8

Mapping the space of flows: considerations and consequences

Thomas Sutherland

For many years now, scholars in geography, as well as other areas of the social sciences, have mounted a sustained challenge to the traditional theorisations of mapping which, in the words of Nigel Thrift (1996: 7), 'claim to re-present some naturally present reality'. There is, as such, little need to further rehearse such debates.[1] At the same time though, what we do need is greater theoretical intervention into the practices of representation that are inherent within mapping, and the ideological precepts by which they are informed and conditioned. Especially in an age of geographic information systems – wherein lies an increasingly stark disparity between the visual appearance of the map itself on one hand, and the numerical data that it claims to represent on the other – the parameters within which such representations are *given*, and the socio-political consequences of such 'givenness' must be analysed with intense scrutiny. Digital mapping *gives* us a world through the binding of quantitative information to a set of representational categories: the question that needs to be asked more strenuously regards what other worlds might be possible.

   In this chapter, I will be focusing upon one particular component of digital mapping: the notion of *flows*, and the way in which they provide a common, but not sufficiently scrutinised, representational category for digitised spatialisations of the (inherently temporal) movement of people, goods and data. In the past twenty or so years, to speak of *flow* in the same way that political economists of a prior generation might have spoken of *circulation* has become utterly common-place – even banal – to the extent that to critique it might seem pedantic. But in fact what we face is a discourse, especially in relation to the processes of globalisation, that takes flow to be a natural and unproblematic way of describing the

temporalities and mobilities of digital, networked capitalism. I wish to challenge this, demonstrating that flow is not simply a neutral category, but rather, is a historically contingent mode of representation and givenness. Luc Boltanski and Ève Chiapello (2007: 143) describe it as, 'an organicist conception of society as a living body irrigated by flows, whether material (communication routes or systems for distributing energy sources) or immaterial (financial flows, flows of information, or movements of symbolic diffusion)' – which although not without its uses, smooths over the breaks, disjoints and dissymmetries that mark the globalised economy, and risks naturalising and even ontologising the myth of capitalism as a process of endlessly fluid expansion. Although I have written previously on the topic of fluidity as a theoretical and philosophical concept (see Sutherland, 2013; 2014b), its role as a metaphor used to represent time (i.e. movement, change, becoming, etc.) in a spatialised form within geographic information systems must be examined further.

Flow maps

The notion of the 'flow map' as a distinct form of thematic map or infographic is comparatively recent, and one that is in large part tied to the gradual computerisation (and hence digitisation) of practices that were once completed by hand. Its introduction marks a decisive reorientation in the goals and principles of mapping, and a turn away from the representation of space towards the *spatialisation of time*. As Paul Virilio (2006: 71) puts it, we are in the midst of a shift whereby 'knowing-power, or power-knowledge, is eliminated to the benefit of moving-power – in other words the study of tendencies, of flows'. From the earliest days of the practice, cartographers would devise maps that not only recorded locations, physical features and political boundaries, but also trade routes and road networks. Of course, in an age of ubiquitous mapping – facilitated in large part by freely available mapping services, such as Google Maps, accessible by smartphone – such a concept seems rather banal (road atlases, produced by motoring associations, being a mainstay in the second-half of the twentieth century long prior even to these aforementioned digital services). But without the tools or competency to accurately chart such spaces, these maps were far more scarce for most of human history.

   The first clear example of such a route map is the *Tabula Peutingeriana*, the sixteenth-century copy of an original Roman map most likely dating to somewhere between the first and third centuries CE, which traces a vast road network across the known world, from Rome itself through large sections of Europe, Africa, the Middle East and Asia (see Figure 8.1). The extent to which this document
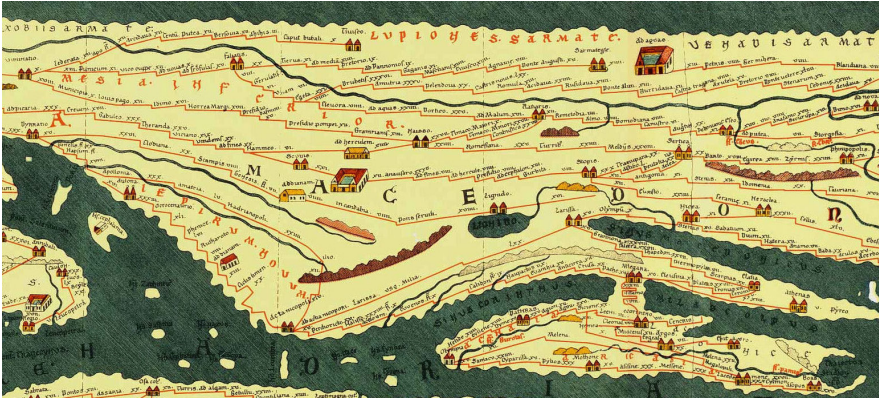
Figure 8.1 Unknown author, *Tabula Peutingeriana*, *c.* fourth–fifth centuries. Conradi Millieri / Wikimedia / public domain.

might actually be considered a true map is contested, given the common sugges-
tion that it is just a diagram of a route network visualising a pre-existing *itinerary*
listing destinations along these roads.[2] But Richard Talbert (2010) argues that it
does have a cartographic basis, even if highly abstract: while there are vast dis-
tortions necessitated in order to represent so much detail within such a narrow
frame, this does not discount the amount of geographical information that is still
represented. It is conceivable 'that no previous mapmaker had been so bold as to
take a frame of such extreme dimensions and then to set the entire *orbis terrarum*
within it, with the city of Rome as the center point – all of which required that
the landscape be remolded on an epic scale' (Talbert, 2010: 162).

   The design and accuracy of such route maps was greatly increased during the
Age of Exploration (from the fifteenth until the eighteenth centuries), assisted
by the various technical devices (e.g. compasses, telescopes, sextants, etc.)
that allowed for more precise measurement of directions, angles, distances,
and so on. These maps, which allowed the tracing of the vast courses travelled
by traders, merchants and colonists across the globe, were particularly crucial
for the expansion and management of the territory of the European imperial
powers through to the twentieth century (see Figure 8.2). As we will see later
in this chapter, such practices of mapping were also implicated in processes of
epistemological rationalisation, essentially flattening out the spherical surface of
the Earth so as to fix it within a predetermined (Cartesian) geometrical schema.
What distinguishes this mapping of trade routes from the mapping of flows
that we are discussing here is the former's fixity: such maps made no claims
to recording the movements, directions and quantities of actual merchants or
their goods; instead, they represent the paths that these objects *might* take. Most

Figure 8.2 J. C. R. Colomb, map of the British Empire from 1886. Norman B. Leventhal Map Center Collection, CC BY-NC-SA.

importantly, the temporal dimension is almost entirely absent, giving little or no sense of chronological change, and presuming the preservation of these routes over significant lengths of time.

Flow maps, by contrast are in essence an application of the principles of the flow chart to cartographic mapping (and more specifically to *thematic mapping*, wherein maps are designed to emphasise one particular subject area or concern). They are typically less interested in specific paths taken by actors, and more in what it is that is 'flowing', from where it originates and to where it is heading, the means by which it is moving, migrating or being transported, and the quantities, frequencies and velocities of this movement. They can be quite simple, indicating just an origin, a terminus and the direction of travel, or they can be very complex, illustrating multiple separate or divergent vectors, multiple directions, intermediaries through which flows pass, bifurcations and splits, transformations, varying quantities, speeds, capacities, and so on and so forth.

The first clearly recognisable examples of these flow maps all appear in the mid-nineteenth century, the key innovators in this respect being the British soldier and public servant Henry Dury Harness, British physician John Snow,

and French civil engineer Charles Joseph Minard (see MacEachren, 1979). Harness, who worked for the newly founded Irish Railway Commission at the time, developed what is perhaps the first ever set of flow maps, representing both the movement of travellers and commodities, as well as the volume of such movements through the usage of lines of varying thickness. Snow, who had a distinguished career in medicine, attempted to dispute the hegemonic miasmatic theory of disease transmission by mapping the incidence of cholera across London, demonstrating that the infection was being spread via a water-pump, and was hence water-borne. Although this was not in itself a flow map as we would usually understand it, it nonetheless marks a significant milestone in both the rise of infographics as an apparently effective medium for visually representing information, and the increasingly ubiquitous use of statistics and other such instruments in order to survey and categorise a human population. Eugene Thacker (2004: 178) contends that 'bodies, though never apolitical, become politically materialised at the moment they are transmuted into policies, laws, governmental guidelines, funding sources, marketable and FDA-approved drugs, and medical-economic investments and insurances', and while it would not be fair to lump Snow's study in with such methods of control, it nonetheless signifies a crucial step towards such biopolitics.

Finally, Minard, who is renowned as a pioneer in the representation of numerical data through visualisation, and who is generally recognised as having developed the symbolisation of flows independently of Harness, produced a famed map charting Napoleon's disastrous march to Moscow in 1812 (see Figure 8.3). The failure of this endeavour marked the beginning of the decline of French hegemony in Europe. The map measured the diminution of the French army in terms of geographic location, as well as six other types of data, remarkably, in a single graph. It is probably this ability to represent so much information within a single image (often with decidedly social or political ends) that has led to the proliferation of the flow map in recent years. From Alexis Bhagat and Lize Mogel's *An Atlas of Radical Cartography* (2008), through the Bureau d'Etudes and their noted 'Governing by Networks', to the Counter-Cartographies Collective (3Cs), and the Spanish group Hackitectura, flow maps are of the moment. One project from Hackitectura epitomises this trend – seeking as it does to understand the border between Spain and Morocco as 'not an abstract geopolitical line but an increasingly complicated, contested space' by attempting to 'follow the flows that already traverse the border, such as migrants, internet data and cell phone calls, as well as capital and police', and the way in which these flows shape it into a border region (Dalton and Mason-Deese, 2012: 448).

As Robert L. Harris (2000: 157) writes, emphasising the diverse ranges of uses to which they might be put, '[f]low maps can be used to show movement
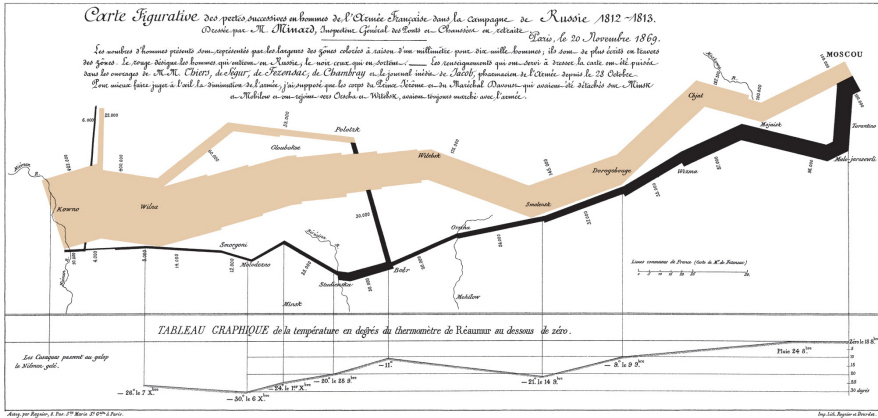
Figure 8.3 Charles Minard, Carte Figurative, 1869. Mahahahaneapneap/Wikimedia Commons/public domain.

of almost anything, including tangible things such as people, products, produce, natural resources, weather, etc., as well as intangible things such as know-how, talent, credit, or goodwill'. Yet what is omitted in this description, and in most discussions related to this mode of mapping, is any justification for why such movement should be understood in terms of flow – a word which, from its Old English roots (*flōwan*) onward, is tied to the image of water in motion to a much greater extent even than the French *flux* (derived from the Latin *fluxus*). Such ambiguities date back at least as far as the Ephesian philosopher Heraclitus, whose metaphor of an endlessly flowing river is often (quite possibly erroneously) taken as an illustration of a universe in a state of constant 'becoming'. Does not the use of this metaphor project a certain set of *a priori* spatial qualities onto the temporal movements under question?

In response to this, one might point out that the term in this context is most likely derived from the commonly used concept of the flow chart, and its origins in the attempts to visually map out the problems of flow-shop scheduling, rather than any direct semantic linkage to the image of liquid flowing. While this is perhaps at least partly true, to make this claim would be to ignore the distance that its usage in mapping today has from these origins, *and* the way in which its usage has been shifted (and in some sense reciprocally determined) by its deployment across the social sciences, particularly but not exclusively in human geography. This notion of mapping flows, in other words, regardless of its semantic origins, fits quite neatly into a widely disseminated discourse that equates the metaphor of fluidity with, in the words of Zygmunt Bauman (2000: 5), 'the radical melting of the fetters and manacles rightly or wrongly suspected of limiting the individual

freedom to choose and to act'. Flow is frequently associated with a series of global socio-economic transformations that have occurred in the second-half of the twentieth century. These include: trade liberalisation and the gradual elimination of tariffs, quotas and subsidies; deregulation of the financial and housing markets; the introduction of so-called 'flexible' labour practices, casualising the labour market and dramatically extending the precariousness of employment across varied industries; an increased corporeal mobility for both an elite managerial class, and a disenfranchised and displaced underclass; postmodernisation as the cultural logic of post-industrial capitalism, emphasising the mutability and non-essentiality of identity; and an economy that is ever more reliant upon the light-speed communication and transport of data through fibre-optic networks.

Of course, as Bernhard Siegert (2011: 14) notes, a media theory of mapping cannot understand the map as a mere representation in its own right; conversely, it should instead be 'concerned with the way changes in cartographic procedures give rise to various orders of representation', arguing that '[i]nstead of representing cultural predispositions', the map is 'their very basis of production'. To map trade routes in the fashion described above is not merely to re-present a pre-existing reality, formed in the shifts and manoeuvres of international commerce, for these maps themselves *give* a reality – one which provides possibilities, but also delimits them. Regardless though, the crucial thing to note is that route maps are indicative of a time when these possibilities were not expected to change with any great frequency or regularity. They can thus be understood as the products of an age when, in spite of the frenetic race to accumulation that marked imperialism and early industrial capitalism more broadly, time seemed to move more slowly and with greater predictability –this early period of globalisation stretched, rather than compressed, space and time, necessitating greatly deferred communication over vast distances.

It was only in the late twentieth century, contends Chris Speed (2011: 240), with the growing influence of human geography (itself in large part a reaction to the accelerating temporal milieu of neoliberal capitalism and increased demands for mobility engendered by an unprecedented push towards globalisation) that the mapping of space began to be really problematised by questions of time:

> [w]ith humans comes a model of 'time' that is more relative to 'real-time', and subsequently maps had to start speeding up. Formerly used to articulate the slow effects of ice-ages and other aspects of geo-morphology, maps now needed to show the speed of the human, and suddenly maps required time.

The complex relationship of this shift to processes of computerisation and the development of geographic information systems is particularly important here. It was through computer processing that complexity theory was able to move

beyond the niches of mathematical modelling and become perhaps the dominant (i.e. hegemonic) paradigm for understanding change in the twenty-first century. As Manuel DeLanda (1991: 6) observes, computers have enabled the investigation of processes of self-organisation, whereby 'order emerges spontaneously out of chaos', the result being that 'natural phenomena once thought to lack any structure, like the turbulent flow of a fast-moving liquid, have now been found to possess an extremely intricate molecular organisation'.

In other words, even though for a long time flow maps were still predominately produced by hand, computerisation provides the means by which the mapping of self-organising systems over time might be understood in terms of 'flow'. In doing so, this also provides an imperative for the further mapping of such flows. I would propose that it is precisely this set of *technical conditions* that forms a necessary, albeit obviously in no way sufficient, cause for our (over-determined) present day fascination with the representation of flows. Flow, anthropologist Stuart Alexander Rockefeller (2011: 557) argues, is 'one of the most important words constituting a new social scientific perspective on the relation of scale, agency, locality, and mobility on the global scene'. Yet, as he goes on to note, it is surprising how little it has been analysed given the import with which it is oft spoken, for '[t]he term has an aura and can appear to say a great deal, yet it can be employed in a nearly unaware fashion, as if its meaning were entirely uncomplicated and its use so innocuous as to call for no special mention', such that it might allude to quite radical implications while at the same time maintaining a certain etymological innocence (Rockefeller, 2011: 558). There is a seductive appeal – as well as a number of normative assumptions – contained in the words themselves and in the images that they evoke, and as such, there is no reason for us to treat them as neutral terms, nor ones whose meaning is unproblematically self-evident. In fact, it would seem to be their multivalent nature – the multiplicity of meanings for which they may be mobilised, often shifting between the parlance of metaphysics, natural science and everyday language without clear delineation – that has led to these terms' predominance.

The mapping of flows seems to take on a particular urgency in an age when the solidity and permanence of traditional socio-political structures upon which we have usually depended seems to be melting away in the furious creative destruction of neoliberal, globalised, digital capitalism. We might also connect it to changing patterns of representation engendered by new, ubiquitous forms of media – as Robert Hassan (2012: 179) writes:

> [t]he words we now interface with in social networking, in our news reading, in our working days and, above all, in our education are fluxual representations that

are mutable and flowing and no longer fixed in time and space as ink on paper is. Writing has become liquid, and digital representations of meaning have begun to pulse and flow at an ever-quickening pace that militates against the pause and traction, concentration and reflection that meaning construction and knowledge production demand, and that print culture could facilitate.

One is surely justified in wondering whether this emphasis upon the mapping of flows, rather than, or in addition to, routes and static locations, is indicative not only of shifts in socio-economic conditions, temporal environments and modes of data collection, but also the increasingly fluid means by which these changes are represented. These metaphors of fluidity tend to carry with them an implication of the affective or non-representational – in the words of Virilio (1994: 28), they mimic 'the gaze of the ancient mariner fleeing the non-refractive and non-directional surface of geometry for the open sea', seeking out 'environments of uneven transparency, sea and sky apparently without limits, the ideal of an essentially different, essentially singular world, as the initial foundation of the formation of meaning'. Yet are they not bound to those representations from which they hope to abscond through 'the paradoxical logic of the videoframe which privileges the accident, the surprise, over the durable substance of the message'? (Virilio, 1994: 65)

Flow in the social sciences

Before we explore the specific consequences for digital mapping and geography, we should first explore further the use of the term flow within the social sciences, for it is here that the use of the category has largely become normalised. The term itself, being entirely mundane in origins, can be traced back almost to the beginnings of political economy as a field of study. Marx (1973: 211), for instance, speaks of 'the constant flow of the circulatory process' and political economists, in reference to mobility, use flow in terms of both goods and capital. Flow has also remained a standard term within the language of finance and the term first seems to have entered the social sciences as a distinct, albeit under-analysed concept in the work of Arjun Appadurai, an anthropologist whose work centres upon the interrelationships of globalisation and modernity in terms of a global cultural flow. For Appadurai (1996: 37):

people, machinery, money, images, and ideas now follow increasingly nonisomorphic paths; of course, at all periods in human history, there have been some disjunctures in the flows of these things, but the sheer speed, scale, and volume of each of these flows is now so great that the disjunctures have become central to the politics of global culture.

While no adequate definition of the concept of flows is ever really provided at any point in his work, what would seem to be clear from this quote is that there is some sense of historicisation occurring. It is not so much the flows themselves (in the sense of freedom of mobility) that are new, but rather, the disjunction between the five dimensions (ethnoscapes, mediascapes, technoscapes, financescapes and ideoscapes) that comprise the social imaginary.

It would initially seem then that Appadurai's conception of fluidity is not singular or absolute, but instead defined by its turbulences and incommensurabilities. When he writes that the 'suffix *-scape*, allows us to point to the fluid, irregular shapes of these landscapes', it would appear that he is speaking solely in the language of contingency its turbulences and fluidity as a result of the speed and mobility that has been greatly facilitated by the processes of globalisation (Appadurai, 1996: 33). Simultaneously, however, Appadurai (1990: 301) relies quite heavily upon the distinctly metaphysical vocabulary of Gilles Deleuze and Félix Guattari, albeit with an anthropological tinge, when he argues, for instance, that '[d]eterritorialisation, in general, is one of the central forces of the modern world'. Deleuzian philosophy, it must be noted, has had a significant impact upon the ubiquity of this concept of flow within the social sciences and particularly human geography. In the words of Boltanski and Chiapello (2007: xxiv), what Deleuze and Guattari offer is 'an ontology containing only one tier or plane (the 'plane of immanence')', which 'knows only singularities or flows, the relationship between which assumes a reticular form and whose movements and relations are governed by a logic of forces'.

It is not particularly surprising that as a result, Appadurai (1996: 47) has a tendency to slip into an ontological register of writing: noting the importance of chaos theory, he speaks of a methodological approach premised upon 'a world of disjunctive global flows … that relies on images of flow and uncertainty, hence *chaos*, rather than on older images of order, stability, and systematicness', and warns of naturalising 'the kind of illusion of order that we can no longer afford to impose on a world that is so transparently volatile'. The implication here seems fairly unambiguous: in an increasingly entropic social formation we can no longer justify preserving illusory concepts of order, and therefore, must embrace a methodological approach that embraces this chaos. For Appadurai, writes Rockefeller (2011: 561), 'flow is both the problem and the solution, the cause and the means of anthropological inquiry into globalisation, the reality that challenges our understanding and the tool to understand that reality'. The 'unyoking of imagination from place' – the deterritorialisation of imaginative power – he implies, should be embraced for its emancipatory potential (Appadurai, 1996: 58).

Manuel Castells' conception of flows, which he has developed from the late 1980s onward, is somewhat different from that of Appadurai, although they certainly share features. In *The Informational City* (1991: 169–170), he remarks that '[w]hile organisations are located in places, and their components are place-dependent, *the organisational logic is placeless*, being fundamentally dependent on the space of flows that characterizes information networks'. He expands upon this argument in *The Rise of the Network Society* (2010: 442), writing that:

> our society is constructed around flows: flows of capital, flows of information, flows of technology, flows of organisational interaction, flows of images, sounds, and symbols. Flows are not just one element of the social organization: they are the expression of processes *dominating* our economic, political, and symbolic life.

He defines these flows as 'purposeful, repetitive, programmable sequences of exchange and interaction between physically disjointed positions held by social actors in the economic, political, and symbolic structures of society', and posits them as constituting a *space of flows*, which he in turn defines as 'the material organisation of time-sharing social practices that work through flows' (Castells, 2010: 442).

What we see in Castells' work is an even more explicit historicisation of fluidity: he does not simply represent circulation and mobility as universal categories, but rather, reflects them in relation to a particular set of socio-technical and economic circumstances. The concept of the space of flows is also directly connected to the issue of temporality: it compresses time into a singular, homogeneous simultaneity – through increased speeds of computation, communication and data transmission, as well as the increased demands for multitasking and the dissolution of discrete social practices – producing an 'eternal ephemerality' in distinct contrast to the 'scattered, fragmented, and disconnected' temporality of the *space of places* (Castells, 2010: 497). What is profoundly valuable, though not unproblematic, about these accounts of flow is that they emphasise the enhanced role of the interconnected processes of circulation, distribution and transmission under digital capitalism (albeit in a specifically spatial form). Castells especially identifies with acuity the way in which demands for change and mobility are linked to the inhuman acceleration of the turnover time of capital.

Unlike Appadurai, Castells does not fall into the trap of celebrating the contingencies of flow, a rather common tendency which recalls, more than anything else, the mystical and irrationalist metaphysics of Henri Bergson (1911). Bergson (1911: 12, 46) counterposes an intuitional encounter with 'the flow of the real' against a rationalising, homogenising intellect which 'dislikes what is fluid, and solidifies everything it touches'. This equation of organisation and

rationality, with oppression (and repression) exercising a significant, albeit often covert, influence over contemporary social theory, is achieved through his influence upon Deleuze. With this in mind, we may now look at the ways in which we might understand this notion of flows in relation to digital mapping and geographic information systems.

The givenness of fluidity

In its simplest terms, digital mapping involves the digitisation of either preexisting maps or the tracing and measuring of orthophotographic imagery. The latter refer to the use of geometrically corrected aerial photography as the basis for mapping, rather than using the traditional symbolic representations. Dissemination of imagery through services such as Google Maps has encouraged everyday utilisation of such data. In either case, the result is a set of spatio-temporally indexed digital data, which allows locations to be recorded in terms of both their physical placement (i.e. latitude, longitude and elevation, referenced through Cartesian coordinates) and, more crucially, their temporal occurrence. As a result, while traditional hardcopy maps or surveys will generally seek to represent spatial data at one particular point in time (or at most a few distinct periods, given that any more would likely make it uninterpretable), the digital map offers the possibility of representing and analysing changes over time with both minute detail and vast breadth. Hence, although the metaphor of flow as a figuration of capitalist circulation is not new, geographic information systems provide the capacity for a form of mapping *premised upon flows* – in other words, of tracing the specific movements of various diverse objects, patterns and events (e.g. not only people, animals, raw materials and commodities, but also, information, capital and affect, etc.) over a specified period of time, centralising the once marginal figure of time within these practices.

There is an inherent tension here, and one that is inevitable when discussing the temporal characteristics of mapping: to map is, in essence, to spatialise; to capture specific characteristics of the world within the fixed points of Cartesian space. This was of course the difficulty that Gerardus Mercator faced in 1569 when attempting to project a spherical globe onto a two-dimensional surface, achieving straight and perpendicular parallels and meridians, as well as a uniform linear scale, through the distortion of scale (see Figure 8.4). In effect, mapping necessitates distortion, a fact that becomes all the more obvious in the case of flow maps which are a *literal conversion of time into space*, inasmuch as they must somehow represent movement and chance according to the strictures of a spatial framework that makes no affordance to such temporalities. According
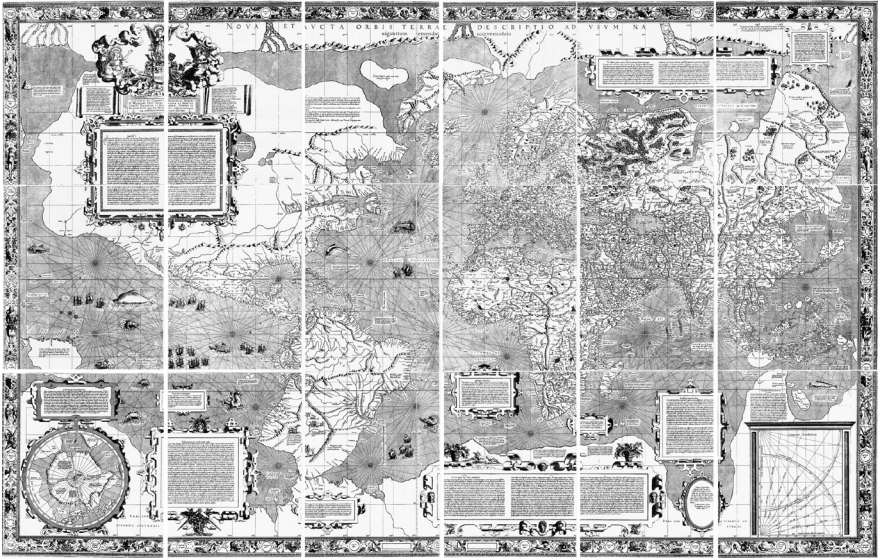
Figure 8.4 Gerardus Mercator, world map, 1569. Alvesgaspar/Wikimedia Commons/
public domain.

to Cubitt (1998: 52), 'the conventions of traditional mapping embody ideo-
logical projects, portraying mastery over the environment, while the new GIS
composite mapping techniques imply a similarly ideological domination over
human geography'. Is there a specific ideology, we must wonder, attached to
such processes of spatialisation (and the distortion of time therein)?

Bernard Stiegler (2011: 75) describes the various modalities of mediation,
'permitting symbolic fluxes and flows to be discretised and deposited, that is,
permitting the spatialisation of their temporality', as processes of *grammatisa-
tion*. He argues that while such tendencies have always been a component of the
technical mentality that defines human thought (insofar as it exteriorises itself),
it is in the age of digital, networked media that grammatisation allows for the
widespread exploitation of libidinal drives. Spatialisation, he suggests, is impli-
cated in the rationalisation and subsequent homogenisation of human behaviour,
giving it a quite specific ideological purpose. Of course, such anxieties regarding
the transformation of time into space are not at all new: as far back as Aristotle's
Physics, we see concerns from philosophers regarding the way in which time
seems to be immobilised in its graphic representation. But what we face at
present is a media environment in which our phenomenal experience of time is
increasingly superseded, and indeed conditioned, by a growing set of digitally
operated time-critical processes that are not only imperceptible (and perhaps

even incomprehensible) to us, but which effectively *rationalise* the organisation and management of time according to principles that have little concern for human experience or wellbeing (see Sutherland, 2014a).

In this context, it is important to query whether the mapping of flows risks not so much representing the heterogeneity of temporal change as providing the means for its reduction to parameters advantageous to bureaucratic management and control. This is not to suggest that time is inherently opposed to spatial representation – an argument that would hew far too closely to the dualistic mysticism of Bergson or technophobic conservatism of Heidegger. Rather, the mapping of flows has become prevalent at a point in history when protocols of control, employed by both corporations and national governments, increasingly favour the management of time through its spatialisation and grammatisation. This does not mean that we should assume that there is a sinister character to flow maps, but it should make us aware of the potential that inheres within them for time (as it is represented) to be distorted along specifically ideological lines.

As noted earlier, one of the interesting elements of the flow map is its ability to graphically represent the movement or alteration of almost any object. One of the consequences of this broad applicability is that the practice of mapping flows has moved beyond the disciplinary boundaries of cartography and human geography to become a rather popular means of presenting information regarding movement and change throughout the social sciences. 'The flow map has an intriguing elegance', observes Mark Monmonier (1993: 190), such that 'the scholar with relevant data often cannot resist its ability to organise information and capture the reader's attention'. At a time when institutional, governmental and corporate pressures mean that academics within such fields find themselves needing to offer a veneer of objective scientificity to the research that they produce, even when this is grossly unsuited to their actual goals and methodologies, the mapping of flows provides a visually appealing and easily graspable way of fulfilling such expectations. It also risks *giving* a mode of representation (and in this sense then, giving a world in itself) that is structured in line with the exigencies of the rationalised, neoliberal academy. This is not to imply that other forms of mapping do not or would not comply with such exigencies in a similar manner, but merely to underscore the contingency of any particular instance of representation, embedded within the norms and conventions of its conditions of production.

When I speak of mapping as a mode of *givenness*, I mean specifically that a map is not simply a form of representation in its own right, but is a system through which a representation of the world is given. '[M]ap projections refer to their own systematicity', writes Cubitt (1998: 52), 'but also, as framing devices,

[they] point towards a world which they compose for the viewer but oppose to themselves'. When we speak in terms of the traditional map, it is not so much that an authorial subject (the cartographer) represents an objective eternal reality within which he or she resides, but that this precise division between subject and world is *given through* the process of mapping, establishing and refining the latter's contours and boundaries. Against a 'defiant insistence on a logic of representation, a common-sense belief in the evidence of an objective "reality" that is prior to all mental representations or written marks, a normative concept of rigour and scientism' (Siegert, 2011: 13), we can instead think mapping as a performative gesture productive of the phenomenality that we typically refer to as 'experience'. What makes digital mapping particularly worthy of commentary, however, is the way in which it quite visibly severs the presumed hierarchy between cartographer and world, situating instead in the latter's place the abstractions of digital data. Rather than making claim to the representation of an external, objective world, the procedural, generative and dynamic nature of digital mapping makes quite evident the way in which its production is reliant upon digitised, computerised data which *in no way resembles its supposed referent*. Luciana Parisi writes (2013: 18):

> generative algorithms are entering all logics of modeling – so much so that they now seem to be almost ubiquitous (from the modeling of urban infrastructures to the modeling of media networks, from the modeling of epidemics to the modeling of populations flows, work flows, and weather systems).

What digital mapping thus at least partly brings to light are the abstractions and ideals that lie at the heart of all cartographic practices, and which exist not as some necessary evil, corrupting and simplifying their referents in the name of utility, but as the very parameters through which this world is given. Whereas mapping in its traditional form was able to occlude this relationship because of the visual and spatial resemblance of its products to the empirical world that it claimed to represent, digital data and its generative algorithms are utterly incommensurable with analog visualisations that it produces. This quite starkly unveils the interfacial mediation of the digital. In the words of Alexander Galloway (2012: 82), data '*have no necessary visual form*', and as such, require 'a contingent leap from the mode of the mathematical to the mode of the visual' in order to be represented. He goes on to remark that 'any visualisation of data must invent an artificial set of translation rules that convert abstract number to semiotic sign', pointing out that 'any data visualisation is first and foremost a visualisation *of the conversion rules themselves*, and only secondarily a visualisation of the raw data' (Galloway, 2012: 83). Once again, the process of representation

that constitutes mapping is a process of givenness in its own right, rather than the mimesis of an already-given reality.

So how then does this relate to the notion of flows and fluidity? In the end, it is a question of critically interrogating the ways in which data are represented, given any visualisation in this respect is necessarily contingent (and thus arbitrary). We must not accept that any form of digital cartography is essential, natural or straightforwardly empirical (in the sense of a direct correspondence between representation and reality). What I wish to argue here is that the very concept of the mapping of flows, while potentially valuable in some instances, risks ontologising and absolutising the historical contingencies that it claims to represent, making them appear natural and unproblematic. In other words, the category of flows is a specific *form* of representation through which a distinctly, albeit not necessarily deliberately, ideological reality is given. In order to do this, I will return to the metaphor of flow as utilised in the social sciences, before reflecting upon its place within mapping more narrowly.

To say that '"everything flows", that matter is in flux, moving, becoming, is not to say that everything moves in the same way or at the same speed', contends Peter Merriman (2012: 5), for 'the world may be in constant movement, flux and becoming, but this does not mean that these movements are flat, linear and uniform'. In one sense, Merriman is correct – all things change, all things become, but they do so at their own rates, in relation to their own ontogenesis and patterns of individuation. At the same time though, is not the very notion of the 'flow' an exemplary case of the homogenising tendencies of such a discourse? Does not this metaphor carry along with it a set of affective, scientific and metaphysical presumptions that already shape and delimit these purportedly heterogeneous phenomena? It would be problematic to try to extricate the category of flow from the differential ontologies (those that identify being not with a stable, inert substance, but with the movement of a self-differentiating *becoming*) that have grown in influence over the course of the twentieth century. As Tim Cresswell (2006: 26) notes, whereas most traditional accounts of metaphysics (excluding perhaps the hydraulic model of Lucretian atomism) conceive of movement 'through the lens of place, rootedness, spatial order, and belonging', and thus view it 'as morally and ideologically suspect, a by-product of a world arranged through place and spatial order', this more recent form of ontology 'puts mobility first, has little time for notions of attachment to place, and revels in notions of flow, flux, and dynamism'. Perhaps such a category is needed, in order that these claims to heterogeneity might be given (and thus represented, within the strictures of theoretical discourse, if not the visual configurations of mapping), but this does not mean that flow is the *only* category that

could be used, or that the connection between it and observations of movement or change is self-evident and unproblematic.

So why, we must ask, has this trope become so popular? Why is the term so frequently, uncritically and off-handedly deployed in the social sciences, and especially within the practices of mapping that have grown in dominance within these disciplines? The simple answer is probably to a large degree the correct one: the image of fluidity is an effective metaphor for the way in which network-driven distribution channels are able to transmit goods, information and even people at *rates and speeds* that make them effectively unthinkable by the human intellect alone, particularly when attempting to represent these movements in a visual manner. In one sense, the way in which digitisation has allowed such movements to instead be tracked through computerised algorithms – practical implementations of complexity theory – has allowed them to be characterised in this fashion, as a kind of simplistic formal cause: 'the way it tends to privilege a form (unbroken, agentless movement) over any content' (Rockefeller, 2011: 560). It does not matter what the contents of the flow are, as long as they flow, and as such, a contingency is raised to the status of a general category. Yet this is still an incredibly abstract sense of form, with no real recognition of the heterogeneity in speed, content and direction of these so-called flows. It is, in Alberto Toscano's (2008: 58) terms, a 'warm abstraction'. Far from the detached, static ideas that we usually associate with the abstract, he observes that 'recent conceptual production has sought to circumvent the customary reproaches against abstract thought by promoting concepts that are ever more vital, supple, pliant: flows, rhizomes, the virtual, scapes, the diagram, and so on' (Toscano, 2008: 58). In many cases, this term 'flow' appears to act as a floating signifier, used to describe some ineffable quality of the movements of a globalised world.

Marshall McLuhan (1964: 28) argues that 'the instant speed of electricity confers the mythic dimension on ordinary industrial and social action', and I wonder whether there is an element of this mythology in the conception of digital fluidity and its manifestation within the discourse of mapping: the seductiveness of the metaphor presents an effective way of mentally fathoming the overwhelming temporal complexity and acceleration of our world today. There is a worrying latent utopianism that seems to reside within this metaphor – writes Virilio (1994: 28):

> the power of the unexplored side of the failure of technical knowledge, a poetics of wandering, of the unexpected, the shipwreck which did not exist before the ship did; and beside this, very much alongside it, that stowaway, madness: the internal shipwreck of reason for which water, the fluid, remains a Utopian symbol throughout the centuries.

This is not to suggest that flow maps are necessarily embedded within anti-technological romanticism.[3] Instead they can, regardless of the intentions of their creator, be read in such a fashion, and can simplistically depict a freedom of movement more in line with the mythology of digital capitalism than anything else.

   None of this is to say that the mapping of flows is without utility, or that it is inherently politically reactionary. It is important that we elucidate the patterns of transnational commerce that define today's economy, especially given the way in which discourses of global development and growing labour markets belie the grossly unequal distribution of wealth and concentration of capital within a small set of post-industrial Western nations (even if this dynamic is gradually changing). Mapping flows also provides opportunities for understanding with greater clarity the ways in which specific types of commodities, particularly the products of informational and affective labour, are transmitted and distributed across borders and through diasporic communities, and can illustrate effectively the vast population movements and general processes of deterritorialisation that picked up speed during the twentieth century. There are a plethora of such opportunities available, and they should not be summarily dismissed. But at the same time, we must highlight that the metaphor of flows is not the only way to present such data, and is certainly in no sense a *natural* means of representation, having emerged from the very systems that we are attempting to critique.

   There is a troubling level of obfuscation, as I hope to have shown, in this concept – as Rockefeller (2011: 564) notes quite accurately:

> certain usages of 'flow' carry some intellectual baggage that I doubt most people who use it would welcome – a radical time/space dualism and incompatibility with dialectical approaches. If we accept the terms of the dichotomy implicit in this genealogy of 'flow,' it becomes impossible to understand places or anything as the products of movement. Rather, things and movement remain in permanent opposition as appearance versus truth.

These categories of 'flow' and 'flows' are not neutral descriptors of the world, nor are they simply reductive and abstracted means of describing a reality that exceeds them. On the contrary, it is through these abstractions, at least in part, that such a distinction is given in the first place. Because data have no necessary visual form, we should not accede to any protestations regarding the inexorability of such representations. Flow, as a moulding of geolocational and temporal data into the form of a map, provides the representative frame through which the world is at least partly given, and is, in my contention, one that smooths

over the disjunctures and dissymmetries that characterise the global economy today and problematise the mythology of a frictionless capitalism freed of any limitations or peripheries. The mapping of flows, in other words, even when it seeks to challenge the status quo, risks falling back into the same ideological practices of the state, military and financial institutions that, as Benjamin Noys (2010: 125) would have it, do not so much glide over an already-smooth space as 'constantly and actively *smooth* space' themselves.

Is it possible then to conceive of a politics of mapping, and a practice of representation that 'involves the preservation not merely of utopian moments or fantasies within the "smooth space" of capitalist ideology, but rather the memories and re-actualisations of forms and modes of struggle' (Noys, 2010: 169)? I would argue that it is, and that while we do not need to abandon the concept or application of the flow map (since this rejection would simply be an act of even greater obfuscation), we do need to augment or supplement it with a far greater level of attention to the breaks, disjunctures and striations that inhibit movements, as well as the institutional structures, both national and multinational, that coordinate them. Given how closely the very category of flow reinforces the mythologies of an entrenched and obdurate global capitalism, more effort should be made to indicate the inevitable disconnect between this and other potential modes of representation – that is, to show the contingency of this representation, and the gap between the givenness of the flow map and the data that is given (and hence shaped) through it.

Additionally though, what we might attempt to elucidate is the technical *mediation* that tends to be occluded in this form of presentation. Such mediation lies not only in terms of the various modes of computerised or otherwise mediated coordination that manage, direct and surveil these movements, but also resides in the technical conditions under which the processes of mapping occur, especially at a time when we are so heavily reliant upon geographic information systems and digitised processing of data. A denatured procedure of mapping flows would attempt to unveil such conditions of production, for as Wolfgang Ernst (2013: 52) writes, 'when a fiction is revealed, artificiality is also revealed, and the coming out of media is witnessed'. We should steer clear, however, of assuming that such a revelation is indicative of the fictional status of maps in relation to the objective reality that they supposedly represent; rather, by unveiling the mediation that lies at the heart of the very givenness of mapping as practice and decision, we can collapse this division. The point on which we should, and indeed must end then is that maps are always in some sense fictional, for they do not represent a reality as much as *give* the phenomena through which a reality is at least partly created. The question is, is the mapping of flows the most appropriate kind of fiction?

Acknowledgements

Notes

1   For a more detailed overview of the problems of representation in practices and discourses of mapping, see Del Casino and Hanna (2006).
2   A more contemporary equivalent of the *Tabula Peutingeriana* perhaps being the now-common public transport maps created in the wake of Henry C. Beck's 1933 circuit-like redesign of the London Underground's various lines: a remarkably clear but also highly abstract representation of a series of locations with little affordance made to either location or distance, as opposed to a map that is primarily grounded in a representation of physical space and the objects contained within it.
3   Plato is arguably the originator of this kind of thinking. In the *Protagoras* he equates the movement of water with the slipperiness of sophistry, counselling the titular character (one of the first sophists) to avoid sailing out into the open sea of false speeches and misleading rhetoric.

References

Appadurai, A. (1990) Disjuncture and difference in the global cultural economy. *Theory, Culture and Society*, 7: pp. 295–310.
Appadurai, A. (1996) *Modernity at Large: Cultural Dimensions of Globalization.* Minneapolis, Minnesota: Minnesota University Press.
Bauman, Z. (2000) *Liquid Modernity*. Cambridge and Malden: Polity.
Bergson, H. (1911) *Creative Evolution.* Translated by A. Mitchell. Mineola: Dover.
Bhagat, A. and Mogel, L. (eds) (2008) *An Atlas of Radical Cartography*. Los Angeles: Journal of Aesthetics and Protest Press.
Boltanski, L. and Chiapello, E. (2007) *The New Spirit of Capitalism*. Translated by G. Elliott. London: Verso.
Castells, M. (1991) *The Informational City: Information Technology, Economic Restructuring, and the Urban-Regional Process.* Oxford: Blackwell.
Castells, M. (2010) *The Rise of the Network Society.* Chichester: Wiley-Blackwell.
Cresswell, T. (2006) *On the Move: Mobility in the Modern Western World*. London: Routledge.
Cubitt, S. (1998) *Digital Aesthetics*. London: Sage Publications.
Cubitt, S. (2013) 'Global media and archaeologies of network technologies'. In: Graves-

Brown, P., Harrison, R. and Piccini, A. (eds) *The Oxford Handbook of the Archaeology of the Contemporary World*. Oxford: Oxford University Press, pp. 135–148.

Dalton, C. and Mason-Deese, L. (2012) Counter (mapping) actions: Mapping as militant research. *ACME: An International E-Journal for Critical Geographies*, 11: pp. 439–466.

DeLanda, M. (1991) *War in the Age of Intelligent Machines*. New York: Zone Books.

Del Casino, V. J. and Hanna, S. P. (2006) 'Beyond the 'binaries': A methodological intervention for interrogating maps as representational practices. *ACME: An International E-Journal for Critical Geographies*, 4(1): pp. 34–56.

Deleuze, G., and Guattari, F. (1988) *A Thousand Plateaus: Capitalism and Schizophrenia*. London: Bloomsbury Publishing.

Ernst, W. (2013) *Digital Memory and the Archive*. Minneapolis, Minnesota: University of Minnesota Press.

Galloway, A. R. (2012) *The Interface Effect*. Cambridge: Polity.

Harris, R. L. (2000) *Information Graphics: A Comprehensive Illustrated Reference*. Oxford: Oxford University Press.

Hassan, R. (2012) The knowledge deficit: Liquid words as neo-liberal technologies. *International Journal of Media and Cultural Politics*, 8: pp. 175–191.

MacEachren, A. M. (1979) The evolution of thematic cartography: A research methodology and historical review. *The Canadian Cartographer*, 16: pp. 17–33.

Martin, E. (1996) The society of flows and the flows of culture: Reading Castells in the light of cultural accounts of the body, health and complex systems. *Critique of Anthropology*, 16: pp. 49–56.

Marx, K. (1973) *Grundrisse*. Translated by M. Nicolaus. London: Penguin.

McLuhan, M. (1964) *Understanding Media: The Extensions of Man.* New York McGraw Hill.

Merriman, P. (2012) *Mobility, Space, and Culture*. London: Routledge.

Monmonier, M. (1993) *Mapping It Out: Expository Cartography for the Humanities and Social Sciences*. Chicago, Illinois: The University of Chicago Press.

Noys, B. (2010) *The Persistence of the Negative: A Critique of Contemporary Continental Theory*. Edinburgh: Edinburgh University Press.

Parisi, L. (2013) *Contagious Architecture: Computation, Aesthetics, and Space*. Cambridge, Massachusetts: The Massachusetts Institute of Technology Press.

Rockefeller, S. A. (2011) Flow. *Current Anthropology*, 52: pp. 557–578.

Siegert, B. (2011) The map *is* the territory. *Radical Philosophy*, 169: pp. 13–16.

Speed, C. (2011) Kissing and making up: Time, space and locative media. *Digital Creativity*, 22: pp. 235–246.

Stiegler, B. (2011) *The Decadence of Industrial Democracies*. Translated by D. Ross and S. Arnold. Cambridge: Polity.

Sutherland, T. (2013) Liquid networks and the metaphysics of flux: Ontologies of flow in an age of speed and mobility. *Theory, Culture and Society*, 30: pp. 3–23.

Sutherland, T. (2014a) Getting nowhere fast: A teleological conception of socio-technical acceleration. *Time and Society*, 23: pp. 49–68.

Sutherland, T. (2014b) Intensive mobilities: figurations of the nomad in contemporary theory. *Environment and Planning D: Society and Space*, 32: pp. 935–950.

Talbert, R. J. A. (2010) *Rome's World: The Peutinger Map Reconsidered*. Cambridge: Cambridge University Press.

Thacker, E. (2004) *Biomedia*. Minneapolis, Minnesota: University of Minnesota Press.

Thrift, N. (1996) *Spatial Formations*. London: Sage Publications.

Toscano, A. (2008) The culture of abstraction. *Theory, Culture and Society*, 25: pp. 57–75.

Virilio, P. (1994) *The Vision Machine*. Translated by Julie Rose. Bloomington and Indianapolis: Indiana University Press.

Virilio, P. (2006) *Speed and Politics: An Essay on Dromology*. Translated by M. Polizzotti. Los Angeles: Semiotext(e).