are shaped by infrastructure and media, and by understanding practices (whether through or around infrastructures), social science research may be able to explore new social forms constituted around these platforms. With reference to our earlier discussion of Foucault and Latour, we see this entwinement of the social and the material as requiring a very precise analysis of how these aspects mutually shape each other, rather than a celebration of 'pure sociality'. It is on the basis of such careful characterization that we can best approach these settings, which are both field and lab in the traditional sense.

### ***Human-technology oppositions***

One of the important elements in characterizing these platforms is therefore the distinctive sociality they produce. We noted earlier that a social technology approach could be valuable in making visible how human attributes are constituted, in cases where the technological and the human are opposed. Around platforms such as Flickr, an intricate distribution and entwinement of human and non-human abilities takes place. Masses of information have to be organized on these platforms and there is a strong tendency to identify and embed specifically human abilities in the technological. Sometimes termed ‘social browsing’ or ‘social information filtering’, the exercise of human abilities is retrieved from these contexts. They then become resources in building technologies:

‘Social browsing is a natural step in the evolution of technologies that exploit independent activities of many users to recommend or rate for a specific user’ (Lehman and Jones, 2007).

A very mundane, pioneering form of this is embedded in a function at Amazon, where further books are presented with the phrase: ‘people who bought this book also looked at *x*, *y*, *z*.’ Another form of this practice is the tagging of material by users. This is something at which humans are considered to excel, whereas tasks such as tagging photos, as happens on Flickr, are considered a huge challenge for machines. This assumes particular qualities for humans in relation to what technology can do.

Research in this vein then tries to capture not only the tags, but also to relate them to other kinds of ‘meta-data’ that are produced by human users. The information gathered is then put to use in the functioning of technology, for example, to build better search engines. To illustrate this, if a user were to type beetle in the Flickr search engine, the results might include photos of bugs and of Volkswagen cars. But if the users’ contacts are taken into account, this search process can be ‘improved’. If the user has marked

as ‘friends’ other users whose accounts contain mostly photos of cars, then the search engine can take this into account as a form of meta-data that will shape the search towards photos of VW beetles.<sup>10</sup> The social is here defined as shared interests, which in turn is used as input to determine which ‘meanings’ should be favoured in filtering information.

### ***Aggregation and Individuals***

It is therefore important to analyze and make visible the kind of sociality that is being built by and into these information tools. In the case of much work done on Flickr, it is a view of the social that is highly individualistic, based on a notion of ‘preferences’ that are articulated according to templates and functions built into the platforms. Some forms of sociality may also be filtered out in these applications; because friends were ‘digging’ (recommending) each other’s stories (and therefore getting them to the front page), the platform Digg started trying to ‘remove’ this sociality – a ‘group’ or ‘clique’ effect – and to measure the ‘diversity of the individuals digging the story’ (Lerman, 2007). (Like in the case of focus groups discussed earlier, group dynamics are undesirable because they pollute the desired form of aggregation.) In this case, the capacity of a human to judge whether a story is interesting is considered valuable. But, the model of sociality being used here rejects that judgment should be entwined with social ties, that one might judge a friend’s story to be better. This is a ‘bottom-up’ view of how the social should be expressed, retrieved and fed back into these platforms, and one which is widely distributed across information and library science, and computer science (Kolbitsh and Maurer, 2006). This work seeks to isolate the single human, the individual, and to remove the biasing effect of social ties on pure cognition. Other work, however, tends to see mediated networks as an integral part of the context of social relations. This work articulates a more complex view of the social, where not

only content and rating, but also the ‘social meta-data (e.g. relationships, indications of other-orientedness and reciprocal patterns)’ (Skågeby, 2008: 293) are considered as basis for shaping interests and concerns in these settings. The links that are created between users and contents and various sites are also objects of concern: links, tagging and comments become ties to manage, rather than bias to be removed (Ito et al., 2008). Social meta-data and traceable socio-technical relations are taken as human behaviours and part and parcel of ‘the social.

Another way in which the social is being configured in these settings is through the use of tagging practices as representative of shared cultural meanings, a phenomenon sometimes labeled ‘folksonomies’ (Davies, 2006: 223). These can in turn be used to filter information and to address ‘information overload’ (Lehman and Jones, 2007).<sup>11</sup> But they can also be interesting elements to interrogate practices that may be arising in these contexts, for example, how users may begin to use tags that are popular, in order to increase interest in their photos (Davies, 2006), or how tagging and commenting can be forms of acknowledgment, reward or gift-giving.

While such use of social information can seem trivial, the degree to which these approaches are deployed and the impact they have in shaping the information we retrieve should not be underestimated. These social technologies combine aspects of what is considered to be uniquely human insight (such as assigning meaning to an image) and combine these with some of the strengths of computing technologies (handling huge amounts of data and correlating bits of information and visualizing them) to support all kinds of activities around databases.

This work suggests that social sciences can have an important contribution to make, as to the soundness of the social models being deployed. Participant observation research in this area has shown that in mediated settings (whether social networks, virtual worlds or gaming environments), interactions and

settings are strongly shaped by collectivities, groups, guilds or subcultures. Rather than an aggregation of individual users, complex social dynamics can be observed (Jakobsson and Taylor, 2003; Boellstorff, 2008). Furthermore, since this kind of sociality is being ‘built into’ these kinds of services, interrogation of these forms is a crucial component of contemporary politics of knowledge (Mackenzie, 2006). The notion of individual may also be in need of further attention.

The human subject being configured in these settings is that of a cognitively competent, individual user.<sup>12</sup> Social software also fosters a particular kind of behaviour that exacerbates and possibly transforms aspects of the traditional view of the liberal, capitalist self. The user, who creates and produces in these settings, partakes in new labour relations. These platforms provide the possibility of creative freedom for users, and purport to support this uniquely human creativity. At the same time, these settings also harness and valorize this creativity through particular forms of sociality (Boellstorff, 2008; Hayles, 2005).

The challenge for social science is to understand mediation and feedback loops, networked social relations and the dynamics emergent from such systems. Besides being directed at the body or operationalised in face-to-face settings, our third case shows that social technologies also mediate the social, leading to a particular version of the informationalised self and of networked sociality.

## CONCLUSION

Many other technologies could be analyzed as social technologies: the lie detector, behavior modification through operant conditioning, the ‘sleeping policeman’ (Callon and Latour, 1992), laws, constitutions, house rules, genetic counseling (Brunger and Lippman, 1995), military drill (McNeill, 1995),

standards (Edwards, 2004), etc. We hope to have shown how an interrogation of these as social technologies can be a fruitful way to raise the issue of the distinctiveness of the social. Rather than attempt to discuss many examples of social technology, a strategy that might end up reifying these as a category, we have focused on showing how a particular set of dynamics ensure the constitution, use and efficacy of social technologies. We have also stressed how these technologies, as they become widespread, can convey particular versions of the social. Perhaps most importantly for the readers of this volume, we have pointed out that social technologies matter a great deal both across society and in the knowledge-making practices of the social sciences.

We have shown how social technologies can be used to produce a proper relation to an object, and lead to successful interactions, for example in the case of the social scientist leading a focus group. This form also exists outside the lab, for example, in the self-discipline that traders must exercise in order to deal successfully with the market (Zaitloom, 2004) or in the way 'friendship' is factored out of online recommendation systems. Social technologies are therefore not only extensions or applications of social scientific knowledge, but integral to them. The cases discussed in this chapter highlight the importance of reflecting on the relations that are necessary for making knowledge, and how these relations configure objects, subjects and experiments in the social sciences.

By showing that we can understand the social sciences by considering how they build and use social technologies, we also distinguish this approach from a view of social technologies as the ideologically-driven 'application' of social science knowledge, such as that of Pickel (2001):

'Unlike social science, social technology is based on political norms and moral standards that determine what constitutes an unsatisfactory state of affairs, a desirable goal, and acceptable means' (Pickel, 2001: 466).

Pickel draws a sharp contrast between knowledge and technology, on the basis of the latter's value-ladenness. Such distinctions between technology and knowledge are highly problematic, as our case studies have shown. This line of work could be further developed by elaborating on work done in studies of science and technology. Rheinberger's work on epistemic and technical objects has served to analyze experimental systems in biology. To be adapted to the social sciences, the interrelation between the two components, noted by Rheinberger, would need to be further examined and adjusted. Various efforts in this direction are ongoing: we note the analysis of the dynamics of teamwork and collaboration in the social sciences in terms of the creation of objects and their interrogation (Collier et al., 2006); examinations of the use of case studies in the social sciences as both objects and experimental systems (Beaulieu et al., 2007), analyses of the constitution of particular 'objects' that are claimed to unify the social sciences, from the bottom up (Derksen, 2005), and critiques of the ontological power exercised by the social sciences (Law and Urry, 2003).

While we wish to stress the importance of social technology for the operation of the social sciences in their practices of knowledge production, we also want to note that there is an instrumental connotation to the notion of technology. Black-boxing, packaging, can be an extremely useful strategy to have knowledge claims circulate, to establish agreement, or to extend networks. But the creation and circulation of a technology can also be a liability for the social sciences. When social scientific expertise becomes packaged, it can seem suspect. Instrumentalisation implies a loss of the complex subject-object relation we discussed earlier, at the level of specific techniques. For example, much self-help consists on a practical level of techniques very similar to orthodox psychology. Psychologists would probably say that the advice is not quite scientifically correct, and that anyway therapy is best done person-to-person, because 'rapport' is essential to success. Instrumentalization also has implications for the legitimacy of the social sciences.

Finally, this work also contributes to further problematisation of the notion of 'technology'. Specifically, a reflection on

technology in the social sciences provides an interesting contrast to the work being done in 'technology studies', an important area of science and technology studies (STS). The object of technology studies tends to be material devices, either in everyday life (bicycles, water pumps, computers) or in the natural and life sciences (vaccines, DNA techniques, MRI scanners) – though more recent work has also considered information and communication technology (electronic patient record, telephones, databases). In contrast, the topic of social technology enables a focus on fields of knowledge production (such as education science, psychology, anthropology, marketing, criminology) that are relatively neglected in the study of technology. Two related circumstances have shaped this relative neglect. First, science and technology studies have focused on the traditional sciences, and on engineering and medicine. The reasons for this are multiple, but include the relative high status of these areas, their perceived weightiness and consequences for Western society, and the availability of funding. A second issue is the importance of the device in shaping the object of technology studies. While several critiques of the conceptualization of technologies have been pursued, stressing the changeability and multiplicity of technologies (De Laet and Mol, 2000; Newman, 1998), technologies have overwhelmingly been defined as material objects – mass produced and widely deployed by users and consumers. While drawing on insights from this body of work, our chapter contributes to a reorientation of the study of technology, towards the consideration of technologies arising from the social sciences that are not primarily devices.

## NOTES

1 Also noted by Michael: 'Under the appropriate economic and cultural network conditions, forms of human servitude are "more efficient and convenient" than the development and application of

technological artifacts capable of fulfilling the same function' (Michael, 2000: 23).

2 The social construction of technology approach has documented a large number of cases where the development of institutions, corporations and infrastructures were shaped by the sociality associated with particular technologies. The early years of the telephone were marked by strong debates in the part of the US served by Bell, about what was the proper sociality for it to support (i.e. business telephoning, between head office and factory, versus gossiping women) (Fischer, 1992: 78–79).

3 It is easier to change IAT scores by manipulating the environment, than by giving instructions to fake; they are malleable, but not fakeable. (Nosek et al., 2006: 280).

4 See also Akrich (1992), Michael (2000: 36).

5 Most of them, at least. 'I don't think Syd has opinions as such', said David Gilmour when asked what Syd Barrett, the former frontman of Pink Floyd, thought about the fact that he had been replaced by Gilmour. [http://www.syddbarrett.net/subpages/articles/new\\_musical\\_express\\_april\\_13.htm](http://www.syddbarrett.net/subpages/articles/new_musical_express_april_13.htm)

6 The literature on this question is extensive. We mention only Danziger (1997) and Richards (2002) for psychology, and Ashmore (1989) for science in general.

7 See also Macintyre (1985).

8 See also Benschop and Draaisma (2000).

9 Users' positions are themselves defined on the basis of the popularity of their own photos and the number and type of relations they entertain with other users. The fact that the exact functioning of such weighing formulas is considered a company secret is in itself highly interesting: measurement of expertise, influence and sociality become highly valuable commodities in these settings. This extends the practices around audience measurement, political polling, etc.

10 This example, used by Lerman in explaining her lab's work, assumes that ambiguity is undesirable.

11 So the reasoning is that sociality will be the basis for better tools, which will be necessary because human abilities to sustain sociality (in its current form) will not be able to deal with the volume of ties, relations and meanings on these platforms.

12 The cases of multiple users of single accounts and of multiple accounts for single users are too often brushed over as a minor confounding issue, and would be deserving of much more scrutiny.

## REFERENCES

Akrich, M. (1992) 'The de-scription of technical objects', in W. Bijker and J. Law (eds), *Shaping Technology/Building Society: Studies in Sociotechnical Change*. Cambridge, USA: MIT Press. pp. 205–224.

- Ashmore, M. (1989) *The Reflexive Thesis: Wrighting Sociology of Scientific Knowledge*. Chicago, USA: University of Chicago Press.
- Baistow, K. (2001) 'Behavioural approaches and the cultivation of competence', in G.C. Bunn, G. Richards and A.D. Lovie (eds) *Psychology in Britain*. London UK: Science Museum (Great Britain), British Psychological Society. pp. 309–329.
- Bandura, A. (1974) 'Behavior theory and the models of man' *American Psychologist*, 29(12): 859–869.
- Bargh, J.A. (2007) 'Introduction', in J.A. Bargh (ed.) *Social Psychology and the Unconscious: The Automaticity of Higher Mental Processes*. New York: Psychology Press. pp. 1–9.
- Bargh, J.A. (2008) 'Free will is un-natural', in J. Baer, J. Kaufman, and R.E. Baumeister (eds) *Are we Free? Psychology and Free Will*. New York: Oxford University Press. pp. 128–154.
- Bargh, J.A. and Chartrand, T.L. (2000) 'The mind in the middle: A practical guide to priming and automaticity research', in H.T. Reis and C.M. Judd (eds) *Handbook of Research Methods in Social and Personality Psychology*. New York: Cambridge University Press. pp. 253–285.
- Bargh, J.A., Chen, M. and Burrows, L. (1996) 'Automaticity of social behavior: Direct effect of trait construct and stereotype activation on action', *Journal of Personality and Social Psychology*, 71: 230–244.
- Beaulieu, A. (2004) 'Meditating ethnography: Objectivity and the making of ethnographies of the internet', *Social Epistemology*, 18(2–3): 139–164.
- Beaulieu, A., Scharnhorst, A. and Wouters, P. (2007) 'Not another case study: A middle-range interrogation of ethnographic case studies in the exploration of e-science', *Science, Technology & Human Values*, 32: 672–692.
- Benschop, R.J. and Draaisma, D. (2000) 'In pursuit of precision. The calibration of minds and machines in late 19th-century psychology', *Annals of Science*, 57: 1–25.
- Bertilsson, T.M. (2003) 'The social as trans-genic: On bio-power and its implications for the social', *Acta Sociologica*, 46(2): 118–131.
- Boellstorff, T. (2008) *Coming of Age in Second Life: An Anthropologist Explores the Virtually Human*. Princeton: Princeton University Press.
- boyd, d.m. and Ellison, N.B. (2007) 'Social network sites: Definition, history, and scholarship', *Journal of Computer-Mediated Communication*, 13(1), article 11. [http://jcmc.indiana.edu/vol13/issue1/boyd\\_ellison.html](http://jcmc.indiana.edu/vol13/issue1/boyd_ellison.html) (accessed 18 November 2008).
- Brown, S. (2003) 'Natural writing: The case of Serres', *Interdisciplinary Science Reviews*, 28(3), 184–192.
- Brunger, F. and Lippman, A. (1995) 'Resistance and adherence to the norms of genetic counselling', *Journal of Genetic Counseling*, 4(3): 151–167.
- Bruns, A. (2008) *Blogs, Wikipedia, Second Life, and Beyond: From Production to Prodsusage*. New York: Peter Lang.
- Callon, M. and Latour, B. (1992) 'Don't throw the baby out with the bath school! A reply to Collins and Yearley', in A. Pickering (ed.) *Science as Practice and Culture*. Chicago: University of Chicago Press. pp. 343–368.
- Chartrand, T.L. (2005) 'The role of conscious awareness in consumer behavior', *Journal of Consumer Psychology*, 15(3): 203–210.
- Chen, S., Fitzsimmons, G. and Andersen, S. (2007) 'Automaticity in close relationships', in J. Bargh (ed.) *Social Psychology and the Unconscious: The Automaticity of Higher Mental Processes*, Frontiers of social psychology. New York: Psychology Press. pp. 133–172.
- Collier, S., Lakoff, A. and Rabinow, P. (2006) 'What is a laboratory in the human sciences?', *ARC Working Paper*, No 1. <http://www.anthropos-lab.net/workingspapers/no1.pdf> (accessed October 2 2008)
- Coon, D.J. (1992) 'Testing the limits of sense and science. American experimental psychologists combat spiritualism, 1880–1920', *American Psychologist*, 47(2): 143–151.
- Coon, D. (1993) 'Standardizing the subject – experimental psychologists, introspection, and the quest for a technoscientific ideal', *Technology and Culture*, 34(4): 757–783.
- Danziger, K. (1997) *Naming the Mind: How Psychology Found its Language*. London: Sage.
- Davies, J. (2006) 'Affinities and beyond! Developing ways of seeing in online spaces', *E-Learning*, 3(2): 217–234.
- De Laet, M. and Mol, A. (2000) 'The Zimbabwe bush pump: Mechanics of a fluid technology', *Social Studies of Science*, 30(2): 225–263.
- Derksen, M. (2001) 'Discipline, subjectivity and personality. An analysis of the manuals of four psychological tests', *History of the Human Sciences*, 14(1): 25–47.
- Derksen, M. (2005) 'Against integration. Why evolution cannot unify the social sciences', *Theory & Psychology*, 15(2): 139–162.
- Dunn, E.C. (2004) 'Standards and person-making in east central Europe', in A. Ong and S. Collier (eds) *Global Assemblages: Technology, Politics and Ethics as Anthropological Problems*. London: Blackwell Publishing. pp. 173–193.
- Edwards, P.N. (2004) 'A vast machine: Standards as social technology', *Science*, 304(5672): 827–828.

- Fischer, C. (1992) *America Calling: A Social History of the Telephone to 1940*. Berkeley: University of California Press.
- Fuller, M. (2003) *Behind the Blip: Essays on the Culture of Software*. Brooklyn, USA: Autonomedia.
- Galton, F. (1874) *English Men of Science: Their Nature and Nurture*. London: Frank Cass Publishers.
- Gieryn, T.F. (2006) 'City as truth-spot: Laboratories and field-sites in urban studies', *Social Studies of Science*, 36: 5–38.
- Hacking, I. (1986) 'Making up people', in T.C. Heller, M. Sosna and D.E. Wellerby. (eds) *Reconstructing Individualism*. Stanford, USA: Stanford University Press. pp. 222–236.
- Hacking, I. (2005) 'The Cartesian vision fulfilled: analogue bodies and digital minds', *Interdisciplinary Science Reviews*, 30(2): 153–166.
- Haraway, D.J. (1991) *Simians, Cyborgs and Women: The Reinvention of Nature*. London: Free Association Books.
- Hayles, N.K. (2005) *My Mother was a Computer: Digital Subjects and Literary Texts*. Chicago: University of Chicago Press.
- Igo, S. (2007) *The Averaged American: Surveys, Citizens, and the Making of a Mass Public*. Cambridge, MA: Harvard University Press.
- Ito, M., Baumer, S., Bittanti, M., boyd, d., Cody, R., Herr, B., Horst, H. A., Lange, P. G., Mahendran, D., Martinez, K., Pascoe, C.J., Perkel, D., Robinson, L., Sims, C. and Tripp, L. (Forthcoming) *Hanging Out, Messing Around, Geeking Out: Living and Learning with New Media*. Cambridge, MA: MIT Press.
- Jack, A.I. and Roepstorff, A. (2002) 'Introspection and cognitive brain mapping: from stimulus-response to script-report', *Trends in Cognitive Sciences*, 6(8): 333–339.
- Jakobsson, M. and Taylor, T.L. (2003) 'The Sopranos meets EverQuest: Social networking in massively multiplayer online games', *Ezine*, 17(18). <http://www.mediacritica.net/courses/7111/jakobsson.pdf> (accessed March 9, 2008).
- Jenkins, H. (2006) *Convergence Culture: Where Old and New Media Collide*. New York: New York University Press.
- Keats, D.M. (2001) *Interviewing: A Practical Guide for Students and Professionals*. Buckingham: Open University Press.
- Kim, K.-H. and Yun, H. (2007) 'Cying for me, cying for us: Relational dialectics in a Korean social network site', *Journal of Computer-Mediated Communication*, 13(1), article 15. <http://jcmc.indiana.edu/vol13/issue1/kim.yun.html> (accessed 15 October 2008).
- Kihlstrom, J.F. (2004) 'Availability, accessibility, and subliminal perception', *Consciousness and Cognition*, 13(1): 92–100.
- Knorr Cetina, K. (1999) *Epistemic cultures*. Cambridge, MA: Harvard University Press.
- Kolbitsch, J. and Maurer, H. (2006) 'The transformation of the Web: How emerging communities shape the information we consume', *Journal of Universal Computer Science*, 12(2): 187–213.
- Mettrie, J.O. de La (1748) *L'Homme Machine*. Leyden: Elie Luzac.
- Lange, P.G. (2007) 'Publicly private and privately public: Social networking on YouTube', *Journal of Computer-Mediated Communication*, 13(1). <http://jcmc.indiana.edu/vol13/issue1/lange.html> (accessed 30 October 2008).
- Latour, B. (1992) 'Where are the missing masses? The sociology of a few mundane artifacts', in W.E. Bijker and J. Law (eds) *Shaping Technology/Building Society: Studies in Sociotechnical Change*. Cambridge, MA: MIT Press. pp. 225–258.
- Latour, B. (1993) *We Have Never Been Modern* (trans. Catherine Porter). Cambridge, MA: Harvard University Press.
- Latour, B. (1994) 'Pragmatogonies – a mythical account of how humans and nonhumans swap properties', *American Behavioral Scientist*, 37(6): 791–808.
- Latour, B. (2005) *Reassembling the social: An introduction to Actor-Network-Theory*. Oxford: Oxford University Press.
- Law J. and Urry J. (2003) 'Enacting the social', published by the Department of Sociology, and the Centre for Science Studies, Lancaster University, Lancaster. [www.lancs.ac.uk/fass/sociology/papers/law-urry-enacting-the-social.pdf](http://www.lancs.ac.uk/fass/sociology/papers/law-urry-enacting-the-social.pdf) (accessed 18 November 2008).
- Lerman, K. and Jones, L. (2007) 'Social browsing on Flickr', *Proceedings of International Conference on Weblogs and Social Media*, Boulder, CO, USA. Extended version available on arXiv (cs.HC/0612047).
- Lerman, K. (2007) 'Social networks and social information filtering on Digg', *Proceedings of Int. Conf. on Weblogs and Social Media*, Boulder, CO, USA (poster). Extended version available on arXiv (cs.HC/0612046).
- Lezaun, J. (2007) 'A market of opinions: The political epistemology of focus groups', *The Sociological Review*, 55: 130–151.
- Mackenzie, A. (2006) *Cutting Code: Software and Sociality*. New York: Peter Lang.
- MacIntyre, A. (1985) 'How psychology makes itself true – or false', in S. Koch and D.E. Leary (eds) *A Century of Psychology as a Science*. New York: McGraw Hill. pp. 897–903.

- Michael, M. (2000) *Reconnecting Culture, Technology and Nature: From Society to Heterogeneity*. London: Routledge.
- McNeill, W. (1995) *Keeping Together in Time: Dance and Drill in Human History*. Cambridge, MA: Harvard University Press.
- Newman, S. (1998) 'Here, there, and nowhere at all: Distribution, negotiation and virtuality in postmodern ethnography and engineering', *Knowledge and Society*, (11): 235–267.
- Nosek, B.A., Greenwald, A.G. and Banaji, M.R. (2006) 'The implicit association test at age 7: a methodological and conceptual review', in J.A. Bargh (ed.) *Social Psychology and the Unconscious: The Automaticity of Higher Mental Processes*. New York: Psychology Press. pp. 265–292.
- Osborne, T. and Rose, N. (1999) 'Do the social sciences create phenomena: The case of public opinion research', *British Journal of Sociology*, 50(3): 367–396.
- Owen, R. (1972) *A New View of Society: Or, Essays on the Formation of the Human Character, Preparatory to the Development of a Plan for Gradually Ameliorating the Condition of Mankind* (2nd edition). Clifton, NJ: A. M. Kelley. (Original work published 1816.)
- Pickel, A. (2001) 'Between social sciences and social technology: towards a philosophical foundation for post-communist transformational studies', *Philosophy of the Social Sciences*, 31(4): 459–487.
- Pinch, T.J., Ashmore, M. and Mulkay, M. (1992) 'Technology, testing, text: Clinical budgeting in the U.K. National Health Service', in W.E. Bijker and J. Law (eds), *Shaping Technology/Building Society: Studies in Sociotechnical Change*. Cambridge, MA: MIT Press. pp. 265–289.
- Popper, K.R. (1966) *The Open Society and Its Enemies* (5th edn). London: Routledge & K. Paul.
- Rabinow, P. (1992) 'Artificiality and Enlightenment: From sociobiology to biosociality', in J. Crary and S. Kwinter (eds) *Incorporations*. New York: Zone. pp. 234–257.
- Rheinberger, H.-J. (1997) *Toward a History of Epistemic Things: Synthesizing Proteins in the Test Tube*. Stanford, USA: Stanford University Press.
- Richards, G. (2002) 'The psychology of psychology', *Theory & Psychology*, 12: 7–36.
- Rose, N. (1985) *The psychological complex : psychology, politics and society in England, 1869–1939*. London: Routledge & Kegan Paul.
- Rose, N. (2001) 'The politics of life itself', *Theory, Culture & Society*, 18(6): 1–30.
- Shapin, S. and Schaffer, S. (1989) *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*. Princeton, USA: Princeton University Press.
- Sip, K.E., Roepstorff, A., McGregor, W. and Frith, C. (2008) 'Detecting deception: the scope and limits', *Trends in Cognitive Sciences*, 12(2): 48–53.
- Skågeby, J. (2008) 'Semi-public end-user content contributions - A case-study of concerns and intentions in online photo-sharing', *International Journal of Human Computer Studies*, 66(4): 287–300.
- Skinner, B.F. (1976) *Walden Two*. New York: Macmillan.
- Smith, R. (2005) 'Does reflexivity separate the human sciences from the natural sciences?', *History of the Human Sciences*, 18(4): 1–25.
- Surowiecki, J. (2005) *The Wisdom of Crowds*. New York: Anchor.
- VKS (2008) 'Messy shapes of knowledge: STS explores informatization, new media, and academic work', in E.J. Hackett, O. Amsterdamska, M. Lynch and J. Wajcman (eds) *The Handbook of Science and Technology Studies*. Cambridge, MA: MIT Press. pp. 319–352.
- Watson, J.B. (1930) *Behaviorism*. New York: W.W. Norton & Company.
- Zaitloom, C. (2004) 'The disciplines of speculators', in A. Ong and S. Collier (eds) *Global Assemblages: Technology, Politics and Ethics as Anthropological Problems*. London: Blackwell Publishing. pp. 253–269.