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Digital Devices: nine theses

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Abstract

The aim of the paper is to intervene in debates about the digital and in particular three kinds of framings: those that imagine the digital in terms of epochal shifts, or as representing a new era of mobility and flow, or as redefining life. Instead, we explore the lively, productive and performative qualities of the digital by attending to the specificities of digital devices and how they interact, and sometimes compete, with older devices and their capacity to mobilise and materialise social and other relations. Building on recent work at CRESC on the Social Life of Methods, we recommend a genealogical approach that is alive to the ways in which digital devices are simultaneously shaped by the social world, and can in turn become agents that shape that world. This calls for attending to the specificities of digital devices themselves, how they are varied and composed of diverse socio-technical arrangements, and are enrolled in the creation of new knowledge spaces, institutions and actors. Rather than exploring what large-scale changes can be revealed and understood through the digital, we argue for explorations of *how* digital devices themselves are materially implicated in the production and performance of contemporary sociality. To that end we offer nine theses under the following headings: transactional actors; heterogeneity; visualisation; continuous time; whole populations; granularity; expertise; mobile and mobilising; and non-coherence.

Digital Devices: nine theses

In the second industrial revolution, with its automation of the streams of information, the analysis of discourses has yet to exhaust the forms of knowledge and power. Archaeologies of the present must also take into account data storage, transmission, and calculation in technological media (Kittler, 1990: 369).

Introduction

There is now lively debate on how the proliferation of digital devices is implicated in the governance and organisation of contemporary sociality.¹ However, the aim of this paper is to unsettle those debates. Rather than yoking the digital to grand epochal social theory, we seek to emphasise the social life of digital methods and their capacity to mobilise and materialise social and other relations. This means that we separate the digital from influential diagnoses of large-scale social change (for instance, Manuel Castells' (1996) network society or the notion of bio-politics (Thacker, 2005; Rose, 2008)). Instead we explore digitalisation as a complex and uncertain process of intensification whose effects are uncertain, but include the potential to reawaken and rework long-established social and political relations. Focusing in the spirit of Kittler (2006, 2009) on issues of ontology, we thus explore the productivities and energies embodied in digital media (see also Küchler, 2008). In addition, we try to avoid standing outside the digital, assuming instead that we are caught up in, and need to attend to the specificities of its processes. Finally all this implies that we adopt a particular theoretical and empirical register. In what follows we attend to the *transactional relations* afforded by digital devices, rather than focusing on human subjects.

We start by reflecting on three instructive large-scale analyses of the digital: (a) attempts to link it to epochalist social theory; (b) the 'mobile methods' paradigm; and (c) explorations of 'bio-politics'. Each of these raises important issues, but we suggest that the extent to which they engage with the specificities and materialities of digital devices is limited, and that they tend to reflect arguments developed in a pre-digital age. In the second part of the paper we introduce the notion of 'the social life of methods'. Here we emphasise the constitutive role of social science research methods for modern capitalist societies. Then, in the third section of the paper, we examine how we can better register the significance of the digital in terms of the capacities it offers for elaborating transactional (and especially) social relations. In doing this we make three major arguments. First, we suggest that the challenge of informationalism can be understood genealogically by tracing the differential problems, concerns and devices that have led to the observation of 'whole populations'. Our argument is that the material and productive effects of the digital are reconfiguring knowledge spaces and the structure of social science expertise. Second, we explore the limits of 'external critique' and the extent to which standard methods and conceptual tools help us to understand information from the outside. And then third, we develop an immanent critique, in an attempt to handle the challenge of informationalism 'from within'. In doing this we draw on intellectual resources including Bourdieusian field analysis, Foucault's *dispositifs* and genealogy, and the STS concern with inscription devices.

1: What is the challenge of the digital? Three projections

Many people and organisations are interested in the digital. The elaboration of Web 2.0 devices has attracted major interest from governments (e.g. the Research Councils UK have invested £100 million in research on the 'digital economy'), corporations and interest groups, and various publics. It has also been argued that social science research repertoires need to be rethought (Savage and Burrows, 2007); that new kinds of empirical research are being mobilised (Adkins and Lury, 2009); that novel forms of political engagement have become

possible (Ruppert and Savage, 2011), that new kinds of identities and solidarities are being forged (Castells, 1996); and that new forms of life and biopolitics are being generated (Rose, 2007; Thacker, 2008).

So there is a lot of interest – and a lot of hyperbole. But if we strip away the latter, the capacity of social scientists and cultural theorists to understand the significance of the digital challenge seems less certain. As Mackenzie (2005: 72) wrote recently.

Although there has been wide acknowledgement of the mobility, dynamism and operationality associated with information networks, understanding the cultural specificity of software or code objects remains difficult.

So how is the digital approached in social theory? Our suggestion is that this is done in three main ways. Each is provocative and raises vital issues, but none, we argue, places the digital, in its ubiquity, its routinisation, and its mundanity, at centre-stage. Instead they impart intrinsic properties to the digital, which is imagined to grow and unfold so that its qualities become more widely disseminated. By contrast, we argue that it is important to understand digital devices *relationally*, and explore both how they interact with other kinds of devices, and how they themselves are both varied, and composed of diverse socio-technical arrangements. We start by reviewing three key literatures.

1.1: Epochalism

The suggestion that the digital marks a profound, epochal, rupture in social change is familiar. We are surrounded by claims about the distinctive characteristics of ‘knowing capitalism’ (Thrift, 2005), ‘the information age’ (Webster, 1995; Poster, 2001; Lash, 2002), and ‘the network society’ (Castells, 1999, 2000). However, re-reading many of these seminal texts a decade later suggests that they treat information technologies and the digital in a particular way. Rather than offering novel arguments about its revolutionary capacities, reflections on the innovatory character of the digital tend to reflect concerns with epochal change originally developed in the context of other kinds of evidence.² So, for instance, in writing about the digital, both Castells and Lash rework familiar arguments about globalisation, post-modernism, and reflexivity.

Castells’ (1996, 1997) seminal *The Network Society* remains a key reference. This work was responsible for introducing digital technologies fully into the debates about post-industrial social change that had been raging for two decades since Daniel Bell’s *The Post-Industrial Society*. To this extent, Castells’ intervention lies in the long-standing concern with automation reflected in the work of earlier generations of commentators such as Toffler (1973) and Bell (1973).³ At the same time Castells broke new ground by emphasising the networked character of digital communication. He argued that information can be divided into ‘packets’ and thus distributed in a non-linear and distributed fashion, an operation essential to contemporary capitalism (see e.g., Castells, 1996: 351-52). In this way he brought a distinctive approach to the familiar claims of Harvey (1987) Giddens (1991) and Beck (1992) about the power of globalisation, the break-up of social collectivities, and the creation of new kinds of fluid and mobile identities.

Yet for all the emphasis on ‘the culture of real virtuality’, the technological underpinnings of Castells’ treatise are relatively under-developed. In the way he treats it, the ‘information technology’ paradigm has five characteristics: (i) ‘technologies act on information’; (ii) there is ‘pervasiveness of effects of new technology’; (iii) there is a networking logic, (iv) ‘flexibility’ and (v), ‘convergence of specific technologies into a highly integrated system’ (Castells, 1996: 61-62). There are various problems with this list, as well as substantial. For instance, until the formation of the world wide web and networked computing, information technology did not obviously have a ‘networking logic’. Again, and more specifically, digital devices and their specific modes of operation do not feature in the list. Our suggestion is that

Castells is claiming the digital to be of profound social importance, but his work is more easily understood to be reinforcing trends detected by other social scientists on the basis of other evidence.

It is perhaps Lash (2002) who has made most effort to place informationalism on a more elaborated conceptual basis. Following in the spirit of Castells, he sees it as an ushering in epochal change, and argues that talk of

[i]nformation society is ... preferable to postmodernism in that the former says what society's principle is rather than saying merely what it comes after. Second, postmodernism deals largely with disorder, fragmentation, irrationality, whilst the notion of information accounts for both (...) order and disorder.... Information is preferable and more powerful as a notion because it operates from a unified principle (Lash, 2002: 1-2).

This is appealing, yet in practice, this unified principle is difficult to tease out. Lash reworks Wittgenstein to invoke an idea of 'technological forms of life' (see e.g., Gane, 2004). His aim is to think through the immanent properties of information in order to find a basis for critique that is not external or transcendent to that which it criticises. Yet it is unclear how successful this is. Like Bauman, he tends to treat the digital as if it were deficient. For instance, it is 'non linear' and discontinuous:

...technological forms of life are *really* stretched out. They are too long, stretched out too far for linearity. They are so stretched out that they tear asunder. Spatial link and social bond break (Lash, 2002: 20).

How well this argument works is uncertain (see also Simondon, 1989). Thus it presupposes a linearity that is no longer at work. It poses the question as to how stretched out forms of life have to be before they break. The relational qualities of information are relatively underplayed (it is whatever is transmitted to others (Yoshimi, 2006)). And the argument also fits uncertainly with substantial empirical research which shows that the digital is profoundly associated with the making of what might be termed 'local' social relations. For instance, Woolgar's (2002) 'five rules of virtuality', which are derived from a series of detailed case studies of virtual social relations, lead us away from Lash's thesis. Thus Woolgar tells us that 'virtual technologies supplement rather than substitute for real activities', 'the more virtual the more real', and 'the more global, the more local'. Similarly, as Strathern (2000) argues, rather than being decontextualised, the digital actualises relations and connections that are otherwise beyond perception and thus inherent to the very imagining of social relations. They are materialisations of what Latour (1998) has called a traceable social that is being rendered visible. And finally, as Knox (2005) shows, the use of digital communication in large corporations is associated with intensive local negotiation. Rather than occupying a 'space of flows' or a virtual informationalised world, digital data is itself a materiality that is 'alive', embodied, and mobile. Our point here is that to link the digital to epochalist accounts of social change is to treat it as a reflection of familiar theoretical arguments, and tends to direct attention away from the materiality and productivity of digital devices.

1.2: Fluidity and 'mobile methods'

If Castells and Lash offer a view of the digital which turns out to be under-specified, the social and cultural theory of fluidity and mobility represents a possible alternative resource. This is a diverse body of work that we cannot summarise here. It includes Bauman's (e.g., 2002) analyses of 'liquid modernity', Deleuzian inspired 'geo-philosophical reflections' on the 'intensive', and concerns with 'mobile methods' and the 'mobility paradigm'. In this work the digital is omnipresent: the speed of digital communication serves as an underlying assumption for much of what is being argued. At the same time its physical and material capacities are underplayed:

Virtual proximity defuses the pressure that non virtual closeness is in the habit of exerting. *It also sets the pattern for all other proximity.* All proximity is now bound to measure its merits and shortcomings by the standards of virtual proximity (Bauman, 2003: 63; our emphasis).

This is an attractive idea, but it also poses a problem: what counts as the standards of virtual proximity? Bauman's general position is well known. Following Levinas, he emphasises the ethical value of the face-to-face encounter. So how does the virtual look if we judge it in this way? The response is that it fails to measure up to the standards of the 'real': it is understood as a *deficit*. The result is a paradox. The virtual is treated as transformative. At the same time, as it generates its own productivities and capacities, it turns out that it isn't sufficiently transformative. Recent arguments about *mobile methods* work in a similar way. This is a term used by Sheller and Urry (2006), Urry (2007), Büscher and Urry, (2009), and Büscher *et al.* (2010) to talk of the multiple and myriad mobilities of contemporary social life, and of the related performativity of everyday (im)mobilities that enable new forms of sociological inquiry, explanation and engagement. People make the world physically and socially in the ways in which they move (or don't) – and if we are able to observe this then we are in a position to see how that world is being made. The mobilities paradigm is

transformative of social science, generating an alternative theoretical and methodological landscape. It enables the "social world" to be theorized as a wide array of economic, social, and political practices, infrastructures and ideologies that all involve, entail or curtail various kinds of movement of people, or ideas, or information or objects (Büscher *et al.*, 2010: 4).

This emphasis on mobile methods notes that it is difficult to 'capture' mobility analytically without simultaneously 'trapping' and de-mobilising it. The answer is to resist methods that stabilise in favour of those which are spatially sensitive.

We take the point, but would add two observations. First, given the focus on mobility itself, the actual capacities of the digital play little direct role. Second, the perspective has an elective affinity with theoretically humanist methods (methods that are being called into question by mobility itself). Thus it is striking that in practice exponents of 'mobile methods' insist on the importance of relatively traditional face-to-face routines. The latter include: fleeting face-to-face conversations; walking or moving with research subjects; the use of video ethnography; time-space diaries; participation in virtual interaction; and art interventions (Büscher and Urry, 2010). The last of these aside, none engages directly with the digital devices of the mobile, and each uses interpretative research strategies that (it might be argued) have been eclipsed by digital practices. So here is the tension: on the one hand, mobility is a ubiquitous exemplification of the post-human turn (see Büscher and Urry, 2009); on the other, to research it we need to adapt humanist qualitative methods to these new situations. In this way of thinking the challenge is to rework existing static methods to render them mobile (Fincham, McGuinness and Murray, 2010), while how strategies of quantification, for example, might be used has received little attention. Our conclusion is that the digital is not central to the mobilities that are the core concern of the proponents of this new paradigm. As a result there is little attention to the performativity, productivity and materiality of methods for tracing and knowing mobile people and things, or with the *mobility of digital devices themselves* as they trace the doings of subjects.

1.3: Vitalism and the intensive

A third literature relates the digital with emergent forms of bio-politics (Agamben, 2004; Thacker, 2005). Here, and in part drawing on Foucault, the interest is in the productive capacities of the digital to generate new kinds of emergent relations, and most particularly with new conceptions of 'life itself':

The molecular knowledge of life that has taken shape since the 1960s has been linked to all sorts of highly sophisticated techniques of experimentation that have intervened upon life at this molecular level... the laboratory has become a kind of factory for the creation of new forms of molecular life. And in doing so, it has fabricated a new way of understanding life itself (Rose, 2007: 13).

Thacker (2005) explicitly links these new forms of life to informational politics:

Information in biopolitics is precisely that which can account for the material and embodied and, furthermore, that which can produce the material, the embodied, the biological, the living – “life itself” (28).

Thacker’s argument about how digital technology erases boundaries between the natural and the social is also related to claims about globalisation and so carries epochalist overtones. For just as theorists of post-modernism made much of the flattening of affect and the dominance of self-referential simulacra, now life itself is seen as complicit with informational and representational processes. This body of literature has also cross-fertilised with recent work on vitalism (e.g., Fraser et al., 2006; Barry, 2005). Here, then, the digital is seen as a way of reconfiguring life ‘to conceive life as not confined to living organisms, but as movement, a radical becoming’ (Fraser et al., 2006: 3).

This is challenging, indeed exciting, but it also raises concerns. If our interest is with the digital and its devices, it may or may not be productive to focus on ‘life itself’. Here the legacy of Foucault’s concern with the production of the human subject in disciplinary and governing devices comes through. Yet, as several contributors to this special issue note, it may not necessarily be helpful to privilege the life sciences as we explore the digital challenge. The mundane uses of digital devices in information systems, marketing processes, and security systems, all offer different vantage points. Here it isn’t the redefinition of life that is important. Instead it is the ‘liveliness of data’ and the making of transformational agents that come into focus.

2: The social life of methods

We are suggesting that we need better analytical grasp of the challenge of the digital than is offered in such general accounts. But what might that be? No doubt there are many possibilities, but in what follows we focus on the devices, methods and inscriptions (data). In particular, we draw on Foucault’s concept of the *dispositif* and the STS notion of the inscription device. Foucault (1980) wrote that a *dispositif* is

...a thoroughly heterogeneous ensemble consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions - in short, the said as much as the unsaid. Such are the elements of the apparatus (194).

For Foucault an *episteme* is discursive. It sets limits to what can and cannot be said in a field. However, a *dispositif* (often translated into English as ‘apparatus’) includes an array of material, institutional and behavioural elements. For example, in relation to sexuality, it consists of ‘the body, the sexual organs, pleasures, kinship relations, interpersonal relations, and so forth.’ This suggests that the digital is composed of many different kinds of elements, ranging from computer networks, scanners, algorithms, software and applications to different actors, institutions, regulations and controversies. Devices produce digital data (versions of what Latour (1990) calls inscriptions) in the context of sets of social and technical practices and relations. And those devices are chained together to analyse and visualise what Castells calls ‘informationalisation.’ It is through such cascades of inscriptions – for instance from reams of data to indices – that ever simpler and more mobile digital inscriptions are

generated. And if some of those inscriptions have become more or less stable, difficult to undo, or immutable, then this is because of the scale of investment (literal and metaphorical) that has gone into making them up. It has become too 'expensive' to undo them. Latour warns us, therefore, that:

..., the precise focus should be carefully set, because it is not the inscription by itself that should carry the burden of explaining the power of science; it is the inscription as *the fine edge* and *the final stage* of a whole process of mobilisation.So, the phenomenon we are tackling is *not* inscription per se, but the *cascade* of ever simplified inscriptions that allow harder facts to be produced at greater cost (italics in original; Latour, 1990: 15-16).

Latour is talking about natural science, but how does this unpack into social inquiry? Our first response is that this too may be treated as cascades of *dispositifs* and inscriptions. And as a part of this, and following recent work in the ESRC Centre for Research in Socio-Cultural Change, our second response is that such cascades are simultaneously shaped by the social world, and can in turn become agents that shape that world. But if we are to understand this in the context of the digital, then we need to attend to the specificities of the devices themselves. We need to get our hands dirty and explore their qualities: how it is that they collect, store, and transmit numerical, textual, or visual signals; how they work with respect to sampling and comprehensiveness; and how they interconnect with social and political institutions.

Some orienting comments are in order. As we have hinted, we are drawing here in part on STS (science and technology studies) and more specifically from actor network theory's concern with the agency of objects. Thus much STS literature argues that scientific and technical objects are socially efficacious. Early STS work tended to focus on interventions in engineering (Law 2002) and the life sciences (Latour 1986). However, over the past decade there has been increasing STS-derived interest in social science techniques and methods, with Callon (1996) and Mackenzie's (2008; 2010) work on the performativity of economics. There have also been important studies of how social scientific censuses, mapping, and survey techniques have been associated with the generation of powerful social entities such as the 'national economy' (Mitchell 2002), caste groups (Dirks 2001), and social aggregates such as classes (Savage 2010).

So, for instance, one of the present authors argues that the period from 1950-2000 saw a dramatic intensification of social research methods, notably the sample survey (first conducted on a large national scale in the UK in the 1930s) and interview methods (see Savage, 2010). These techniques were championed as mechanisms to elicit everyday, ordinary, and mundane accounts, and were not only embodied in formal research agencies, but also in popular media and corporate customer services departments. They departed from previous research repertoires based on observational technologies, which depended on the implicit authority of the 'knowing' observer who was deemed able to delineate a moralised account of social relations. Again, as Thrift (2005) argues, new research methods became fully enmeshed in the circuits of 'knowing capitalism', in which the systematic gathering of information about customers, clients, employees and competitors became routine to corporate strategy.

Our suggestion is that it is the dominance of these social science devices that is called into question by the digital. Three features of this 'social science apparatus' are important for our argument here. First, social science devices differ from many in the natural sciences by being physically unspectacular. They are not embodied in laboratories or huge pieces of machinery. Instead they rely on chains of interconnected and cascading devices, and consist of largely statistical procedures, with relatively large corps of skilled 'administrators' (interviewers, surveyors, enumerators, etc), and simple devices such as clip boards, sheets of paper, and more recently laptop computers to record social evidence. In short, they have entered the

mundane circuits of social relations with no consecrated 'laboratories'. But these mundane features are challenged by the figure of the digital.

Second, these social science devices are deeply implicated in the formation of human subjects. The census and the survey both presuppose, yet also enact, the knowing, self-aware individual, who is able to account for himself or herself. Ruppert (2007; 2011) analyses how censuses produce and engage subjects in identifying with classification schemes that principally measure biographical characteristics such as gender, income, occupation and ethnicity, self-elicited identifications focused on social categories. Whether individuals or enumerators complete census forms, subjects require particular reflexive capacities and agencies for the device to operate, including the ability to categorise and creatively make themselves legible. Similarly, Osborne and Rose (1999) describe how the production of 'opinioned or opinionated people' was part-and-parcel of the creation of the technology of public opinion research in the early twentieth century. They argue that genealogies of devices can be paralleled with genealogies of persons: in the case of public opinion polls, people 'learned' to have opinions, became opinioned or opinionated and thus opinion polls 'made up' people.

In another example, Savage (2010) examines the way that the sample survey abstracts lone individuals from their household arrangements (which had been the traditional focus of community studies) and allows the very concept of the non-sexed individual to come to the fore. (Within earlier traditions of community research, sexed and household characteristics were seen as given, primordial). If this is right, then social science research devices were critically implicated in the formation of the self organising and accounting individual. Those devices, together with the recent, largely post-second world war, 'social science apparatus', which were based on the primacy of enumerating and sampling individual accounts (through censuses, interviews and surveys), helped champion a bio-politics of the 'human individual', detached from his or her environment. But all of this is being challenged and indeed undermined with the development of digital devices (Savage, 2010).

Third, the social science apparatus was dependent on a specific infrastructure of humans and devices to generate appropriate 'social data'. Without teams of interviewers, survey instruments, census enumerators and the like such an apparatus would not have existed. This kind of knowledge is not a by-product of *other kinds* of data generating processes. Rather, this apparatus operates in a similar way to the skilled physician, standing outside the social body, and intervening in it with various devices to collect, array, analyse and codify samples of social tissue. These procedures are in keeping with how Rose (1991) defines liberal expertise, which is dependent on the knowing expert, and with Bauman's invocation of the 'intellectual as legislator'.

But what does it mean if we argue that social science methods are becoming dependent on digital devices?

One answer is that it allows us to see the digital as being bound up with processes of re-territorialisation, and the creation of new knowledge spaces, institutions and actors. But *specificity* is needed if we are to make this argument. We need to be wary about large claims. It is, for instance, likely (we'll argue this below) that these new knowledge forms draw from, or resonate with, older technologies of surveillance. Rather than a large scale and external emphasis on flows and mobilities, or epochal change, we are suggesting that it is important to attend to the emerging stabilisations and fixities being performed and stabilised in cascades of (partly social science) devices. And rather than exploring what can be revealed and understood through such devices, it becomes important to explore *how* digital devices themselves are materially implicated in the production and performance of contemporary sociality. So how to think about this?

In line with what we have been saying about apparatuses, inscription devices and their agential capacities, we offer the following conceptualisation of digital devices. This is that digital devices observe and follow activities and *doings* – often, but not always or exclusively those of people. Such doings might include movements, but have more to do with *actions* (transactions, choices, statements, interactions) and their *traceability*. From loyalty cards, online purchasing, blogs, mobile phones, websites, wikis, and social networking sites to government administrative databases, patents, reports and scientific and newspaper articles there are, as we have argued, heterogeneous and multiple cascades of devices. Included in such cascades are numerous applications and software – ever more simplifying and summarising devices – for visualising and analysing digital data. Within these cascades a device can make, compile and transmit digital data and/or remake, analyse and translate data into information and interventions. But, this is the crucial point, all of these digital devices are modes of observation that trace and track doings. In the context of people, instead of tracking a subject that is reflexive and self-eliciting, it rather tracks the *doing subject*.

Where then in such cascades are social science devices located? What is their relative location and role within the productive, material and performative work of the digital?

3: The challenge of the digital rethought: nine theses

We have been arguing that to understand the digital we need to understand how the social is materialised and saturated with devices of various kinds. The digital has not displaced sensuous human interaction, but has reworked sophisticated sets of devices that pre-existed it. These include the technologies of surveillance and control dissected by Foucault (1976) together with the arts of government, but also and perhaps more critically, involve a battery of social science devices that proliferated in the second half of the 20th century. The need is to reflect, in an historical register, on how digital devices compare with other, older, socio-technical devices, and consider the different affordances that they offer in a nuanced manner.

Perhaps an analogy with Bourdieu's concept of field analysis will help (see Halford and Savage, 2010). In this agents are not seen to possess intrinsic qualities and capacities in and of themselves, but only with respect to other agents who are also struggling for position of advantage in a competitive field. Applied to devices, this suggests that they do not carry innate meanings in and of themselves, but are championed as competitors (and if we may extend the metaphor) and complementary to other devices. Overall, it is their comparative relationships with one another that defines their efficacy and ability to be indispensable. Thus for Latour (1990), it is infrastructural investments in inscriptions and their mobilisations that are the sources of dominance. Rather than competition between ideas, it is competition between material devices where those that assemble and summarise become 'centres of calculation.' But crucial to this is their mobility, transmission and circulation – and the similar movement of inscriptions. There is no room for epochs here. Instead we need to explore the *field of devices*.

With this perspective in mind, let us reflect on the capacity of digital devices to produce emergent social relations and doings, placing these in the context of the social science apparatus. On the one hand, we want to suggest, controversially, that we are in part seeing a (sort of) return to an older, observational kind of knowledge economy, based on the political power of the visualisation and mapping of administratively derived data about whole populations. On the other hand, as a genealogical approach demands, we need to attend to the differential problems, concerns and devices through which observation is being performed by the digital and its material and productive effects including the reconfiguration of knowledge spaces and field of social science expertise. We develop these arguments in nine theses:

1. **Transactional actors.** Whereas interview-based social science methods elicit individual accounts and make these the centrepiece of social research, digital devices record data switches, as two (or more) parties do business, exchange and interact. They are thus not derived from conscious intervention by the knowing researcher, but are the by-product of switches. These switches can be multiple, complex and minute. For example, a graphic illustration of mobile phone transactions demonstrates the structure of communication flows between members of a network. It is a form of social network analysis, and has no data at all on specific individuals, instead being concerned only with mapping specific transactions between parties. It thus has affinities with the field analysis of Kurt Lewin's sociometric social psychology, the poverty studies of Charles Booth, and the inter war Chicago school. Here, the focus of inquiry was not on the individual factors which affect behaviour, but on the kinds of spatial flows of behaviours and contacts: contagion, pollution, influence, etc. Similarly, data generated by digital devices allow post-individualist, non-humanist accounts of the social, where it is the play of transactions that can be studied in all their fluidity and dynamism.
2. **Heterogeneity:** Building on this first point, the extent to which digital data sources relate to people – or indeed to populations of people – is limited. The fact that some of those transactions are then pinned to people who are said to have doings is important, but it is not given in the logics of transaction. This thought can be extended in several directions. First, there are many transactions – consider the movement of items through logistics networks – that don't have to do with people at all. Entities quite other than people make up these networks and the patterns that they reveal. Second, even if people are involved – as often they are – they are being disassembled into sets of specific transactions or interactions. It may or may not happen that they are reassembled into 'people'. In some sense, then, the transactional 'doers' may be people, but in and of itself this has no special significance. Indeed, to say as we just did that people 'are being disassembled into sets of specific transactions' and all the rest, is already to risk missing the point. People aren't disassembled. Rather, and perhaps exceptionally, they are sometimes assembled. Third, then, and more generally, it needs to be said that the move to the digital is *a move to heterogeneity*. Perhaps we need to say, following Tarde and Latour, that the social is rather about *heterogeneous association* rather than societies and people. It is about factors, impulses, risk profiles, and circuits. To this extent, humanist conceptions of society are being eclipsed.
3. **Visualisation:** The re-emergence of visualisation as key to social analysis is striking. This stands in stark contrast to the hegemonic use of numerical and textual devices within the social science apparatus (in this respect, the social sciences parted company from the natural sciences where visualisations have always enjoyed more legitimacy). In the social science apparatus, the differentiation between numbers and text which itself takes historical form, since the two have not always been defined in opposition (Kittler, 2006), reaches a very marked form. Visualisation now becomes a means of showing how 'excessive' information can be reduced to a form so that it can be meaningfully, if partially, rendered for interpretation. In this way, as Amoore (2009) discusses, aesthetic criteria can be re-introduced into the use of digital data sources. Rather than analyses being done statistically (through modelling procedures), visualisation becomes a summarising inscription device for stabilising and representing patterns so that they can be interpreted. Although different in construction to Booth's 19th century poverty maps, for example, they nonetheless share a common concern with observing patterns, circulation, flows, and boundary maintenance and leakage.
4. **Continuous, rather than bundled time.** Both interviews and surveys can detect change not by comparing disparate sources, but through internal inspection of unitary data or linked data sets. In the qualitative interview, narratives disclose temporal sequencing through story devices. Surveys permit temporal analysis through comparison of age groups (quasi cohort analysis), or, in the case of panel studies, by tracking the same

individual at different time points. Both thereby allow trends to be discerned through internal analysis, rather than through the messy amalgamation of different sources, as practiced by historians. These procedures involved the eclipse of landscaped and territorial approaches to the social which were grounded in earlier generations of observational social research, due to the way that they depend on abstracting sampled individuals from their environment, increasingly by using the national boundary as the unit in which societies were deemed to operate. In these analyses, time is treated as linear, as a set of standardised points (e.g., years) between which comparisons can take place. Censuses take fixed ‘snapshots’ of populations every five or ten years and then compare quantities of social categories between intervals to reveal change. By contrast new data sources such as digitalised government administrative data deploy continuous time and constitute on-going and dynamic measurements of the movements and transactions of populations (Ruppert, 2010). Examples such as eBorders databases focus on the identification of factors which shape ‘unknown futures’ (Amoore, 2009). Such a perspective offers a shifting platform on which to view change as risk factors are modified. Some digital data is not routinely archived and because it is not focused on the individual, it has no identifying unit which can allow for comparison over time.⁴ In many cases it thus elicits flat, pliable registers of populations.

5. **Whole populations.** Social science methods depend on sampling, and hence social knowledge is generated on the basis of data derived from only a small selection of points, which are then generalised into accounts of social aggregates through statistical procedures. New digital data sources work on the basis of entire systems of records, so that the aggregate is not as important as the individual profile. Through these means, there is a return to a problematic of ‘whole populations’, in which it is not enough to know aggregate properties of the social world, but through which everyone and every transaction can be scanned, monitored, and subject to analysis and intervention. Every individual who uses a Tesco clubcard has a unique ‘DNA’ profile which records their spending patterns, and those who analyse such data insist on its value in allowing a granular knowledge which surpasses aggregated social groups. (Instead, aggregated social groups are derived inductively as discussed below). This concern with whole populations also elicits a descriptive mode of analysis which clusters and classifies to produce social maps which are also moralised and normative. A good example of these is the extensive geodemographic profiles widely used within marketing. It is instructive to note the similarities between the ‘lifestyle’ maps produced by these systems, and the maps generated by Booth and Rowntree a hundred years earlier.
6. **Granularity.** For new data sources, ‘the devil lies in the detail’. There is a suspicion of aggregated properties that are derived deductively, and instead a focus on particularistic identifiers. In credit scoring, security services, social welfare or criminal targeting, and commercial marketing, it is particular suspect, risky, or at-risk populations that are sought out and identified. Databases such as Experian classify unique postcodes. In such processes aggregates may also be derived (as clusters of granular cases), but these are inductively created and not ‘imposed’ onto data sources. Similarly, government administrative databases record multiple cross-agency transactions that when joined-up reveal detailed and unique identifications of individuals. This focus on granularity drives forward a concern with the microscopic, the way that amalgamations of databases can allow ever more granular, unique, specification. It is hence part of a desire for wholeness, an embrace of the total and comprehensive which is never ending but which generates a politics of mash ups, compilation, and data assemblage. Perhaps this helps to explain the attraction of Deleuzian perspectives, where the empirical is held not to be outside the concept, but in interaction with it.⁵ The subject is materialised by digital devices in new ways, and may be understood as a monad.⁶
7. **Expertise.** Survey and interview methods demand intervention from the expert social scientist. The idea that these experts can actually intervene and generate empirical data is

one which was largely new in the post war years, and eclipsed their older gentlemanly role in which they used by-product data generated by inspectors, social workers, and the like. The idea that experts had to intervene in the social world to gather appropriate data which would otherwise be absent and would limit social science was absolutely central to the emergence of critical social science. However, new digital sources create data as a by-product. One does not have to conduct special research on Amazon customers to identify which other books customers are likely to buy, through a questionnaire or interview. Such data is routinely gathered through normal transactional processes and allows customers to be bombarded with information about what people like themselves have bought. This is comparable with the way that social knowledge in 19th and 20th centuries was generated from routine administrative practices of social workers, school inspectors and the like. This is now the source of population knowledge to which governments are 'returning'. Some governments, for instance, have or are planning to replace censuses with administrative records, which at one time were the mainstay of population knowledge (Ruppert, 2010). Data generated as a by-product of everyday transactions with governments (registration, taxation, benefits) are recordings of exchange processes and do not rely on experts to intervene to elicit knowledge of populations.

8. **Mobile and mobilising.** Digital data sources also allow various publics to be enrolled and enacted in the digital in active ways, with Web 2.0 technologies being especially important here (Ruppert and Savage, 2011). There is a range of freely available online data, 'apps', software visualisation devices and so on. For Stiegler (2007), these produce an 'associated symbolic milieu that all members belonging to the milieu participate in it and are functions of the milieu'. We once again need to remind ourselves that rather than being new, this is in many regards a return to the tradition of Mass-Observation and the various field research activities of the middle twentieth century, all of which emphasised how publics could research themselves through writing and observing. This current persisted well into the 1960s, perhaps most notably in the Consumers Association journal *Which*, that relied on letters from the public to judge the quality of products. By contrast, the social science repertoires of the post war years sought to construct respondents in more passive forms so that their accounts could be rendered comparable and equivalent to each other. Be that as it may, what is different is both the location and relation of publics to the numerous devices that make up the digital. Publics are now enacted and enabled to intervene actively by making up their own devices as well as by contributing to the dominance of particular devices through their mass take up. Here we need to account for the *mobility of the digital itself*, and the capacity for the circulation, sharing and take up of devices and data across numerous sites that increasingly transcends institutional boundaries.⁷
9. **Non-coherence:** The proliferation of devices for tracking, tracing and visualising relations has a further consequence. It is at least in some measure *distributed*. In an era of Wikileaks it is important not to get caught up by hype. Nevertheless, it is none the less the case that much transactional data is widely available, and in some cases generally available for those with access to the internet. It is also the case that there are very large numbers of 'apps' available in the public domain for mining and visualising that data. The consequence is that there are many distributed locations of socially relevant digitally derived knowledge. There are various ways of thinking about this. Some would claim that this represents a 'democratisation' of knowledge, though we would be wary of such a large claim. At the other end of the spectrum, others would argue that this represents the erosion of properly validated knowledge of and expertise about the social.⁸ We would be equally cautious before making this argument. What we would suggest, however, is that since both the *distribution* of digital devices and inscriptions is widespread, and that cascading devices work in different ways to produce different effects, it is more readily apparent that knowledges do not cohere to generate a single authoritative representation of the social. In short, we want to suggest that social knowledge is more visibly non-coherent (not incoherent) than it was in the recent past.⁹

Conclusion

We have suggested the need for a heterogeneous and non-coherent understanding of the digital, one which does not seek to ascribe fixed characteristics to it, but which emphasises the contingencies by which it can be mobilised and deployed. But we also want to emphasise that digital methods imply a significant challenge to the social science apparatus. This is a crucial issue which will be a major focus of research in CRESC in future years. In thinking about this, we have tried to argue that it does not help to imagine the digital in terms of epochal shifts, new eras of mobility and flow, or redefinitions of life. The lively and productive changes brought by the digital are no doubt large, but they need to be explored carefully, with due attention to the specificities. And, as a part of this, we have also argued that they often turn out to instantiate and reconstitute older practices, forms of stabilisation, and control. There are many productive devices in the representational landscape – and those that are new interact with, and sometimes compete, with those that are older. Rather than assuming a simple teleology in which the former simply displace the older, we have recommended a genealogical approach that is alive both to the ways in which digital devices reconfigure expertise and institutional circuits, and the ways that social agents of various kinds contest their value and efficacy. At the same time, we have argued that it is important to attend to their distinctive qualities as ‘automated’ devices in which data are by-products that do not require the awareness or intervention of transacting individuals or academic experts. If we are to do this well we will need to vary the magnification as we explore the chains of relations and practices enrolled in the social science apparatus.

¹ This paper was written in part as a reflection of issues developed at a workshop organised by the ESRC Centre for Research on Socio-Cultural Change (CRESC). This was held at The Open University, Camden, London on 20-21 May 2010.

² Though we should state that Lyotard (1979) did note the role of technoscientific transformations in cybernetics, communication theory, data storage and transmission as elements in his account of the post-modern condition.

³ See for instance the comments of Yoshimi (2006: 276): ‘it is generally assumed that information technology alone can fundamentally alter society. The exact nature of the technology cited as the explanatory variable has changed with the times. At one time it was television; later it was the main-frame computer; then it was the computer network, and most recently, mobile media ...’, and similarly ‘Clearly, there is nothing ‘post-’ modern about information society theory. It is no more than a faithful reproduction of the principles of ‘modern’ industrialism adjusted to fit the ‘new’ conditions of information technology.

⁴ The detailed account of transactions collected as part of the Tesco loyalty card system, for instance, are not preserved for more than two years. However, other forms of digital data such as certain archives and government databases have longer durations.

⁵ See for instance, Rose, ‘when I talk about empiricism a la Deleuze... I mean... an attempt to set up a constant dynamic engagement between thought and its object, and thus a concern with engaging the specificities of situations, cases and elements’ (in Gane, 2004: 176)

⁶ The resurgence of monadology within contemporary social science has been marked by recent work on Tarde. See, for instance, Candea (2010). However, as we have just implied, it is also embedded in Deleuze’s influential writing (see in particular Deleuze (1993)). Though it is often treated otherwise, actor-network theory is also a form of monadology. See Latour (1988).

⁷ Though there is still much boundary-making especially in government and commercial data and applications.

⁸ See for example the discussion in Savage and Burrows (2011).

⁹ We have phrased this carefully. Knowledges have always been different. It is the *visibility* of that difference that has changed.

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