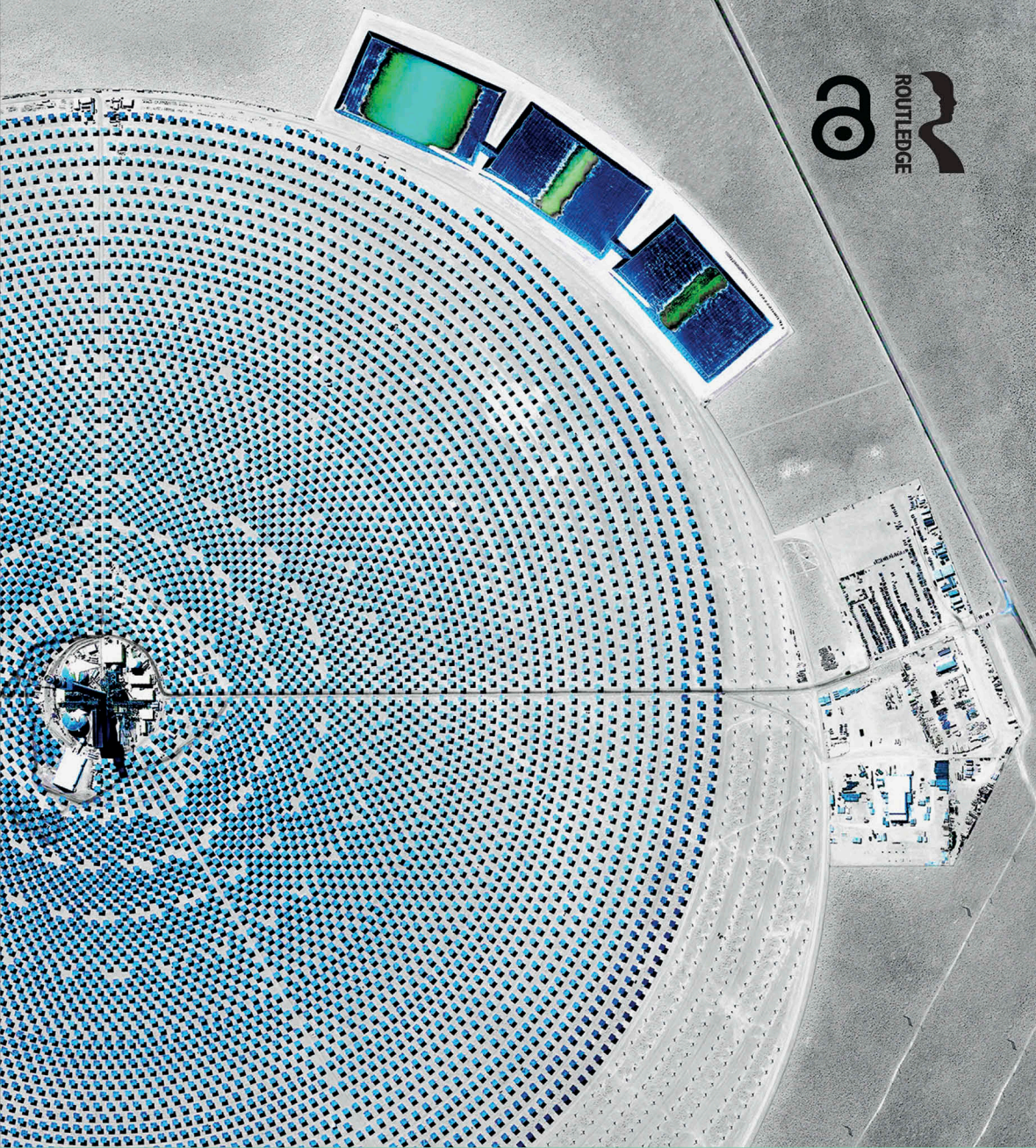

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MAPPING AND POLITICS IN THE DIGITAL AGE

Edited by Pol Bargués-Pedreny, David Chandler and Elena Simon

"*Mapping and Politics in the Digital Age* interrogates maps – seemingly simple yet profoundly complex; agents driving the way we understand and make our world. Historical exemplars lay bare how maps actively build and contest conceptions of the world. Maps are revealed as they permeate and evolve with institutional practices and governance. Finally, the book shows mapping appropriated and deployed to bring about new forms of politics, countering and empowering and visualizing a more just world."

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"A book with an impressive array of new ideas from an interesting collection of contributors. The editors are to be commended on their creativity in assembling such a valuable multidisciplinary examination of cartographic power in the new digital world. I find it highly encouraging that the collection draws lessons and perspectives from historic cartography to look forward and better describe the impacts of mapping practices that are coming into being now and in the near future."

— ***Martin Dodge,*** *Department of Geography, University of Manchester, UK*

"Mapping is not what it used to be! This collection of essays by scholars from across the social sciences and humanities shows why politics in the twenty-first century has been transformed by digital technologies, which reconfigure the knowledge practices through which the world is made knowable as a scene for intervention - by those seeking to impose order on an uncertain future as well as by those seeking to imagine alternative futures."

— ***Clive Barnett,*** *Professor of Geography and Social Theory, University of Exeter, UK*

MAPPING AND POLITICS IN THE DIGITAL AGE

Throughout history, maps have been a powerful tool in the constitutive imaginary of governments seeking to define or contest the limits of their political reach. Today, new digital technologies have become central to mapping as a way of formulating alternative political visions. Mapping can also help marginalised communities to construct speculative designs using participatory practices. *Mapping and Politics in the Digital Age* explores how the development of new digital technologies and mapping practices are transforming global politics, power, and cooperation.

The book brings together authors from across political and social theory, geography, media studies and anthropology to explore mapping and politics across three sections. *Contestations* introduces the reader to contemporary developments within mapping and explores the politics of mapping as a form of knowledge and contestation. *Governance* analyses mapping as a set of institutional practices, providing key methodological frames for understanding global governance in the realms of urban politics, refugee control, health crises and humanitarian interventions and new techniques of biometric regulation and autonomic computation. *Imaginaries* provides examples of future-oriented analytical frameworks, highlighting the transformation of mapping in an age of digital technologies of control and regulation. In a world conceived as without borders and fixed relations, new forms of mapping stress the need to rethink assumptions of power and knowledge.

This book provides a sophisticated and nuanced analysis of the role of mapping in contemporary global governance, and will be of interest to students and researchers working within politics, geography, sociology, media, and digital culture and technology.

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MAPPING AND POLITICS IN THE DIGITAL AGE

Edited by Pol Bargués-Pedreny, David Chandler and Elena Simon

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MAPPING AND POLITICS IN THE DIGITAL AGE

An introduction

Pol Bargués-Pedreny, David Chandler and Elena Simon

Introduction

Mapping has always been a powerful tool in the constitutive imaginary of regimes of governance, from pre-modern cosmologies to modernity's wars of development and colonisation and the postmodern questioning of the nature–culture divide. The power to visualise the location of entities in time and space has been a vital technology of political claim-making and contestation. Today, new digital technologies have become central to mapping as a practice of formulating alternative political visions: from the tracing of river delta changes to the detection of Amazonian ethnological and ecological infrastructures; from the monitoring of prenatal abnormalities to the reconstruction of war crimes and military drone attacks; from participatory mapping practices in marginalised communities to speculative designs in the post-Anthropocene. Today's mapping projects and networks, from open source mapping to crisis mapping programmes, or from projection mapping to map art, increasingly rely on the power of algorithmic computation and machine-learning, drawing upon new software applications and increasingly sophisticated information collected from orbiting satellites.[1]

In today's world, increasingly conceived of in terms of complexity, emergence and unknowability, mapping bears little resemblance to its physical cartographic origins. The entities and data produced by mapping techniques and practices have become much more diverse – less matters of straightforward representation and more likely to appear as 'ephemeral mappings' of relations and correlations (Crampton, 2009, 841). Contemporary imaginaries of mapping as a real-time and evolving process without fixed spatial relations thus raise new concerns and

1 Recent market reports on the wider geospatial industry project this industry to be worth over 40 billion US$ in 2018 with an expected growth up to 86 billion US$ by 2023 (MarketsandMarkets, 2018; Geospatial Media and Communications, 2018).

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possibilities for mapping and politics. Thus, this collection, *Mapping and Politics in the Digital Age*, brings together a range of analysis – across the disciplines of political and social theory, geography, media studies and anthropology – to engage with contemporary transformations in mapping and politics, brought into sharp relief by the development of new computational technologies.

The contributors brought together in this collection seek to analyse and engage with mapping as a vital sphere through which the problematics and tasks of governance are constructed and contested. Mapping concerns the relations and interactions of the entities subject to policy intervention (in the sphere of international relations these entities could be states or societies subject to policy interventions in the diverse spheres of economic, political, social and environmental problems). Authors explore mapping and politics across three markers, which are also used to structure this introduction. First, Contestations, which brings together enquiry into the politics of mapping as a form of knowledge and contestation. This section introduces some of the key themes of mapping as a political technology, as epistemological enquiry and as a set of practices constituting what is known, as much as perspectives through which places and objects are seen. It also introduces the reader to the contemporary developments within mapping and how new ways of seeing and contesting have been enabled. The second part, Governance, understands mapping as a set of institutional practices of knowing and governing. It provides key methodological angles to consider global governance in the realms of urban politics, refugee control, health crises and humanitarian interventions and new techniques of biometric regulation and autonomic computation. The third section, Imaginaries, analyses how mapping is increasingly deployed to bring new forms of politics, objects and agencies into being. It provides examples of future-oriented analytical frameworks, highlighting the transformation of mapping in an age of digital technologies of control and regulation, in which in a world without borders and fixed relations, new forms of mapping stress the need to rethink assumptions of power and knowledge.

Contestations

In the age of ubiquitous digital technology it is increasingly apparent that mapping has little in common with traditional cartography. In fact, the imbrications of mapping with politics enable the contributors to this collection to understand mapping as co-constitutive of the conceptualisations of both time and space; viewing these as outcomes of mapping methodologies rather than as containers with straight lines that maps can represent. J. B. Harley, in his influential work, which helped establish the field of critical cartography, accurately described the limited conception of mapping understood as a merely technical exercise of representation with its emphasis on the 'true' map (Harley, 1989): 'Its central bastions were measurement and standardization and beyond there was a 'not cartography' land where lurked an army of inaccurate, heretical, subjective, valuative, and ideologically distorted images' (1989, 5). For critical approaches to cartography,

this representational framing of mapping produced 'the map as an authoritarian image', removing life and context and thus facilitating managerial, bureaucratic and autocratic modes of governance, distanced from the complex reality on the ground (Harley, 1989, 14).

For Bruno Latour, the map as an 'immutable mobile' was key to the homogenising and universalising drive of modernity, enabling the abstraction of knowledge and the creation of 'objective' space: 'Even the very notion of scale is impossible to understand without an inscription or a map in mind. The 'great man' is a little man looking at a good map. In Mercator's frontispiece, Atlas is transformed from a god who carries the world into a scientist who holds it in his hand! (1986, 27). This is exemplified, for example, in the first world maps that enabled Castile and Portugal to draw lines and claim the sovereignty of lands under the treaties of Tordesillas and Saragossa in 1494 and 1529 (Lobo-Guerrero, this volume) and the late eighteenth century charts of the Atlantic Gulf Stream, enabling westwards navigation, contributing to new trade routes between Europe and North America (Richardson, 1980). At the birth of modernity, European geographers (like the one depicted by the Dutch artist Johannes Vermeer) (Figure 11.4) looked to the stars, calculated the angles of meridians and helped European powers to gain a new level of mastery over the earth (see Panneels, this volume).

Mapping was thus predominately seen as merely an attribute of governmental power and control. The map acted as an 'epistemic engine' (Carroll-Burke, 2001; 2006), constituting space as an empty container filled with distinct autonomous places, side-by-side as separate entities, without context: thus creating a fictional world amenable to subject-centred human rule (Latour, 2016, 7). As Benjamin Bratton states: 'Lines that are linked, folded, and looped become a frame, keeping things in or out … . The modern nation-state is itself also [a] function of a cartographic projection that conceives the Earth as a horizontal plane filled with various allotments of land'; thus, there is 'no stable geopolitical order without an underlying architecture of spatial subdivision' (2015, 24). Mapping was thereby a process of 'emptying out' space of its constitutional relational dynamics and its replacement by a 'universal spatial order based on mathematical formalization and geographic interchangeability: a 'groundless materialism' of 'false equivalences' that could be 'divided up like an algebraic equation' (Bratton, 2015, 30).

In this edited collection, contemporary forms of mapping are conceptualised in a quite different way: as a set of ongoing and embodied practices. Rather than the representation of a two-dimensional flat, constantly present and universal space, which is colonised by places, mapping in a digital age develops an understanding of space as a product of inter-relationality. Therefore, as Doreen Massey has noted: 'we understand space as the sphere of the possibility of the existence of multiplicity in the sense of contemporaneous plurality; as the sphere in which distinct trajectories coexist; as the sphere therefore of coexisting heterogeneity' (2005, 9). For mapping as a mode of contestation, of governance, and of imagination, space is understood to be actively produced through plural interactions: as a relational

outcome, which can be mapped only through seeking to concretise it as a specific or unique set of contingent relations.

In this sense, following from Kitchin and Dodge (2007), mapping is not seen as a fixed or objective representation of the world but rather as an iterative and processual attempt to visualise a particular set of relationships to facilitate problem-solving. Rather than as an abstract image of the world – as if a single map could be 'viewed as a universal and essential solution to a range of questions (that there can be a "best" or "most accurate" map that all people understand and use in the same way to address a range of problems)' (2007, 12) – mapping is seen as a potential method of deconstructing universal forms of representation and causality, bringing knowing closer to reality. It is thus conceived here as processual rather than as representing fixed points or relations. Where, for some contributors, the framing here differs from that of Kitchin and Dodge is that the relational problems addressed in mapping are not merely spatial but also temporal. Mapping as narrative-tracing can deal with relations in time as well as space (for example, on mapping and narrative, see Caquard, 2013; Ryan, this volume). Mapping becomes central in the digital age precisely in recognition of the appreciation of relationality and differentiation.

The use of digital technologies, enabling the visualisation and understanding of dynamic interconnections across time and space, increasingly forestalls artificial separations and distinctions such as the global/local. Today's sensitivities to difference and radical contingency, construct the political in ways that are much less amenable to modernist imaginaries of human mastery. Therefore, somewhat paradoxically, digital maps have facilitated the consideration of the world as 'analogue', as interconnections undermine fixed, abstract and 'objective' imaginaries of representation, instead highlighting the fluidity and heterogeneity of 'nondistinction' (further, see Galloway, 2014). Thus mapping becomes an important technique in contestations, governance and imaginations as it reverses the imaginary of classical liberal assumptions of universal or flat 'Newtonian' space and instead emphasises the spatial, contextual and relational development of social, economic and political institutions, ecosystems and, in its logical development, all entities and assemblages (further, see Massey, 2005).

Mapping becomes a radical and open practice, opposed to reductionist understandings of the world, which empty it of relationality and historical specificity (Ryan, this volume). Mapping thereby enters social and political theorising to engage difference and describe non-linear outcomes such as why the introduction of markets or democracy might make problems of conflict or development more intractable or how social and political institutions affect the impact of social and environmental changes. Rather than taking traditional representations for granted and assuming the power of agential forces (either human or non-human) or the properties of fixed entities, mapping approaches tend to see these representations as concealing the work of relation and translation.

For authors in the first section of this collection, mapping is viewed as central to the articulation of critical alternatives; and increasingly articulated and deployed in

ways that are critical of modernist or linear understandings of governance. Participatory mapping and counter-mapping practices have been used to amplify voices and empower previously marginalised groups and to offer alternative knowledge and future-oriented scenarios, in order to resist the view 'from above', which has been prevalent in traditional maps (Feigenbaum and Specht, this volume). In these cases, mapping agency is no longer exercised from the 'top down' or through the 'vertical' but rather from the 'bottom up' or the 'horizontal'. In discourses of empowerment or capacity-building and inclusion, the mapping of these relations and interactions is often termed 'process-tracing' or the charting of 'path-dependencies', to reveal the contingent nature of interactive processes and the possibilities for intervening to adjust or manipulate these relational cartographies. Yet, as Nicholas Michelsen cautions, in this volume, celebratory accounts of the emancipatory power of the 'bottom-up' or 'horizontalist' approach may be premature.

Governance

One concept that is key to contemporary analytics of mapping is the notion of governance instead of government. This shift implies a different relationship to the problem of control and regulation. In this shift, the world to be mapped is more lively, interactive and contingent where causality is no longer 'linear' but 'complex' or 'non-linear'. This understanding sees causation not as the unfolding of fixed essences or relationships but as a process of complex interaction. Non-linearity means that outcomes are mediated, i.e. that they depend not merely on 'inputs' into the system but rather on how these inputs, in terms of information, interaction, system disturbances, etc., are perceived, understood and responded to. Mapping, in ways that focus on tracing interactive processes and contingent outcomes, can be seen as a distinctive way of recasting traditional maps and forms of governance in a digital age. In this introduction, we suggest that this way of grasping contingent relations, as a problematic of governance, can be usefully analysed through neoliberal constructions of the limits to 'command-and-control' governance agency. Before we explore the logics of mapping in an age of ubiquitous computing, it is therefore useful to introduce and briefly trace the internal development of, and transformations within, neoliberal discourse, as these approaches to contingency moved from the position of marginal critique to becoming an important operating methodology of governance: 'actually existing neoliberalism' (Brenner and Theodore, 2002).

The driving concern of Friedrich von Hayek, often considered the archetypal neoliberal theorist, was the need to counteract the Keynesian influence of state-led development perspectives. These were seen as dangerous approaches to governing intervention in the market, which could reinforce the claims of socialist and communist parties, seeking power on the basis of the possibility of a state-led transformation of socio-economic conditions (Plehwe, 2009). For Hayek, while Cartesian or Newtonian imaginaries of fixed separations might work for the development of abstract technical and scientific 'laws' with some (although limited) application in the natural sciences, the social world was not amenable to understanding through

such conceptual fabrications and crude tools of reasoning (1978b). In the face of 'real' interactive and entangled processes, modernist frameworks thus vastly overrated the power of human reasoning (1978a, 22; 1945, 521–2).

According to Hayek, behavioural responses depended less on the universal 'reality' we were confronted with than on the previous psychological preconditioning of our minds (Mirowski, 2002, 232–40). Human consciousness, in fact, prevented engagement with the world in a universal reasoned and rational way (Hayek, 1952, 25). Just as individuals were held to respond in differential non-linear ways, which fed back and magnified differences in behavioural responses, so too did nations and states, with responses dependent upon their endogenous eco-social conditions. For neoliberal development economists, these path-dependencies meant that, even if the world was becoming more interdependent and globalised, the impacts of these universalising tendencies would be non-linear – differences in eco-social developments would be magnified rather than becoming ameliorated (for example, North, 1990; 1999; 2005). For neoliberal theorising, all distinct systems could self-reproduce different forms of emerging order despite seemingly universal starting conditions. Interactive and iterative processes meant that small differences could over time produce divergent socio-economic orders – in the same way as evolution produced differences in species if they were isolated from each other, such as Darwin's finches on the Galapagos.

The crucial facet of mapping as a neoliberal governmentality was that differences in outcomes could be understood as agential – conscious, subjective choices – rather than as structurally imposed. The key to the self-responsibilisation of the neoliberal subject was therefore not the liberal assumption of rational autonomy, presupposing equality, but the neo-liberal view that this 'autonomy' explained differential outcomes, presupposing and reifying inequality (Chandler and Reid, 2016). As Michel Foucault noted, the work of these neoliberal or neo-institutionalist theorists was not primarily concerned with economic theory but was closely tied to sociological framings and drew on legal and historical problematics, raising 'a whole series of problems that are more historical and institutional than specifically economic' (2008, 135). Where political programmes of intervention through social or political engineering posited social differences as amenable to 'top-down' change, neoliberal approaches stressed agential choice in concrete conditions. It was precisely the agential nature of choice-making which made developmental processes non-linear or unpredictable. Thus the critique of the modernist assumptions of fixed relations in the external environment was intimately tied to conceptions of distributed agency. While, for neoliberal frameworks, the focus was upon explaining (and justifying) socio-economic differences and inequalities, this sensitivity to agency and interaction as drivers of difference and contingent or non-linear outcomes was to become central to the development of mapping as a technique for addressing contingency in our contemporary digital age.

This active and interventionist framing of neoliberalism has been analysed well by Foucauldian governmentality theorists, and others, who have described these forms of regulatory and technical intervention, extending the role of the state in

areas of socio-cultural life held to be the preconditions shaping the environmental and ideational context for social and economic decision-making (for example, Barry et al., 1996; Castree, 2007; Collier, 2005; Dean, 2010; Foucault, 2008). These new indirect forms of intervention necessitated an understanding of deeper and deeper sets of relational interaction: thus, mapping as a key governmental framing was consolidated (Finkenbusch, 2017). In fact, it could be argued that this mode of indirect governance intervention, on the basis of building adaptive capacity, is so well established today that it is rarely considered as a neoliberal construct and much more usually as a pragmatic recognition of the determining role of contextual, institutional and cultural, realities.

In the international sphere this shift was broadly consolidated in the last years of the 1990s, with greater disillusionment with universalist or 'liberal' approaches suggesting that Western or international actors could resolve problems of development, democracy and peace through the export of liberal institutions (Bargués-Pedreny, 2018). As policy-makers shifted away from understandings of the ease with which liberal values and institutions could be exported, so they discovered the importance of societal interactions and the contexts in which local agencies operated on the ground. In response to the so-called 'Liberal Peace' approach (Campbell et al., 2011), neoliberal or neo-institutionalist approaches argued instead for mapping as a governing methodology, clearly expressed in, for example, Roland Paris' (2004) book *At War's End*. Paris argued that the export of liberal institutional frameworks could not be expected to work as a 'quick fix' when the deeper inter-subjective relations within these societies were not compatible with their operation. Any lack of fit would potentially result in unintended and illiberal outcomes (Chandler, 2017).

Thus institutional and socio-cultural interactions were seen as prior concerns to be mapped and addressed to enable any 'translation' of Western institutional forms. As Bruno Latour argues 'democracy can't be parachuted from the bay of a US Air Force plane' (2013, 332):

> If the universalization of knowledge remains a hypocritical pretense as long as we fail to extend the laboratories and colleagues that make it possible to bring knowledge into existence, the universalization of freedom is only a gratuitous injunction as long as we don't take pains to build the artificial enclosures, the 'greenhouses', the air-conditioned equipment that would finally make the 'atmosphere of politics' breathable.

Thus mapping becomes the precondition for policy interventions, enabling policy to be 'translated' from decontextualised aspiration to contextualised possibility. Failures of policy-making then become problems of mapping and the two become thoroughly imbricated in the same process of understanding the differences that differences make and adapting policy through this iterative learning process.

Mapping approaches thereby sought to understand problems as a result of maladaptive dependencies or blockages to system adaptivity. Therefore, external

governance interventions sought to map social, cultural and institutional interactions and effects in order to design policies of intervention into these internal processes. Mapping was able to become a framework of governmentality easily able to extend, from the public sphere to the private and further, to include natural or environmental processes in social outcomes. It sought to consider ever more aspects, to explain why some societies were better able to cope with problems of conflict, disaster and social and environmental change than others. This process of including more and more factors has extended to trace a wide range of interactive or non-linear outcomes, which were previously excluded as 'natural'. Thus, it is common today to argue that disasters and 'natural' catastrophes have, throughout history, had endogenous social roots, being products of human decision-making and non-linear path dependencies (Tierney, 2014, 36). It is for this reason that the United Nations, in 2009, voted to change the designation of the 'International Day for Natural Disaster Reduction' and removed 'natural' from the title.

Under the auspices of new relational, interactive and contingent understandings, international organisations such as the UN, the World Bank and the IMF have been central to bringing mapping understandings to bear in the formulation of extensive good governance regulations, on the basis that 'natural disasters' are contingent products of internal systems of socio-economic and political interaction (for example, World Bank, 2010; 2015). Within this increasingly accepted argument lies the understanding that risk itself cannot be 'reduced' due to the interactive aspects and unintended outcomes of every situation that need to be addressed. Thus, the recognition of the relational embeddedness of all policy actions shifts the focus of governing approaches from 'risk reduction' to 'risk management' (Chandler, 2018, 44).

For example, this can be seen in the mapping of health crises, like the outbreak of Ebola in West Africa, in which digital maps amplify all sorts of risks of the virus's trajectory to legitimise management and containment responses (Ferhani and Stiles, this volume). Also, in the field of humanitarian action, rather than top-down and comprehensive interventions to address problems and their causes, international agencies increasingly use crisis maps – which are created by community volunteers who introduce real-time information on previously created satellite imagery – to focus on the effects of disaster and facilitate relief efforts (Bargués-Pedreny, this volume). The question whether digital maps reproduce the logics of new institutionalism, of structuring choices and frames of societies, or actually constitute a break with some of the tenets of neoliberal governance and invite more radical understandings of the world, thereby runs like a red thread though the chapters of this section.

It is clear that the extension of governing capacities through discourses of relation and depth generate dynamics of their own. This is highlighted through the analysis of biometric mapping, in an identity authentification programme in India (Bhat, in this volume). Harshavardhan Bhat's study illustrates the urgent need for critical examination and conceptualisation of what is at stake for the human body when it is transformed into an active body of economic transaction-ability in

contemporary governance systems. As Antoinette Rouvroy notes (this volume) in an analysis of autonomic computing, the modern subject becomes fragmented into 'correlatable' data and aggregated with others. Thus profiled, the individual will not necessarily be able to contest or resist the autonomic assignation of profiles and the practical consequences ensuing in terms of access to places, opportunities and benefits.

Imaginaries

The overview of the Crescent Dunes Solar Energy Project in Tonopah, Nevada (on the cover jacket of this book), shows thousands of heliostat mirrors that collect the energy of the sun to power up entire cities. The scale of the energy facility, when compared to the human scale, is immense, dazzling, and yet, at the same time, the picture reveals the huge impact of human activities on the geology of the earth. Benjamin Grant is the author of the 'Overview' project, which captures images of a humanly tattooed Earth (Grant, 2016). He is inspired by the 'overview effect', a cognitive shift experienced by astronauts when they saw the Earth from space as a fragile blue planet in need of care. Grant's images reflect the beauty and the fragility of the earth and the impacts of human imbroglios with nature, in order to envision new relations with other humans and non-humans. In the third section of this volume, the authors explore mapping as a political imaginary; as a set of immanent or virtual understandings informing new modes of governance. In so doing, mapping goes beyond the fixity of representations to speculate upon the 'virtual' or 'hidden' processes that produce surprising or unexpected outcomes.

Mapping as a political imaginary perhaps receives its clearest conceptualisation in the approach of assemblage theory. It is in the realm of virtual or immanent alternatives that mapping is seen to move furthest 'away from the anthropocentrism' of modernist thought (Acuto and Curtis, 2014, 2). In international theorising, assemblage theory has become increasingly discussed as a critical methodology focusing upon immanent and emergent understandings, challenging liberal or neoliberal views of causation (Anderson et al., 2012). The framing of assemblage thinking which has perhaps been most instrumental in establishing and cohering the contemporary imaginary of mapping has been C. S. Holling's work on complex interaction in the field of ecology (Walker and Cooper, 2011, 144). Holling's work was central to displacing the liberal imaginary of a norm, or equilibrium, to which policy goals and market thinking needed to be attuned.

Instead of discourses of linear and non-linear causation, his work relied upon an ontology of distinct but interrelated systems or assemblages. Holling assumed that systems were likely to be 'transient' or changing all the time, rather than operating around a fixed or 'natural' equilibrium that would be 'returned' to (Holling, 1973, 1; 1986, 76). Thus he distinguished 'ecological resilience' from traditional understandings of 'engineering resilience' (1973). Whereas 'engineering resilience' was concerned with quantitative measuring, derived from classical physics understandings of fixed relations, 'ecological resilience' was more concerned with the qualitative nature of changing relationships within a system.

Not only did Holling question the idea of a natural equilibrium, he fundamentally challenged the dominant idea that space was a pre-existent universal container, in which causal relations operated in a linear fashion (see also Bryant 2014, 143–7; Morton, 2013, 55–68). As in the discussion above, regarding the governmental framing of difference, ecological theorizing sought to distinguish between different autonomous systems. Holling therefore emphasised that it was vital to 'recognize that the natural world is not very homogeneous over space, as well, but consists of a mosaic of spatial elements with distinct biological, physical, and chemical characteristics that are linked by mechanisms of biological and physical transport' (1973, 16; see also Grove, 2018).

Philosopher Manuel DeLanda argues that a theory of interactive assemblages (and thus of mapping as an imaginary) can similarly be derived from ideas dispersed across the work of Gilles Deleuze and Felix Guattari (DeLanda, 2006, 3). Assemblage theory is understood as overcoming scientific framings, which tend to either focus on the parts (reductionism) or the wholes (structuralism) rather than interactions and relations. As Ben Anderson et al. state:

> By beginning from the claim that 'relations are exterior to their terms', assemblage thinking allows us to: foreground ongoing processes of composition across and through different human and non-human actants; rethink social formations as complex wholes composed through a diversity of parts that do not necessarily cohere into seamless organic wholes; and attend to the expressive powers of entities.
>
> *(2012, 172)*

The conceptualisation that 'relations are exterior to their terms', derived from Deleuze, is conceptually central as relations are not reduced to mere intermediaries between autonomous entities but neither are entities constituted or fully determined by their relations. Relations are the key to the understanding of the contingent emergent effects of interaction. DeLanda, the leading theorist taking Deleuze's work further in this area, argues that the key to understandings of emergence (and thereby the mapping imaginary of alternative worlds) is the political assumption that the internal organisation of an assemblage or entity is more important than the external or extrinsic factors, which 'are efficient solely to the extent to which they take a grip on the proper nature and inner processes of things'. One and the same external set of policies or causal actions 'may produce very different effects' (2006, 20).

This point is the cornerstone for mapping as an imaginary of alternative possibilities. For mapping as a governmentality, the problems of 'translation' lie at the level of formal institutions, for example, property laws or barriers to trade, and at the informal or cultural level. Thus interventions, as in those of peace-building or disaster risk management, seek to adapt or alter these institutions to enable better or more efficient outcomes. The solution is seen to be indirect work on shaping the choice-making environment. Thus adaptation takes place on the assumption that

there is a hierarchy of institutional 'fits', in this case that democracy and markets work best but that they depend on lower institutions like socio-cultural or religious values having the right 'fit'. Mapping as neoliberal or neo-institutional problem-solving seeks to shape or influence these institutions according to preconceived (Eurocentric or Western) ideas of how things 'should be' rather than how they actually are.

Rather than working to govern 'over' and 'against' non-linear outcomes (seen to be a diversion from the norm) in order to adjust outcomes to policy goals (Chandler, 2014), assemblage approaches seek, instead, to govern 'with' or 'through' complex patterns of emergence (Folke, 2006). This shift enables mapping to emerge as a new approach oriented to the virtual rather than the actual, drawing attention to unrealised or inherent possibilities and opportunities. Rather than top-down frameworks, which presuppose a transcendental framing of goals and agency, the mapping of assemblages seeks to draw upon immanent and untapped potentials (see Chandler, this volume). Mapping can be seen as focusing less upon the (subject-centred) epistemological problem of knowing and controlling and to become more 'object-oriented', focusing upon the world itself as a guide to practice. Thus, capacities to 'see', to 'sense' and to 'respond' become increasingly crucial, rather than traditional forms of knowledge (based on the assumptions of fixed properties and relations). As Laura Lo Presti puts it (this volume), 'maps, when looked through a representational lens, are considered a language of dearth and a force of death'. Yet, as she continues, maps can also be seen as 'performances of seeing and doing, desultory events always activated and resensed by their users and (in)operative in divergent contexts'.

Two works that provide useful contemporary examples of how mapping as an imaginary can be conceptualised in less subject-centred ways are speculative realist Levi Bryant's book *Onto-Cartography* (2014) and design theorist Benjamin Bratton's *The Stack* (2015). These works highlight how mapping can be understood as an imaginary beyond the modernist binary divides of culture/nature or subject/object. Mapping is crucial for 'flatter', 'horizontal' or 'immanent' ontologies of assemblage and systems interaction because agency cannot be centralized, but rather is understood as distributed across numerous systems and actors. For Bratton, *The Stack* is an 'accidental megastructure' of systems of planetary scale computation, with multiple levels of both vertical and horizontal interaction, each with its own immanent processes of interactive emergence (2015, 367). It is important to clarify that this 'distributive' agency is not a property of individual systems, actors or agents but is emergent, relational and interactive; as Bratton argues the real outcomes are 'undesigned accidents' (2015, 9).

The emancipatory possibilities of mapping come into being precisely through the open-ended imaginaries of creative interaction, which mean that sites of power and influence are diffusely distributed. As Bryant states:

> This is the basic thesis of onto-cartography and geophilosophy. If we are to understand why assemblages take the form they take, we must investigate how

> corporeal and incorporeal, human and non-human, inorganic, organic, and social machines intersect and interact with another … . In arguing that culture is itself a formation of nature, that it is continuous with nature rather than separate, geophilosophy hopes to … better understand why social ecologies take the form they take and, *above all, to multiply our sites of intervention to produce change*.
>
> *(2014, 255, emphasis added)*

For Bryant, the extension of the mapping imaginary can be a mode for 'producing more just, equitable, and sustainable worlds' (2014, 257). He proposes the methodology of 'onto-cartography' as the 'mapping of assemblages' across space and time, because: 'The first step in producing any sort of change or new assemblages lies in having a good map' (2014, 257). In a formulation very similar to that of Bruno Latour (2004), Bryant argues:

> Onto-cartography … aims at the concrete. Its question is 'how is this assemblage put together, what are the interactions …?' rather than 'how do we overcome capitalism or "patriarchy" or "racism" or "ontotheology"?' … Working on the premise that these things exist in and through assemblages, cartography strives to map those assemblages to determine privileged and strategic points of intervention that would lead to change or destroy these things.
>
> *(2014, 258)*

Mapping as a speculative imaginary developed through the generalisation of ecosystems theory or as assemblage theory, is concerned with ontology more than epistemology, or, to put this another way, seeks to drill down in much more detail to the reality of the world in its plurality, flux and difference, rather than seeking to align maladjustments or 'sub-optimal' systems to an ideal model.

For assemblage theory, as well as for the chapters in the third section, differentiations lead to further differentiations but there can be no external goal of 'progress' to pre-set goals, only the careful management or modulation of interactions to attempt to balance and ease the strains of adaptation as an ongoing process. The genie of new technological mapping capabilities (and their spread throughout social practices) cannot be put back in the bottle. The guiding assumption, as illustrated by Shannon Mattern (this volume), is that the more we recognise and accept (albeit critically and sensitively) the presence of satellites, drones, self-driving cars, sensing machines and other artificially intelligent agents, the more governance is transformed and the possibilities for progress opened up:

> We need multiple eyes, ears, hands, sensors, and brains – automated and manual, digital and analog, machinic and human … and use all these new and old technologies to improve the physical world that we humans (and our non-human companions) read and inhabit.

What are the hopes and promises for mapping and politics in an age of ubiquitous technology, when, as Steven Shaviro suggests, the task seems to be no longer that of critique, revealing hidden truths in the modernist tradition, but the opposite? It seems that

> Nothing is hidden: there are no more concealed depths … . We live in a world where all manners of cultural expression are digitally transcoded and electronically disseminated, where genetic material is freely recombined, and where matter is becoming open to direct manipulation on the atomic and subatomic scales.
>
> *(2014, 43)*

There seems to be little barrier to human access to the relational depths of interactive life, yet at the same time the power to influence or control these processes seems to have waned as the human is no longer in command of the interactive agencies of the Anthropocene (Turpin, 2013; Tsing et al., 2017). The stakes are high, but the prospects are unclear. It could be that with digital technologies maps have reinvigorated modernist ways of seeing, facilitating creative ways of responding to financial crises, environmental disasters and humanitarian emergencies, and providing a 'cognitive gaze' enabling new approaches and solutions to contemporary problems (Panneels, this volume). At the same time, the proliferation of digital maps seems to be reinforcing a world governed by a new, 'postmodern', rationalist technocracy in which individual actions become predictable and depoliticised and where, without a liberal telos of progress or utopian visions of alternative worlds, the creative impulse at the centre of critical thinking can only wither (Rouvroy, this volume).

Structure of the book

The collection is organised in three parts, organised along the lines of the introductory sections above. The chapters in the first section, Contestations, consider the politics of mapping as a form of knowledge, analysing the development of the 'cartographic gaze'. This God-like view 'from above', which allowed the European imposition of world order, has over time been contested by counter-mapping practices. Mapping is thus understood as epistemic practices that are entangled in different ways with the articulation of (and challenges to) power.

In chapter 1, 'On the epistemology of maps and mapping: De la Cosa, Mercator and the making of spatial imaginaries', Luis Lobo-Guerrero focuses on two historical maps, Juan de la Cosa's 1500 Mappa Mundi, the first cartographic representation to depict the Americas as a separate and single continent, and Gerardus Mercator's World Map of 1569, the first modern geometrical projection of global space, which converted rhumb lines into straight lines for use in navigation. Lobo-Guerrero uses these examples to argue that maps – through the location of waters and lands, the representation of latitude and longitude, the drawing of imaginary

lines with political significance, the production of empty and 'silent' spaces, and the use of scales, symbols, forms of writing, languages, and images – allowed for a reconstitution of a rhetoric of power and the making of European globality.

Anna Feigenbaum and Doug Specht, in chapter 2, 'From the cartographic gaze to contestatory cartographies', contend that in today's digital age, as much as in the times of Mercator, the proliferation of geographic imaging technologies and digital tools are reproducing the 'cartographic gaze' and furthering the use of maps as precious tools for control and domination. Despite the appearance of counter mapping practices, which seek to challenge power relations and pluralise world-views, the authors claim that these practices from below are still entrapped by the pervasiveness of the cartographic gaze.

In 'Horizontalism is a map', chapter 3, Nicholas Michelsen explains how mapping presupposes a perceptual architecture of power and is pessimistic about practices of counter-mapping and resistance. He notes that horizontal networks, which operate according to the map of the rhizome or swarm, have been seen as positive, as an escape from and a challenge to hierarchical and centralised maps. From the anti-globalisation movement to the Arab Spring, too much faith is being placed in horizontalism, he warns, on the grounds that 'horizontalism is a map' too. Thus, the faith in the map of the all-channel distributed network is misleading – it is still as dangerous and murderous as the maps of totalitarian states.

In chapter 4, '(Analog) mapping the knowable and ways of knowing: Relational ontologies of chickens and ancestors in rural Sierra Leone', Caitlin Ryan's analysis brings some optimism to challenge the reader who may be tempted to dismiss maps of all kinds. She explores indigenous communities' conception of space and land, which is informed by the ancestors' wisdom and communicated through chickens and goats via ritual practices. Ryan shows how these worldviews fundamentally differ and contest the ways of knowing of digital modernist maps introduced by foreign companies in the making of land deals. In so doing, the privilege habitually given to modernist maps, in which land is merely a means of capital transformation, is put into question.

In the second section, Governance, mapping as a practice is analysed as inseparable from governance itself. Chapters in this section consider how mapping is used to constitute the objects and methods of governance. Yet as digital maps and other intelligent technologies are introduced governance practices seem to morph and adopt novel forms.

In chapter 5, 'Mapping epidemics: Securitisation, risk and geopolitics', Adam Ferhani and Gregory Stiles examine the digital maps used to govern the 2014/15 West African Ebola outbreak, according to a Western-centric security perspective. Through their analysis, the authors highlight how these digital maps assisted in framing the security debate surrounding Ebola. They amplified notions of risk and traced the spread of the virus to legitimise containment responses.

Harshavardhan Bhat, in chapter 6, 'About 'terms and conditions': The Aadhar biometric identification programme as a mapping analytic', examines the Aadhar Programme, run by the Unique Identification Authority of India, which consists of

an unique identification number (printed as a card) linked with biometric (fingerprints, iris, facial photograph) and demographic data (date of birth, age, gender, address, mobile number and email). The author examines how this identification programme is transforming traditional ideas of politics and citizenship. Rather than the modern construction of the human as citizen and consumer subject, Aadhar enables governing agencies to see the human as entangled with the nation and as a body of economic transaction-ability.

In 'Mapping as governance in an age of autonomic computing: Technology, virtuality and utopia', chapter 7, Antoinette Rouvroy analyses mapping as governance through the rise of autonomic computing in the sectors of security and marketing. She explores how these autonomic computers, from traditional laptops to complex computer-sensor networks, map and translate the physical world and its inhabitants and their trajectories, choices and actions. She argues that mapping facilitates an epistemic change in our relation to the 'real', which decreases reflexive capabilities that enable individual self-determination and collective self-governance.

In chapter 8, 'Mapping without the world and the poverty of digital humanitarians', Pol Bargués-Pedreny examines digital maps in the field of humanitarian action, which are constantly created and renovated by community volunteers on previously provided satellite imagery and used by agencies to track and respond to crises. The author explains that the recent enthusiasm for maps is related to a shift in the interpretation of maps: from understanding maps mimetically as tools that reflect (or cannot reflect) reality to theorising maps pragmatically, as useful tools that do not represent any territory outside the map but enable people to move or to travel. This view, motivated by the advent of digital technologies, has given popularity to maps, as they seem untethered from a reality 'out there' and their links with power become increasingly elusive. However, this flattening of the meaning of maps, the chapter concludes, has stripped their value as cultural resources and expressions of a common humanity and degraded the purpose of humanitarianism.

In the last section, Imaginaries, the chapters explore the idea that mapping is increasingly a way of bringing new forms of politics and new objects and agencies into being.

Laura Lo Presti, in chapter 9, 'Post(mortem) cartographies: Reframing the cartographic exhaustion in the age of mapping's excess', sets up a dialogue between two dominant critical approaches in geography: that of the 'exhausted geographer', who restlessly criticises maps and their power, and the 'geographer of the excess', who considers mapping more enthusiastically and investigates it as other than a uniquely political means of spatial control. Instead of universalising these positions, Lo Presti proposes that we recognise 'mapping' and 'politics' as relative and specific to their context of production, circulation and reception. She infers that this is useful in order to see contemporary mapping through an affirmative lens that contextualises maps' functions of life and death.

In chapter 10, 'Mapping beyond the human: Correlation and the governance of effects', David Chandler argues that mapping as posthuman governance focuses upon the emergence of effects. New digital technologies reveal new relations of

interaction and new agencies or actants to be taken into account, but there is no necessary assumption that effects can be understood and manipulated or governed through transcendental policy goals. As correlation displaces causation, real-time responsive forms of management through mapping increasingly focus on the 'what is' of the world in its complex and plural emergence. He argues that the ontological assumptions of mapping as a technology of posthuman governance can be usefully grasped in terms of actor network theory, in that the concern is not the nature of systems or substances but ways in which change can be detected through seeing processes of emergence as relational.

In 'Map-i: Mercator revisited: from mapping modernity to postmodern creative cartographies', chapter 11, Inge Panneels compares Mercator's work, which is paradigmatic of how the first maps helped to reorder the globe, with the advent of new digital technologies and approaches, which are radically altering our collective worldviews. The piece reflects on the significant increase in knowledge over the last five hundred years that has been much aided by the incremental speed of travel and communication and the closing of the space–time gap. *The Powers of Ten* by Ray and Charles Eames, as a succinct merging of different fields of knowledge into a coherent visual narrative, is analysed as one of the first examples of ontological mapping.

Shannon Mattern, in 'Mapping's intelligent agents', chapter 12, starts by noting how autonomous vehicles will shorten commutes, reduce fuel consumption, improve public health and slow global warming. Other intelligent agents are transforming our notions of space and time and instituting revolutionary progress in disciplines as diverse as medicine, architecture, engineering and international relations. Mattern encourages us to recognise these other 'intelligent agents' – including indigenous and local communities, and even other species – because they are active mapping agents with distinct spatial intelligences, and they have stakes in the environments we all share. She ends with a utopian vision:

> we can aim at a collection of mappings – Western scientific and indigenous epistemologies, human and other-species ontologies, mechanical and organic means of experiencing and representing place, cartographic rationalism and empiricism, projection and retrospection – that invites comparison and appreciation of the ways in which our world is both known and unknown.

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PART I. CONTESTATIONS

1

ON THE EPISTEMOLOGY OF MAPS AND MAPPING

De la Cosa, Mercator and the making of spatial imaginaries

Luis Lobo-Guerrero

For almost fourteen hundred years, European understanding of the earthly sphere and its relation to the universe (cosmographic knowledge) remained that described by Ptolemy in the second century AD. This was the world of Greco-Roman times, the *oikoumene* that covered a quarter of the earth's surface (Snyder, 1997, 10–14). In Ptolemy's *Geographia*, such a world began with the Canary Islands in the west and China in the east, the British Isles in the north and 'Terra Incognita' in the south. The *oikoumene* was a landmass partly surrounded by a series of disconnected waters, the Britannic Ocean to the north, the Indian Ocean to the south, the Occidental Ocean to the west, and a plethora of connected seas within the Mediterranean (Ptolemaeus, 1966 [1511]).

By the time of the Renaissance, the European conception of the world changed very quickly. It was a time of exploration and expansion in which Europe built on the experience of distant trade and travel resulting from the commercial revolution of the thirteenth century (De Roover, 1942; Lopez 1971). Distant trade implied long-distance sailing routes, and such routes required maps. Such was the context under which a particular tradition of mapping emerged in the Mediterranean and northern Europe; that of Portolan charts. These were maps intended for travel which also depicted commercial and political connections with uses in diplomacy and trade (see, e.g. Tobler, 1966; J. E. Kelley, 1977; Campbell, 2007). By the fifteenth century, when Iberian powers began to compete for discovery and conquest beyond the Ptolemaic world, first in the Atlantic, then in the Indian and the Pacific oceans, cartography began to depict different problems in the representation of space, a European depiction of spatiality that would quickly understand itself as global.

By 1500, the Majorcan Portolan practice, a cartographic tradition that corresponded to a mainly Mediterranean form of sailing, employed since Antiquity into the late Middle Ages, was in vogue. Pilots would either sail from port to port along a coast

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where rocks, shoals, and other obstructions, not always visible, posed perils to their ships, or would clear away from them by sailing out to sea 'where courses were more direct, underwater hazards were less prevalent, and there was more room to manoeuvre' (Ash, 2007, 510; Hewson, 1983, chaps 1–3). For longer voyages where coastal routes were impractical or impossible – for example, between Venice to Alexandria or from Norway to Iceland – pilots would seek to sail along stable courses by keeping a direction of travel and by estimating the distance covered (Ash, 2007, 510). This they could do with the help of a compass, by estimating their location in relation to the Polar Star and the sun's zenith with basic instruments, and by resorting to some form of distance estimation system such as the chip log (see Waters, 1955; 1970). For Mediterranean sailing, where pilots were rarely out of visual contact with the coast for more than two days, Portolan maps offered useful rich coastal details and general political and economic information, as well as rhumb lines that facilitated the plotting of their ships' courses (Campbell, 2007).

When Portuguese and then Castilian sailors ventured to Atlantic waters in the fifteenth century, first as a way to find routes towards the south of Africa and later west to 'the Indies', a different form of navigation started to be developed that would in turn lead to the emergence of a different cartographic tradition. In Atlantic waters pilots began to identify sea currents and winds which were different from those of the Mediterranean which made sailing through straight courses more difficult, if not impossible. They also ventured beyond the latitude and longitude of the Mediterranean and began to experience the effects of problems such as magnetic deviation (the difference between magnetic and true North) when trying to locate themselves. This demanded the adaptation of skills, ship design, sails, and navigation techniques and instruments. For such form of navigation, the straight sailing courses and coastal details offered by Portolan maps were of lesser value than information on sea currents, wind systems and, especially, ways of knowing latitude and longitude as a means for determining location.

This chapter tells a story of how the making of early modern cartographic representations at the transition between the Majorcan Portolan mapping tradition and the geometric projections that appear in the second half of the sixteenth century help reveal some of the most outstanding and useful elements of mapping for understanding the making of orders of governance in time. The chapter focuses on two maps, Juan de la Cosa's 1500 'mappa mundi', the first cartographic representation to show the Americas as a separate and single continent, and Gerardus Mercator's world map of 1569, a projection that allows for a flat representation of a globe considered as the first modern geometrical depiction of global space. Both maps reveal a particular quest in the development of a European understanding of spatiality: the problem of location. They also reveal the usefulness of maps as instruments for travel and imperial business offering an opportunity to explore the particularities of how geopolitics were understood in the context of time. By focusing on issues such as how maps located waters and lands, how they represented latitude and longitude in their projections, how they plotted imaginary lines with political significance, how they represented empty and 'silent' spaces, how they presented and employed scales, how they integrated imagined and discovered

lands into single cartographic charts, and how symbols, forms of writing, languages, and images constituted forms of rhetoric which help reveal specific forms of power (e.g. Harley, 2006; Tegeler, 2018; Boria and Rossetto, 2017) it is possible to reconstruct narratives that shed light on the making of a European ordering of global space; or, in other terms, of a making of European globality.

Rich as the problematisation of the making of spatial globality is, or better put, globalit(ies), if we were to move beyond the Eurocentric perspective, this chapter can only attempt to offer some general observations, contextualised through just a few references of a growing literature on what could be called the epistemologies of European-based modern cartography.[1] In what follows, the chapter begins with an introduction of the two maps and the context, conditions and practices under which they were produced, continues with an analysis of the logics of representation involved in them, and concludes with some reflections on the epistemology of mapping for the understanding of the making of orders of the real.

De la Cosa's mappa mundi

In 1500, Juan de la Cosa, owner and master of the Santa Maria, the largest of the three ships that travelled with Columbus on the first trip of 'discovery', produced a mappa mundi, a chart considered to be the oldest known European cartographic representation of the New World (Figure 1.1). For the first time, a mappa mundi displayed a unified continent in the Indies, what we today call the Americas. As an eyewitness who combined the roles of mariner, entrepreneur, and royal officer into the craft of mapmaking, de la Cosa's representation of the world can be explored as revealing an imaginary of power embedded in the contexts of European imperial competition, the state of cosmographic knowledge and practices of the time, and a Christian account of colonisation and ordering of planetary space.

The mappa mundi is an early example of a map that retains the Portolan detail on coasts and sailing courses but also begins to plot land according to estimated latitudes across the Atlantic. The map has a clear focus on location based on latitude, which is evident, for example, in the marking of the line of the equator and the Tropic of Cancer (the Northern Tropic) as reference lines. This is also evident when observing how the demarcated contours of land in the continent provide a general idea of the shape of the coastline and offers some latitudinal accuracy, to the degree that was possible at the time, around the Antilles region. Although the shape of the continent remains vaguely familiar to us today, as it advances north and south its location appears strange. This reveals the absence of a way of calculating longitude that affects how the north and south sections of the continent are depicted, almost as if they had been rotated ninety degrees with regard to the position they are 'usually' located in.

1 There is a rich bibliography detailing non-European forms of cartography in this and previous periods. For a general description, see (Harley and Woodward, 2007).

FIGURE 1.1 Mappa mundi, 1500, Juan de la Cosa; rotated to match modern map orientations.

Source: Original at the Museo Naval de Madrid (PD-1923).

It is worth mentioning in passing that the tradition of establishing geographical location employing meridians and parallels is an application of Euclidean geometry and was already adopted by Ptolemy in the second century in his *Geographia* (Bagrow, 1945), although, as will be seen later, not with the geometric precision developed by Mercator in the late sixteenth century. When fifteenth- and early to mid-sixteenth-century Iberian cosmographers such as de la Cosa employed the use of parallels to indicate latitude in their maps, they did so based on their understanding of parallel lines in the Mediterranean which, in virtue of Ptolemy's work, were considered equivalent in length. As a consequence, the projection of space offered by their maps was of a cylindrical form that slightly distorted the depiction of coastlines in the European seas and, as will be noted below, did not have much consequence for areas close to the equator. It did, however, have major implications for the depiction and the determination of location in regions beyond the tropics as evident in the mappa mundi. It is also important to note that the calculation of longitude at sea remained impossible until the invention of the marine chronometer in the eighteenth century, regardless of the offering of prizes since 1598 in Spain, for whoever could provide a solution to the problem of keeping the time of origin throughout a sea voyage.[2] Other geographic phenomena of particular relevance for establishing location beyond the tropics, such as magnetic declination, although apparently known to the Chinese centuries earlier (Smith and Needham, 1967), and allegedly experienced by Columbus on his first trip (James E. Kelley, 1983), remained without a means of calculation in the West until the eighteenth century.

De la Cosa's map was not intended for navigational use. It appears to have been commissioned by Archbishop Fonseca, then in charge of organising the trips to Indies, with the intention of presenting the global perspective of the discoveries to the Catholic Monarchs as well as to foreign dignitaries, possibly Italian (Martin-Meras, 2000, 80).[3] Its most notable contribution was the depiction of the American continent as a landmass separated from Asia, a perspective Columbus died ignorant of in 1499. It will take until 1513 for the South Sea (Pacific) to be discovered by Nunez de Balboa confirming the separation of the continents, for the Pacific coasts of the Americas and for the coasts to start to be mapped.

Juan de la Cosa played a central role with vested experience and authority in the trips of discovery of the new world. After nine trips across the Atlantic, de la Cosa accumulated as much Atlantic sailing, navigational and cosmographical experience as was possible at the time. Partnered with the great names of Alonso de Ojeda and Americo Vespucci, Vasco Nuñez de Balboa and Rodrigo de Bastidas, he was considered by 1507 to be one

2 It is widely unknown, for example, that as far as 1598, more than a century before the widely known English Longitude Act of 1714, Philip III of Spain had offered a reward for anyone who could devise a practical and reliable solution for the problem of finding longitude at sea. The prize consisted of a sum of 6,000 ducats plus a life annuity of 2,000 ducats and 1,000 ducats more for expenses. The task of assessing the merits of the proposals was entrusted to the Casa de Contratación de Sevilla (Jonkers, 2007, 434).

3 See Buisseret on the role of mapping on how decision makers and political advisers come to know the world (Buisseret, 1992).

of the five most experienced and knowledgeable sailors of Castille. In such capacity he was summoned by King Ferdinand to the Junta de Navegantes, a technical commission tasked with exploring the possibilities of opening a western route through which to reach the islands of the species, the 'Especieria'. Although the task was eventually only achieved in 1519 by Magallanes and Elcano with their circumnavigation of the globe (Arranz Márquez, 1982, 87), de la Cosa's experience had more immediate effects. In 1503 the Casa de Contratación de Sevilla was established as what might be understood today as a super-ministry in charge of most American affairs, and by 1507, two years before de la Cosa's death, the position of 'piloto mayor' was created. This new role was tasked with maintaining an up-to-date chart of the world, the Padrón Real, which included information derived from reports and corrections provided by pilots returning from the Indies. The basis for such a map would be de la Cosa's mappa mundi.

De la Cosa's map also played a role in depicting the Spanish geopolitical claim within the Treaty of Tordesillas. This was a treaty whereby Castile and Portugal agreed to divide the world in two parts based on the 1493 Pope Alexander VI's Bull *Inter Coetera*, an instrument which granted the rights to discovery and colonisation to Spain west of an established meridian and to the Portuguese to the east. The dividing line was established as being 370 leagues west of Cape Verde islands off the coast of Africa (Goodman, 2002, 53M CS). Determining the exact location of the line was, however, contentious, given the difficulties of demarcating a line at sea and of locating it on a map in the absence of precise geodesic measurements. After the Magallanes-Elcano's circumnavigation of 1519, during which they reached the Moluccas islands and the Philippines, the location of the line became of paramount importance since the 'anti-meridian' was to determine the right of access to trade in spices in such longitudes, and also, with China. Whereas it was not disputed that Portugal reigned in the Indian Ocean, it was not clear where the limit of such territory was in Asian waters. In 1524 Charles V convened a conference in Badajoz including jurists, cosmographers and commissioners from both sides to settle the matter (Portuondo, 2013, 66). Whereas there is no agreement among experts on what the line at the very east of the American landmass in de la Cosa's map represents, it is taken by some to be the Spanish representation of the Tordesillas line, a strong visual political statement to competing European powers and a depiction of the territorial vastness of the nascent empire.

Mercator's world map

Sixty-nine years after de la Cosa's mappa mundi, Gerardus Mercator produced in Flanders a world map (Figure 1.2), a new cartographic representation using a geometric projection that represented sailing courses of constant bearing as straight lines in the style used by Ptolemy in his *Geographia* but with technical corrections. As noted by Snyder, Ptolemy's technique in mapping the *oikoumene*, his 'scheme of describing the position of places by their longitude and latitude, could theoretically be applied to the whole sphere … it was a geographical idea of elegant simplicity' (Snyder, 2007, 370).

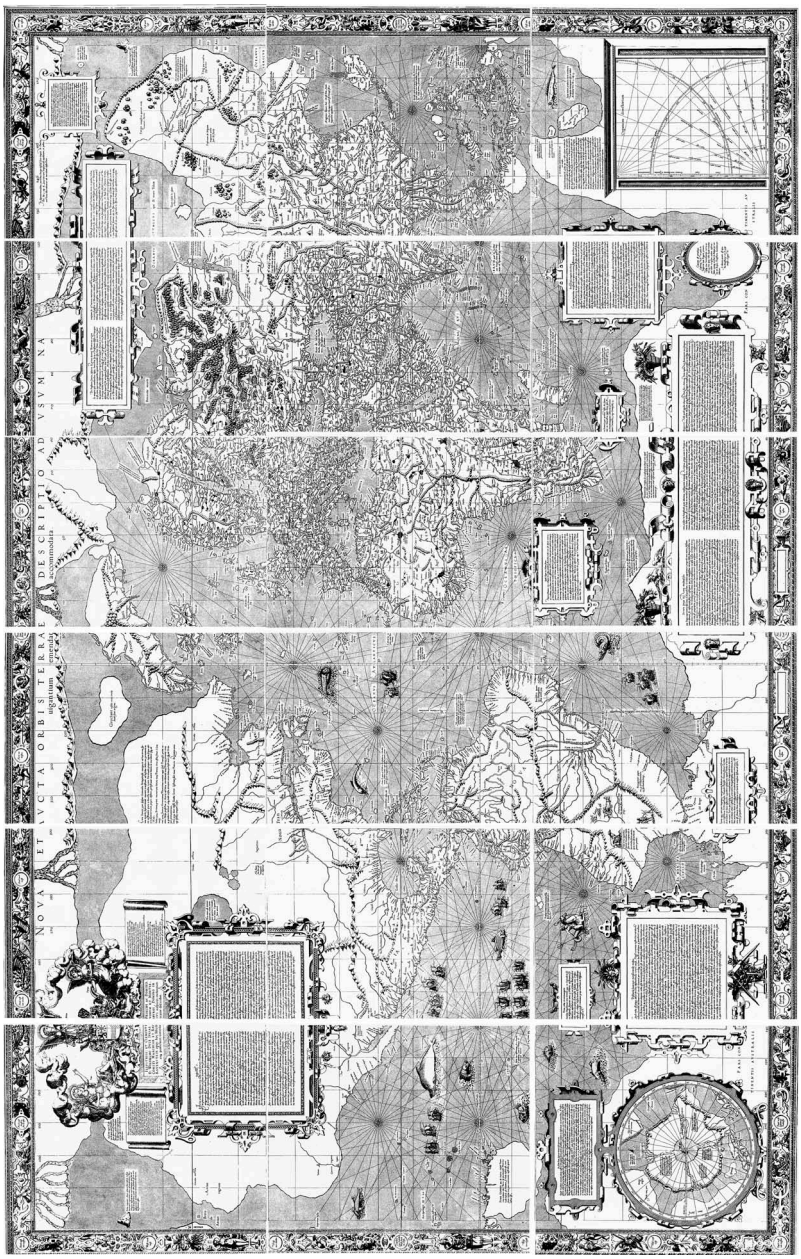

FIGURE 1.2 Gerardus Mercator's world map, Nova et Aucta Orbis Terrae Descriptio ad Usum Navigantium Emendate Accommodata, 1569.

The map appeared divided into eighteen sheets providing a flat representation of the world, as a cylindrical projection, but this time, spacing the parallels more widely as the poles are approached to prevent the deformation offered in previous maps (Snyder, 1997, 45). His contribution aimed to correct the distortions that resulted from conical projections of space derived from the Ptolemaic assumption on the length of parallels, such as that implicit in de la Cosa's map. Explicitly intended for navigation, as noted by Mercator in the description contained in the map itself, it sought to offer practical resources with which to find a ship's location at sea and the planning of voyages based on the calculation of distances. It showed all lines of constant bearing (loxodromes or rhumb lines) straight, including parallels and meridians. Mariners 'could then follow a single compass setting (adjusted for magnetic declination) based on the bearing or azimuth of the straight line connecting the point of departure and destination on the map' (Snyder, 1997, 45).

However, the map was, as is technically called, a 'conformal map projection' derived from a stereographic one, and as such did not allow for observing distances correctly (Snyder, 1997, 45). For its use in navigation the mariner required mathematical training to handle the complex calculations to reveal actual distances. This complication explains why it took several decades to be of practical use. In 1594 a set of tables produced by Edward Wright for calculating the length of the lines were published (Blundeville, 1594), easing the use of the projection in navigation and making the map of use for ordinary mariners.

Although aimed as an aid for navigation, Mercator's projection was soon adopted for geographical purposes within the context of European imperial competition. In 1587, Romuldus Mercator, son of Gerardus, published a 'Two Hemisphere World Map' employing his father's projection. By 1595, Jodocus Hondius, a Flemish cartographer and religious refugee in London, adapted Romuldus's map by shifting the central meridians by ninety degrees so that Europe, Africa and the Americas appeared in a single hemisphere 'thereby showing the circumnavigational routes of Francis Drake and Thomas Cavendish [of the late 1570s] to better advantage' (Snyder, 2007, 367). Contributing to the establishment of Amsterdam as a centre for European cartography in the seventeenth century, in the context of the Dutch War of Independence, Hondius's mapping of Drake's ventures constitutes an example of how cartographic projection can, not only be employed to colonise the imagination of populations with geopolitical effects, but also be used to disrupt a hegemony of power, in this case the Spanish one. As noted by Pickles, cartography had a role in thinking in the sixteenth and seventeenth centuries. It constituted 'the most important forms of reason. To map was to think' (Pickles, 2003, 77), but also, to map was a way of framing thought.

In contrast to de la Cosa's case, the knowledge employed by Gerardus Mercator in the making of his world map and his projection was mainly of an academic kind. Born in Flanders in 1512, Mercator entered the University of Lovaine in 1530 where he received an Aristotelian-based scholastic training in theology, philosophy

and Greek. He then studied geography, mathematics and astronomy and apprenticed in globe-making with Gemma Frisius, a prominent mathematics and geography authority at the time. His intellectual tensions with Aristotelic scholasticism and religious doubts, elements that impacted the production of his maps, led to accusations of heresy and subsequent imprisonment for seven months, after which he emigrated to Duisburg in 1552. It was there where he crafted his maps and globes. In Duisburg he appears to have enjoyed religious and political freedom although not detached from imperial order. He worked as cosmographer to Duke Wilhelm and maintained contact with the Imperial court. It is known that he had made a present of globes to Emperor Charles V in the early 1540s that granted him the title of 'Imperatoris domesticus' (member of the royal household) (Hall and Brevoort, 1878, 167).

From what is known, Mercator did not travel much and was never at sea. His experience of spatiality beyond the confines of north-western Europe came through his interaction with knowledgeable people, in person and through correspondence. It is possible to learn through his letters and through his activity as a member of what has been called the Republic of Letters – maintaining contact with scholars across Europe and having access to the latest scientific knowledge in geography, theology and philosophy – that most of his work was based on secondary sources, information provided through third parties, and collaboration with partners.

The influence of Mercator's projection in the way individuals and collectives see the world, remains prominent until today. The fact that the size of Europe in such projection 'is portrayed about twice its true area in proportion to countries near the equator' (Snyder, 1997, 48), and that the projection has systematically been used in the provision of general geographical education in Western-led educational systems since the eighteenth century, has had an impact on how generations perceive the relative size and shape of the continents. This has been seen as contributing towards the portrayal of Eurocentric imaginaries of the world (e.g. Hodgkinson, 1991; Villanueva and Gonzalo, 2010) and has begun to be contested. In Boston, for example, since 2007 legislation has led to the introduction of an alternative cartographic projection in public schools, the Gall-Peters projection, expected to allow students to appreciate the 'true' areas covered by countries and continents and provide an education on the impact of geographical projections (Monmonier, 2004).

Debates around which projection to use exposes to public debate the role of cartography in the creation of world images. It has also opened up discussion on the role of cartography and cartographic practices and uses in the formation and consolidation of world imaginaries. Potentially, it could also inform discussion on contemporary user-generated content mapping which allegedly seeks to subvert master representations of space (e.g. Farman, 2010) but still relies on cartographic infrastructure and designs. Most importantly for this chapter, however, it opens up the space for discussions on the logics of representation at stake, both in master projections and on the maps based on them.

The role of maps in coding, decoding and recoding of planetary spaces

In 1981, Jean Baudrillard argued, if controversially, that 'the territory no longer precedes the map, nor does it survive it. It is nevertheless the map that precedes the territory – *precession of simulacra* – that engenders the territory' (Baudrillard, 1994, 1). In doing so, Baudrillard opened up a debate on the logics of representation involved in maps, mapmaking, and map utilisation which detaches representation from the simulated and allows for an understanding of maps as creative media. As media, maps operate an interface between the mapmaker and the map-user where the former projects a spatial imaginary onto the latter exercising a particular form of power. The mapmaker, if technical, becomes an agent influenced by politics, culture, experience, information, strategy, and interests, which influence the creative nature of maps. If Baudrillard was right in his observation, which has had traction within critical cartographic thought (King, 1996; Harley, 2001), detaching the map from an expectation of represented reality prepares the space for approaching mapmaking as a practice of power and maps as political objects with political effects.

By engaging with the contexts under which maps are created and their intended and actual uses prepares the ground to challenge the innocence of maps and mapmaking in the ways in which they contribute towards the constitution of geopolitical imaginaries. Maps can and should be interrogated as empirical objects used for revealing the historical relationalities of power involved in the making, projection and reading of spatial imaginaries in given moments. Scholars, mainly geographers, concerned with problematising the role of maps, have made a number of contributions towards this effect. Two will be highlighted below.

The first, made by John Harley, an early observer of the philosophy of maps and mapmaking, relates to the fertile ground maps offer for critically exploring the tensions that make them possible.

> Maps are not just the decorative treasures of the collector's cabinet, but they are active instruments of power. Maps can be read as a record of a clash between cultures, of conflicting ideologies, of ethnic attitudes and stereotypes, and of the values that different societies attach to the land. Maps always conceal more than they seem to show. Maps are often a record of myth as much as of a real geography, of an 'oral geography'[…].
>
> *(Harley et al., 1990, xii)*[4]

Building on this observation, Jeremy Crampton, presented maps as social constructions that should be approached as problematic communication devices

4 These observations were made by Harley in the context of analysing historical maps associated with within the commemorations of the 500 years of the Columbian Encounter with the New World. Notwithstanding, the observation speaks to the phenomena of mapping in general.

that can be used to reveal the tensions that help explore genealogies of power in mapping practices (Crampton, 2001).

The second contribution was made by Derek Gregory who argued that geographical practices such as mapping from the epistemologies and the politics they display constitute a 'World as Exhibition' to refer to how technologies and practices of representation influenced ways of seeing (Gregory, 1994). Gregory's observation is an invitation to approach maps as an effect that reveals the ways in which worlds are understood and imagined, but also the technical and cognitive limitations of their means for representation (e.g. the cylindrical projection of de la Cosa's map or the impact of Mercator's projection in the perception of countries and continents). As such, much can be learned not only from the tensions maps reveal but also about those who require maps, those who commission them, those who produce them and those who profit from their making and trade.

Drawing on these two observations, three epistemological aspects could be unravelled from the two maps explored in this chapter. The first is the practice of drawing lines as the basic feature of cartography. The drawing of a line is not simply a technical matter involving the tracing of ink on a surface to create a shape. If approached in light of the two positions just mentioned, drawing lines is not an innocent practice. The decision on where to draw a line and how, with what intensity, in what form, in which colour, is already stating a position embedded in political, cultural, economic and social contexts, a position that contributes towards the projection of an imaginary of power. In *A History of Spaces*, John Pickles engaged with how lines are deeply embedded in the ways in which the world has been geocoded through mapping. '[B]oundary objects have been inscribed, literally written on the surface of the earth and coded by layer upon layer of lines drawn on paper' (Pickles, 2003, 5).

Within the drawing of lines, institutions involved in this systematic practice are of paramount relevance. As Pickles notes, '[c]artographic institutions and practices have coded, decoded and recoded planetary, national and social spaces' (Pickles, 2003, 5). Mapmakers are schooled within particular traditions, taught in detailed ways through specific methods and examined through specific techniques. Within such schooling, institutions play a prominent role, one which David Harvey has called to explore due to their importance in the production of geographic knowledge and practices and the forms of governmentality they instantiate (Harvey, 2000). '[M]apping space', as he puts it, is 'a fundamental prerequisite for the structuring of any kind of knowledge' (Harvey, 2000, 111–12). The role of experience in mapping practice, however, must not be ignored. However, trained a mapmaker can be, situated and historical experience will influence the ways in which practice is conducted. The two maps presented in this chapter are illustrative of this fact. There are implications derived from Juan de la Cosa's experience as explorer, royal officer and mariner, and from Mercator's academic training and commercial practices in how they draw their lines and the implications these had in the production and impact of their maps.

De la Cosa's and Mercator's maps display different kinds of lines and line-drawing which have various technical, scientific, and most importantly here, political effects. The mappa mundi contains a highly visible vertical line touching the easternmost corner of the Brazilian coast, which bears flags indicating Castilian dominion, and has been interpreted, as noted earlier, as the demarcation line of the Tordesillas Treaty (Martin-Meras, 2000, 76). This interpretation has been contested by Sandman who argued that the line 'probably represents a line of zero magnetic declination (at the time assumed to be a fixed meridian)' (Sandman, 2007, 1111). As the divider of the world in two halves implementing papal authority, the line was not an innocent addition in the map. It played a particular role in portraying the struggle between Iberian powers and represented, in a visually unequivocal manner, the new world discovered and by Castile. The line was to acquire even more importance twenty years later after Magellan-Elcano's circumnavigation of 1519 when the Molucca islands were reached. Given that meridians are global, the Tordesillas line had to be interpreted as well as an anti-meridian dividing the world in the Pacific Ocean (then known as Mar del Sur). Even if the line included in the mappa mundi was not the Tordesillas demarcation, being the only meridian marked on it would have certainly had an impact on the observer. Other lines, the rhumb lines derived from the Wind Roses, deserve detailed analysis that cannot be offered here.

On Mercator's map, the lines that enabled his geometric projection not only played a technical role in allowing for a flattened depiction of landed masses but also affected the visual representation of the size of the continents. For an untrained eye, this appeared to be a fact, an unpolitical, objective, naked scientific truth that showed the relative distance, size and location of continents, countries and waters. The drawing of the lines, the mathematics and techniques employed, all justified by Mercator in an explanatory box contained in the map itself, are part of the rhetoric deployed to legitimise its scientific value and limitations of use. The visual effect created through the projection, however, is not neutral. Even if resulting from a geometric technical procedure, the effects have an impact on how the observer perceives the landmasses in the globe, as mentioned above. The projection can also be used to focus on particular areas of the globe to highlight the political prominence of emerging powers, such as Hondius's mapping of Drake's ventures, also noted earlier. The positioning of landmasses in the globe by employing a reticular grid in a way that replaced its previous Ptolemaic use provides an allegedly depoliticised geographical framework which has shaped geographical practice and imagination to the present day.

This idea links to the second epistemological aspect to be made explicit in this analysis, the role of maps as text. In *The New Nature of Maps*, Harley makes reference to the idea that the role of cartographers is to manufacture power (Harley, 2001, 149). Inspired by Derrida, he spoke of 'map text' as embedding a 'spatial panopticon' that expresses a complex set of relationalities of power (Harley, 2001, 21–2, footnote 100). Maps as text, Harley argued, are not a mirror of nature. They are not a simple representation of the real. They create a real through 'a graphic language to be decoded' (Harley, 2001, 36). They construct a reality through

'images laden with intentions and consequences that can be studied in the societies of their time' (Harley, 2001, 36). 'Maps do not possess a grammar in the mode of written language, but they are nonetheless deliberately designed texts, created by the application of principles and techniques developed as formal systems of communication by map makers' (Harley, 2001, 36).

As text, maps constitute rhetorical images which do not seek to represent a total truth or faithful reality. Rhetoric is a means for persuasion, it displays a discourse intended to convince, visually in this case, about a production of space. Rhetoric is not innocent, neither is the reality it seeks to portray. Rhetoric is not 'dictated by the intrinsic truth of the data'. If critically read, maps reflect the use of rhetorical codes employed by mapmakers (see Harley, 2001, 37; 1988).

Crucial rhetorical elements of maps are the silences they include. Silences in mapmaking are not voids. They are not empty or forgotten spaces. Silences are intentional and can be given a voice when interrogated. The case of *Terra Incognita*, for example, is as much an invitation to wonder as it is a statement of the mapmaker, the culture in which mapmaking and the mapmaker is embedded, and perhaps a revelation of the state of knowledge on specific regions. In de la Cosa's original map, the American continent is depicted in green (a dark shade in the print included in this chapter) and left almost empty apart from banners from the two Iberian powers and names of coastal places that depict political possession. Such emptiness speaks of a world to be colonised, a frontier where sovereignty can be exercised. In Mercator's map, most of what we today call the Americas remains empty, silent, with the inclusion of some rivers and the names of some coastal places. Notably, no banners or symbols of political power are included, an element that reinforces the author's scientific claim of neutrality .

As banal as silences in text map might appear, they are complex constructs that, if analysed, could reveal power relations that are not evident. As complex constructs, much is involved in making them possible and the relationality of the elements involved might not at first appear to obey to specific (linear) causalities. As Harley notes, '[they] are contributed by many agents in the mapmaking process, through the stages of gathering to those of compilation, editing, drafting, printing, and publication' (Harley, 1988, 58). Their analysis therefore demands careful attention to the details, in particular to detailed historical epistemological exploration in order to understand the meaning of symbols, the way in which they are employed, the context they betray, and the relations that make them possible, and the power relations they reveal. Such is not a straightforward task. 'In assessing silences we must be aware not only of the geographical limits to knowledge but also of the technological constraints to representation, and of the silences in the historical record owing to the destruction of evidence' (Harley, 1988, 58). Silences, in sum, have profound meanings if one care's to explore them. 'Silences should be regarded as positive statements and not as merely passive gaps in the flow of language (…) Silence should be seen as an active human performance' (Harley, 1988, 58).

As well as rhetoric, the subject of mapping, and the mapping subject, are part of the text that produces what could be called the subjected map. This constitutes the

third epistemological aspect explored here, the role of experience. The subject, as is by now well known in social, cultural, and political theory, is not passive. As noted in the case of de la Cosa and Mercator, it is imbued with particular kinds of experience that affect the narrative of the map. This is of course not a novel observation. When arguing that '[t]erritories are produced by the overlapping of inscriptions we call mappings', Pickles referred to lines as descriptions of forms of 'lived experience' (Pickles, 2004, 5). Lived experience is a particular understanding of history that allows narratives to focus on specific ways of being in the world rather than on the history of institutions and personalities or ready-made concepts and categories of thought (Veyne, 1971). Lived experience does not take place in a void or in isolation. As put by Pickles, '[t]he drawing and reading of a line, the historical emergence of cartographic reason, the production and circulation of a map, and lived experience are so thoroughly and historically intertwined and over determined' (Pickles, 2004, 5). Whereas Pickles's concern was to understand how 'mapping and the cartographic gaze' coded subjects and produced identities (Pickles, 2004, 12), his observation challenges the technical character of the mapmaker and transforms it into a subject of power.

Several elements of experience can be read into the two maps. Mercator was an armchair academic professional, highly networked across Europe and informed by scientific knowledge. De la Cosa was an explorer, entrepreneur and royal officer with vast sailing experience, who circulated within the confines of the Iberian scientific and political circles. The rhetorical strategy of the maps reveals experiential elements between political authority and mapmaking and the legitimate base from which their own authority as mapmakers derived. De la Cosas's was quite clearly an imperial instrument on power visualisation intended for diplomatic and perhaps trade networks consumption. It operated under the institution of the crown of the Catholic Monarchs and served as a base for the subsequent institutionalisation of cartography as one of its instruments of power through the Padrón Real within the Casa de Contratación de Sevilla – the institution created to govern the Indies. Mercator's institutional setting was a commercial one that was in turn framed through political and religious limitations. His map was intended to serve a practical, if technical, purpose and was expected to sell and be used. The former's was printed on paper and intended to circulate, the latter was drawn on parchment and mainly kept secret or shared selectively. Details such as the language used and the type of script, the colours employed in de la Cosa's map and the absence of them in Mercator's, the amount of text and the use of flags and other symbolisms, the marking of scale and its use in the map, the empty spaces, as well as many other elements – albeit rhetorical elements – must be analysed as well as imbued by experience. Experience in this sense is not simply a record of lived life but a record of encounters with specific problems of life.

There are plenty more epistemological aspects to analyse in the two maps but they exceed the scope of this piece. Let us finish this part by coming back to Baudrillard's observation noted at the start of the section, that territory does not precede the map and does not survive it. The hyperreal character of maps – which

allows the observer to read in them not a factual, objective, politically neutral world but rather a world that is complexly and actively produced through the articulation of lines, text, rhetoric and experience – is what turns maps into empirical spaces from which to interrogate the production of specific orders of governance in the world. As such, maps provide a space from which to detail how political effects such as territory, borders and sovereignties are never ready-made but produced through complex technologies of power. In this respect, maps should not be taken as a product of political power but as productive of political power. Read and analysed carefully, they can provide the empirical ground from which to understand the complex relationalities at play in making possible very particular materialisations of order, power and governance. While maps can be read as expressing a hegemonic effect of sovereign power, very much in line with Jordan Branch's ideas on *The Cartographic State* (Branch, 2014), they can also be read, in a more exciting epistemological way, as the result of complex negotiations and contestations of imaginaries of the world, what Matthew Sparke refers to as the 'counterhegemonic effect of cartographic negotiations' (Sparke, 1998, 464).

Maps and the simulacrum of order, power and governance

The quest for location under which the two maps examined in this chapter emerged is part of a wider struggle in modernity to establish and achieve spatial order. In less than a century, Ptolemy's *oikoumene* grew into a European perception of global space where circumnavigation, the establishment and operation of inter-continental trading routes, and competition for landed and oceanic control became the norm between imperial and aspiring imperial powers in Europe. Maps, as discussed here, provide material evidence of how the imaginaries of power deployed through multiple, and often overlapping, logics of representation are part of the production of spaces of governance.

The problem of location, however, is not a matter of cartographic products, practices and epistemologies of the sixteenth century. In contemporary forms and practices of mapping, location remains a prominent problem. Computer applications employing GPS technology available in the public domain, such as car navigation systems, are used with the expectation of providing real-time precise location and information relative to it. An internet search is georeferenced through algorithmic technologies and can use location to provide the user with relevant information. Relevance is determined by elements such as proximity, market habits, interests and identity and driven by market elements such as sponsorship and political filters such as content management. In these systems, location becomes an enabler of markets and governance by targeting products and services and by generating information that can be transformed into intelligence. The location these systems provide, however, is not unrestricted. It relies entirely on access to and operation of the systems and is subject to complex modes of control. Neither is the idea of location an objective matter. It relates to and depends on the system on which the platform operates.

One of the promises of the digitisation of mapping in the early twenty-first century has been that users can generate, through the use of portable devices, content in real time to improve the accuracy of information for all. This promise is associated with an aspiration of turning maps into objective democratic devices for sharing geo-referenced information. Both promise and aspiration remain that. In a similar way in which Ptolemaian coordinates have been used to structure physical space and determine global location, digital platforms rely on systems of coordinates that are subject to ownership and control. The Global Positioning System (GPS), for example, a system that provides free geolocation and time information to GPS receivers around the globe, is owned by the United States government and operated by the US Air Force, which can selectively deny or degrade access to users. Denied or degraded access to GPS can annul or restrict the location capabilities of the platforms on which digital maps operate. The idea that maps become democratic inasmuch as all users can contribute to their development is a mediated promise dependent on access and the correct operation of systems and the platforms that employ them.

There is also the issue of knowledge. Whereas in de la Cosa's and Mercator's time expert knowledge, known then as cosmological, was required for the mapmaking, in the digital age applications provide user-friendly platforms to create, manage and use maps. In the absence of professional mapmakers and digital platforms and the technologies on which they operate, few individuals would master the knowledge required to understand geographical systems, digital or analogue, and create the maps they need. The idea that access to information on location could be understood as a common good is very much dependent on levels of geographical education and access to maps and their enabling platforms.

The modern struggle to establish and achieve spatial order so present in the analysis of de la Cosa's and Mercator's maps, therefore, remains a prevalent matter today. The struggle takes place at various levels, as can be read into the various chapters of this volume. Empirically, it deals with access, control and management of information. Technically, it deals with the creation, development and protection of digital platforms, visualisation techniques and visual and textual rhetoric. Analytically, it deals with the creation, understanding and operation of known and novel orders of representation of space – the geometric grid being but one. And experientially it deals with ways of relating sensorial experience and ways of knowing the world into cartographic media. If anything, the struggle has been intensified by the number of people involved in the promise and aspiration mentioned before, the sheer amount of information made available digitally, and the vulnerabilities of systems and platforms to external influence – security in the cyber domain.

The three epistemological aspects - of lines, text with their rhetoric, and experience - that are explored in this chapter, remain valid for analysing the hyperreal character of contemporary forms of digital cartography. Some elements have changed, of course. Digital maps are not drawn but coded, they remain textual and visual constructs of rhetorically (if algorithmically) portrayed spatial orders.

They result from real-life experiences of knowing and dealing with specific problems in the world. In the same way as analogue maps, the hyperreal character of digital maps does not allow observers to read in them a factual, objective, politically neutral world. They do allow, however, for a careful epistemological exploration of the elements that produce the spatial imaginaries that frame the world.

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2

FROM THE CARTOGRAPHIC GAZE TO CONTESTATORY CARTOGRAPHIES

Doug Specht and Anna Feigenbaum

Cartographic gaze

Rene Descartes declared in the sixteenth century that the world was now dominated by the visual, a notion that would be seen as defining the Enlightenment (Descartes, cited in Potts, 2015). As the increased dominance of seeing and the desire to visualise the world cohered with the production of increasingly accurate tools of measurement and the advent of the printing press, cartography emerged as a discipline, often used as tool of oppression and dominance. Cartographic visualisations, afforded the creator, and user, a God's eye view of the world. Following others (Casas-Cortés et al., 2013; Koch, 1998), this chapter refers to this way of seeing the world from above as the 'cartographic gaze'. First, the chapter briefly examines the historical emergence of the cartographic gaze before turning to a discussion about how the proliferation of geographic imaging technologies and digital tools simultaneously further embedded this gaze into mapping practice, while also diffusing such practices of mapping to broader populations. Discussing the rise of participatory mapping and counter-mapping under the rubric of contestatory cartographies, the chapter presents some of the challenges that face those attempting to create alternative maps of their worlds, and the ways in which they become entrapped by the pervasiveness of the cartographic gaze. We use the term participatory mapping to refer to methodologies for map-making based around the participation of those who the map will represent. And we employ the term counter-mapping to reference those mapping practices that explicitly seek to expose and challenge power relations. In specific, we look at how the colonising origins of the cartographic gaze limit what it is possible to do with these alternative mapping practices.

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The emergence of the cartographic gaze

While maps have long been used by states as tools of control, a theme that can be traced back to the Babylonians (Finkel, 1995), the sixteenth century saw this on an unprecedented scale. Newly 'discovered' lands required an increasingly detailed series of mappings. These maps were produced as views from above and worked to serve as tools of possession, the explorer and cartographers' elevated position and the commanding view provided by the maps mirrored the divine gaze of God, positioning the commissioner of the map in a seemingly omniscient position (Lobo-Guerrero's chapter). In this way, the cartographic gaze was the precursor to the surveillant gaze, epitomized by Bentham's Panopticon and the work of Foucault. These new maps of the sixteenth century gave monarchs and the landowners that served them greater control and further-reaching power. Ownership over space became defined in robust terms, and alongside the process of enclosure, the position of the peasantry, landowners and the monarchy became ever solidified, changing the perception and understanding of space itself. Furthermore, the cartographic gaze also embodies the Sartrian conceptualisation of Gazing, serving as another battlefield for the definition of self. This becomes particularly prevalent in the use of maps as colonial objects, where God-like views of the world are used to carve up new territories and define peoples, resources and power across newly 'discovered' territories.

These maps were instrumental in the forming of the Other – and with that the subjugation of the Other. The cartographic gaze objectifies the Other and robs one of freedom as a subject (Sartre, 1963; Yancy, 2008). Much like the gaze of Medusa that turned the onlooker to stone, the map solidifies relations and immobilises those who are mapped. In the Sartrian sense, the cartographic gaze is thus not a way of looking at the world but a medium for spreading domination through power models emboldened through colonialism. This positions the map maker in a divine position and strips the mapped of their self-determination, limiting insurrection. To take this Sartrian tone further, it is 'nothing but an ideology of lies, a perfect justification for pillage; its honeyed words, its affectation of sensibility [are] only alibis for aggression' (Sartre, 1963, 21).

Furthermore, the cartographic gaze proliferated the illusion of accuracy in maps and data. Wood (2015) argues that nineteenth-century empiricism imbued maps with the myth that what they visualised was 'veridical and value-free pictures of reality' (n.p.). It was also during this time that charts came into what Friendly (2008) calls the Golden Age of Statistical Graphics. The rise of statistical offices that came with the use of quantitative and numerical information for industrialisation and commerce gave way to a range of graphical developments for representing statistical information. While used primarily by government institutions, this period also saw the employment of these techniques in social campaigns, including Florence Nightingale's rose diagram on preventable deaths in the Crimea War (Brasseur, 2005). More often cited in geographic circles is John Snow's (1855) cholera maps, which, while rarely held up as such, actually stand as a testament to the

illusion of the accuracy of maps. Instead, they are referenced by those wishing to perpetuate the myth of maps alone being able to save lives, while the reality was that these maps were neither revolutionary nor instrumental in persuading others (Specht, 2017; Shapter, 1971). The myth surrounding these maps has become increasingly prevalent throughout modernity, perpetuating the notion of accuracy provided by these exercises and helping to solidify the cartographic gaze that allowed for their development.

The power to map – as with the power to collect, analyse and visualise statistical information – rested largely in government and large-scale corporate organisations. Yet the power of the cartographic gaze is not restricted to those in positions of authority. With the rise and spread of digital tools for mapping and open data at the end of the twentieth century, the modes of seeing derived from the cartographic gaze became embedded in new tools. These reinforced the illusionary vision of the cartographic gaze but also diversified and expanded who could participate in the manufacture of this gaze. This expansion of the power to map calls for a more complex understanding of the history and function of the cartographic gaze that does not simply pit visualisation's empirical and imperial power against critical critiques of these practices as inherently oppressive. What is needed rather is a better way of documenting how the power of visualisation has been embedded, distributed and tactically put to use by different parties in struggles for social equality and justice. Geography and communication studies have offered up a number of such ideas over the last hundred years, with themes of participatory mapping and counter-mapping practices being prevalent, although these attempts are far from homogenous in their ideas.

Contestatory cartography

The connections between the datafication of peoples, data visualisation and cartography, while born in the nineteenth century, were solidified with the advent of Geographic Information Systems (GIS) technologies. GIS systems have been around since the 1960s, and can even be traced back to the early days of computing in the 1950s when the military began to see the importance of connecting geography with the new power of computing (Haklay, 2010). Esri,[1] one of the most powerful mapping companies in the world, emerged in the 1970s, and software that would allow personal computers to harness GIS products appeared in the 1980s. The 1990s saw huge developments in computing and computing power, leading to the emergence of companies such a Garmin (est. 1989) and the development of ever more powerful GIS and GPS (Global Positioning System)-based programmes. Yet these systems and their processes of codification and datification of people remained tools of the elites, continuing to extend the cartographic gaze through what were now digital means. The level of complexity and multi-disciplinary knowledge required to operate them, and interpret their data, was too

1 Formally known by its full title, Environmental Systems Research Institute.

significant a barrier to entry. The vast amounts of computing power required – and until the early 2000s, limited access to the data required – meant that not only were the barriers too high but also that the only way to enter the market was through connections to the military or state, for example Ordnance Survey in the UK (Evans, 2013). Thus, these maps also represent the power held within these institutions (Ballatore, 2014), something that is still prevalent.

More recent changes in web-based geo systems and open source GIS have begun to reduce both the technical and financial entry points into digital map making (Goodchild, 2009). In the late 2000s emergent digital interfaces became more and more accessible, giving rise to what has been popularly called 'cartography 2.0' (Crampton, 2009), our current period of cartographic production that has seen a proliferation of digital mapping. The proliferation of digital mapping platforms and related tools has meant that access becomes cheaper and intermediaries are not always required to call, invite, edit or prescribe what cartographic artefacts will be produced. Distinct from more general practices of 'cartography 2.0', contestatory cartography involves a direct engagement with the ethics and risks that arise in the process of cartographic production. Drawing from PGIS and activist mapping practices from previous decades, 'cartography 2.0' brings with it new and adapted practices of cartographic production as people experiment with ways to try to contest sites and practices of colonial power through mapping. This often involves mappings that make social and economic injustices visible, contest spatial rendering of resources done by authorities or challenge statistical analysis related to spatial boundaries.

Casas-Cortes and Cobarrubias note that there has been an increase in people around the world who are engaging these new technologies to draw 'new maps, maps of resistance that can be used to attack the visible and invisible around them' (2008, 60). By then using these maps as part of the process of advocacy involves an explicit recognition of maps as rhetorical devices. In this way, maps no longer solely represent space but are used to shape the direction of the argument, to identify those objects to be considered and also to lay out the discursive boundaries of the discussion. 'When individuals make their own maps, they offer an expression of what they consider important, what they consider to be "of interest", and for what they are willing to fight' (Institute for Applied Autonomy, 2008, 35). So, the thinking goes, those who make their own maps are able both to lay claim to landscapes and position themselves within the narrative as both authors and individuals. In this way, these new cartographies, it is suggested, offer a direct challenge to the perceived neutrality of spatial data. By confronting this power, map makers can claim their right to set the rules of debate and to provide interpretations with both 'an authority and a contingency equal to official representations' (ibid., 35).

However, while these tactical cartographies may be able to amplify voices, change conversations and influence policies, their experimentation is still bound by the cartographic gaze. The new resources 'cartography 2.0' offers up, which include Google Earth and Google Maps, were first built upon newly available military satellite data, introduced in 2005 (Crampton, 2009). While this allowed for

mappings of alternative visions of society (Evans, 2013), the colonial logics of cartographic vision itself are much harder to transform. These broader questions around the limitations and possibilities for what contestatory mapping can do are beginning to open up critical debate around the relationships of power and space and the new knowledges that might inhabit these spaces (Bryan, 2011; Parker, 2006). In the remainder of this chapter we discuss two primary – and sometimes overlapping – modes of contestatory mapping, participatory mapping and counter-mapping, before turning to look at some of the ways that the cartographic gaze remains embroiled in these contestatory practices.

Participatory mapping

In the 1980s, new modes of using GIS came to be called many things, most of which fall under the umbrella of PGIS or PPGIS (Participatory-GIS and Public Participatory-GIS respectively). PGIS in itself has a rich and diverse conceptual history drawing upon PRA (Participatory Rural Appraisals) development methods, community planning and development practices, critical theory and political economies (Weiner et al., 2002; Harris, 2016). In the last decade PGIS has built a new foundation based upon a better understanding of the political and institutional conditions of GIS itself and now seeks to foster ever more inclusive practices. However, it still represents only one genus of the rapidly developing mass of geographic tools for public use (Elwood, 2006; Walker and Rinner, 2013).

While the history of participatory mapping can be traced back to the PRA movement of the 1980s, it is becoming clear that the wide range of online tools and the bringing together of the web 2.0 and GIS into the GeoWeb has brought about a whole new way of working with participatory systems. Along with these new practices, a range of new debates and epistemologies have emerged, which might be thought of as *neogeographies* (Crampton, 2009; Atzmanstofer et al., 2014). Connecting these PGIS elements to mobile devices and their inbuilt GPS, people become used as censors to further enable the creation of crowd-sourced participatory maps (Sheehan, 2015; Meek et al. 2014). Projects such as *OpenStreetMap* have shown what can be achieved by amateurs with little or no geographic background (Goodchild, 2009). Even before such enterprises, Jane Goodall had seen the benefits of satellite images for conservation, even based on low-resolution aerial photography (Tullis, 2015). Médecins Sans Frontières have stated the importance of maps and participatory mapping projects in helping them to reach people in times of crisis (Smith, 2015).

Moreover, participatory mapping activities are helping communities to lay claim to land around the world (Johnson et al., 2005), notably the peoples of Awas Tingni and the Maya of Belize, who have significantly changed the legal status of indigenous peoples in the region (Wainwright and Bryan, 2009). PGIS has been used to support the United Nations Programme on Reducing Emissions from Deforestation and Forest Degradation (UN-REDD), healthcare, targeting villages for development aid and forestry projects and in protests against water

contamination from large-scale mining projects (Eisen, 2014; Catlett and Ghani, 2015; Specht, 2018). Community-led PGIS projects have also helped WaterAid invest appropriately in the poorest areas of Dar es Salaam, leading to significant improvements in the lives of people there (Gloeckner et al., 2004). Furthermore, PGIS, through its inclusion of the communities affected by map-making practices, has been shown in some cases to reduce conflict and help communities arrive at collective decisions (Carver, 2003). And the diffusion of GIS through the web now means that it is possible to both reach more places and work remotely with communities, or even bring remote communities together in a shared digital space (Elwood, 2006).

These are all significant initiatives and achievements that should not be discounted, but nor should they be seen in isolation from the bigger (P-)GIS narrative. The assumption that PGIS projects automatically promote empowerment and the bringing together of communities is dangerous and naïve (Weiner et al., 2002). The basic entry requirements for GIS have not actually moved all that much: fast internet and a computer or tablet are still required for producing the maps themselves. Even if a mobile phone is sufficient for some tasks, large data centres and increasingly large amounts of computing power is needed to crunch the data produced by these phones. This means that the control over the data produced has not been wrested from the hands of the elite hands in the way that PGIS and neogeography scholars have suggested (Haklay, 2013). Furthermore, there is the issue of participation in its broadest sense, with all the cultural and social implications that this brings and the balances of power that it might upset or bring to light (Sletto, 2009). These kinds of participatory projects can serve not to diminish, but rather to reinforce the dichotomy between local and scientific knowledge, and so are less of an insurrection than a disempowering exercise (ibid.).

Yet, geographers often celebrate the power of participatory maps and activists like Nietschmann, Brody, Herlihy, Stocks, Chapin and Harris. In these numerous conceptualisations, the basic understanding of these PGIS projects tend to see the practice as replacing *bad* colonial maps with *good* anti-colonial ones. Yet, it is clear that these new maps are neither inherently good nor beyond question; they are open to multiple readings, and they may have potentially undesirable outcomes. Accordingly, there is required analysis of the social processes through which participatory maps are produced and read (Wainwright and Bryan, 2009). It would seem then that the way in which neogeographies and PGIS practice have evolved to detach PGIS from its background in GIS (Weiner et al., 2002) is problematic. It is also clear that the average citizen is not aware of the body of knowledge that rests behind more traditional mapping practices and the critical discourses that challenge the cartographic gaze (Goodchild, 2009). This is compounded as research around GIS and PGIS has become increasingly removed from the critical discourses of the 1990s as scholars struggle to keep up with technological advances and the increasing numbers of people who are engaging with these tools. To counter this, it is important to approach PGIS as a spatial practice that reframes societies rather than just remaps them (Bryan, 2011); in the same vain, PGIS should not be

examined as a tool that can be picked up and then put down again – rather, these mappings become an intrinsic part of the fabric of everyday life (Johnson et al., 2005). It is certain that the role of citizens has shifted greatly from being the object of maps to being the creator of maps, but this has not turned maps into neutral objects separated from power (Pánek, 2016).

While PGIS is on the increase, it will be sometime before the last billion are connected to the internet, so any representation will always exclude them (Verplanke et al., 2016). Maps certainly already colonise the imagination, and it is thus essential to ensure they do not continue to colonise or subjugate, through the obscuring guise of PGIS and data visualisation, those who are being mapped (Bayley, 2016). However, this is difficult to escape: even the great cartographic theorist Brian Harley has expressed something of personal outrage that he himself might have been duped by such maps and visualisations, which, he later came to note, were more destructive than guns and warships in their power to oppress the Other and to crush insurrection against anything but the map's representation of power (Harley, 2002). This perhaps leaves us once again impotent to enact change or to challenge power through these tools. After all, the participatory element of PGIS is in many ways little more than an addition, both semantically and in practice, to the imperialist juggernaut of military-derived Geographic Information Systems.

Counter-mapping

The inaccuracy, bias or total lack of representation that can be found in maps has led people to argue that we need to draw new maps, maps of resistance that can be used to attack the visible and invisible (Casas-Cortes and Cobarrubias, 2008). This invisibility and lack of representation is not just an issue in the developing world. Across Europe there are places and people that cannot be found on regular maps, from Italy to Great Britain and beyond the border of Schengenland in Romania, Ukraine, Libya and Morocco, migrants, undocumented peoples, nonconformist religious sites, non-nationalised languages and ethnic groups are not mapped or are removed from maps. Counter-maps then are maps of resistance that go beyond the notions of participation and the theoretical barriers of PGIS. While participatory mapping practices involve local or affected communities, they use traditional, institutional models and modes for mapping, often led by an outside practitioner. Counter-maps seek to both subvert the methodological practice of mapping and expose and challenge power relations; to question at its core the cartographic gaze. Taking on a variety of forms, counter-maps work to challenge the status quo and disrupt normative ideas of place and space, often seeking to remove or undermine the cartographic gaze. Distinct from more general uses of mapping or PGIS, counter-mapping involves an explicit engagement with the ethics and risks that arise in the process of making maps together. This often involves critical analysis of how people, and the places they inhabit, become represented.

This kind of counter-mapping can open up possibilities for new forms of knowledge production and political change. Furthermore, counter-mapping develops the notion that technologies in themselves cannot be of use without developing meaningful relationships around knowledge and power sharing. Counter-mapping then might be seen as a direct response to the top-down, elitist, colonial mapping embodied by the cartographic gaze, bringing together a new collective order that will better represent the people who are being mapped and producing the map (Parker, 2006). Although counter-mapping has to some extent been regularly practiced in the developing world (Perkins, 2007), there are increasing opportunities for more mapping practice to occur, potentially allowing for a greater empowerment of communities and the amplification of stories (Weiner et al., 2002). The world has become increasingly spatially orientated (Soja, 1989). Understanding that maps are filled with signs and myths helps us to better understand the information or data held within the map, and thus who is represented or not, and from this it is possible to create counter-mapping projects. Just as the photographer must make a number of choices of framing, point of view, lenses, lighting, film, speed, plus the choices in the darkroom, so too do the mapper and the counter-mapper as they map the knowledge they prefer (Gripsrud, 2006). This notion that even counter-maps must, by definition of space, also involve choices about what is included and, more importantly, who is excluded leads to significant limitations of these contestatory cartographies.

Limitations of contestatory cartography

Much of the discussion around PGIS and counter-mapping suggests that people no longer have to settle for representations being imposed upon them; as access becomes cheaper, making a self-representation no longer requires intermediaries to call, invite, edit or prescribe the way in which cartographic representations are produced. In the digital age, it is perhaps possible to escape the cartographic gaze as people no longer need a *broadcaster* to provide a platform for or to invite or edit their self-representations (Thumim, 2012). Yet, despite all these many claims for the benefits of self-representation, 'to this day many groups, communities and individuals consider themselves to be dangerously *mis*-represented' (Kidd, 2016, 8). The virtues of participatory GIS and counter-mapping cannot alone erode the conflict between what Barthes (1957) would term the *denotations* and the *connotations* of the cartographic artefacts. Because mapping is most often a process that combines aerial visual representation (or a view from above) with data and geographical information, these alternative maps remain embedded in the practices that emerged out of the colonial agenda. They cannot escape their embodiment of military technology and the pervasive cartographic gaze with its historical roots as a practice of containment, persuasion and oppression. These impossibilities of escaping the cartographic gaze can be broadly seen in three areas: first, that platforms have politics; second, that the visualisation practices involved in the creation of

maps is never neutral; and third, that all maps are only a partial perspective of the landscape they represent and the experiences of the people that inhabit that landscape. The remainder of this chapter will examine each of these limitations in turn.

Platforms have politics

Following new media scholars, platforms can be considered as computational software that offers affordances and limitations to users' participation and interactions. The 'politics' of a platform refers to how power gets embedded into computational layers as well as how relations play out through user engagement with the platform (Gillespie, 2010; Helmond, 2015; Langlois and Elmer, 2013). Mapping platforms, while less often considered by new media scholars, are sites at which decisions around programming, often hidden from users, are deeply embroiled in politics. As mapping platforms often pre-determine places and their meanings, they shape users' spatial imaginations and limit what is possible to map.

As noted above, the rise of digital mapping platforms can be traced from its colonial roots in the cartographic gaze of the enlightenment era, through the military development of GIS, computing and satellite technologies, and then on to participatory platforms. Whether elite or lay produced, all mapping, even that which aims to counter the status quo, is based upon classification and codification of real world objects into taxonomies and terminology. The slots into which data might be fitted are defined by those who make the software, not those who create the knowledge (Brown et al., 2013). For a long time the knowledge of local peoples has been translated through tools and language to suit the needs of the coloniser (Kitchin et al., 2009), resulting in mapping platforms that resemble or make programmable the coloniser's renderings of place and space. While the more collaborative approaches of PGIS may attempt to re-prioritise local and minoritarian spatial knowledges, this knowledge becomes mediated through tools invented by the military at the height of colonial worldviews (Harris, 2016; Elwood, 2006; Carver, 2003). This is something that occurs at the very level of translation from subjugated knowledge into Western information, particularly in relation to the often flexible, porous nature of indigenous understandings of land, and the hard lines of scientific maps and their taxonomies (Harris, 2016). In this sense, some argue that PGIS and counter-mapping can provide little more than a simulacrum of subjugated local and indigenous knowledges (Rundstrom, 1998).

This colonial translation can manifest politically. Zoom into the disputed areas between Palestine and Israel on OpenStreetMap and you will find the city of Jerusalem, named in Hebrew. A few years back, zooming in the area could yield results in Arabic or Hebrew, depending on which of the community's *mapping warriors* – a term used to describe those who engage in such online mapping conflicts – had most recently updated their wiki-style database. The OpenStreetMap team, to stop the constant changing of the city's name, locked the database and decided to follow a policy of naming that favoured what they call the 'dominate controlling power' in a region. The open platform, designed for participation, for

countering the dominant structures in global mapping, becomes compromised by its coding and by the pervasive nature of global politics.

This kind of platform politics can be found across other similar incidents. In Crimea, as the Russians rename cities and streets, OpenStreetMap must decide who the dominant power is. Related occurrences have appeared on Google Maps, which allows for public participation in naming places and updating data. In 2011, as rebels advanced on Gaddafi in Libya, Green Square was returned to its pre-Gaddafi-era name of Martyrs Square. Maps don't just reflect conflicts on the ground; their power can shape territorial disputes. In 2010 Nicaragua accidentally invaded Costa Rica because of a Google Maps error that placed the border in accordance with an outdated 1858 treaty. Quite what the Nicaraguan army were doing relying solely on Google Maps is another question. Even when making counter-maps, it is not possible to escape these platform politics. As Sean Cubitt (1998) reminds us, while computers will talk to anyone, it is the privileged and historically powerful that teach them to speak.

No visualisation is neutral

Like all visual representations, maps capture, construct and communicate meaning. Questions of how best to visually represent places, quantities, topical issues, experiences or anything else that you have decided to map will always be fraught with debate. Just as platforms can have political decisions embedded in them, so too can the software and visual libraries people use to create the visual interfaces and symbology of maps. The development of ISOs, international treaties on mark-up language, symbology and database structures of geographic information embed the cartographic gaze into the visual representation of spatial information. While this consistency of forms can help build literacy through repetition and ensures compatibility across platforms, it also privileges particular ways of seeing data and reifies the idea that visualisations are objective representations of the truth. Likewise, the statistical visualisation conventions developed in the nineteenth century continue to be used by data visualisation designers. Visualisation libraries (for example, D3.js), as well as software programmes that simplify the generation of visualisations from raw data (for example, Tableau), further embed these conventions into contemporary digital map design, and often without the user being able to see or access the process of visualisation, leading to a reduction in the space for critical analysis of this work. To take a rather basic example: Google's decision to give over more space to the mapping of roads and then make these a more prominent and detailed feature of its service does well in helping navigation but also skews the viewer's perceptions of the importance (and quantity) of roads, while at the same time diminishing the presence of people and cities. This might seem a harmless issue, but in order to incorporate the additional road labels, the names of urban centres have been removed, effectively eliminating their existence (O'Beirne, 2016). The complications are numerous even with relatively

simple scenarios. As ever, the issue comes back to the question of who decides which categories, colours and logos are legitimate, representative or appropriate. Even if this power to label is turned over to participants, one person's deforestation issue can be another person's indigenous rights issue.

Attempts to confront and challenge these limitations can be found in contestatory mapping projects, particularly those that engage explicitly with the aesthetics of map production. Art maps that break conventions and sense maps that challenge the dominance of the visual are some strategies that seek to confront the cartographic gaze. These mapping practices attempt to reveal the cartographic gaze's oppressive history and binary assumptions, thus undoing the apparent neutrality they avow (D'Ignazio and Klein, 2016; Lupton, 2017). For many critical cartographers, tensions exist between the desire to challenge the cartographic gaze yet still produce a map that is easily readable and understandable to audiences. Breaking conventions means taking the user outside of how they are trained to see. While this can yield affective moments and transformative encounters, it may also distract from the delivery of the maps' messages. What strategies contestatory cartographers choose rests on considerations of audiences and desired outcomes.

Problem of partial perspectives

If it were possible to overcome the limitations related to platform politics and visualisation, then the barrier of perspective is all but impenetrable. As Branston and Stafford (2010) note, 'no representation can contain more than a fraction of its real-world subject' (129). No map, counter, participatory, military or otherwise, can be a perfect depiction of territory, in fact for a map to be a truly faithful representation of space, it would need to be at a scale of 1:1, including every feature of the land at correct scale; this feat has only been achieved in fiction, in Borges' (2000, 1960) celebrated story *On Exactitude in Science*. And thus, something must give, something must be left off; when people create representations of the world there are agendas at play and a particular set of ideas, values, attitudes and identities become normalized. These appear as issues of power, ownership, authenticity and meaning (Kidd, 2016). As the Car-Tac Collective wrote,

> even [if] the map is not the territory, to make maps is to organize oneself, to generate new connections and to be able to transform the material and immaterial conditions in which we find ourselves immersed. It isn't the territory, but it definitely produces territory.
>
> *(PTCCC, 2008)*

Even more problematic, those items, be they people, objects, data or locations, that do make their way on to a map, having been seen as a legitimate representation by the cartographer, do then themselves rarely, if ever, have any one single, fixed and unchanging meaning (Hall, 1997). In other words, while the map may appear representational in the mind of the creator, it can only ever be as representative as

the viewer, or reader, of the map understands it to be. In this way representation further becomes 'a site of active political, cultural and social movement within which are, each and every one of us, implicated', to further echo Stuart Hall (1997, 343). First asked by the Institute of Development Studies (IDS) in 1979, this predicament is perhaps captured best by the now infamous question: 'Whose knowledge counts?'. Regardless of the completeness of a map, the deeply embedded Euro-American, industrial-military, colonial cartographic gaze means that data that already conforms to this worldview is what gets taken seriously, or given legitimacy (McFarlane, 2006). This evokes the work of Spivak (1988) when she questions whether the *subaltern* can speak. To fully understand the way in which we understand the Other – or in this case collect and analysis data about the Other – we must turn the anthropological gaze on ourselves and view our representations about, or on behalf of, the Other as a function of our geopolitical and institutional positioning (Kapoor, 2005).

Mapping maps onto other maps can help us see these new stories emerge, both from where data overlaps and from the holes and cracks that can become clear through these combined visualisations. In this methodology, all competing narratives are mapped together as equals. This can only work, however, if subjugated knowledges, and the Other, are recognised and incorporated as legitimate and comparable, regardless of the way in which they are formed (Balit, 2012; Mosse, 2001; Taylor, 2007). Knowledge must not be provincialised, nor passed off as universal (Robinson, 2003). This becomes an increasingly difficult task within the cartographic gaze. First, there is a bias towards the creation of God's eye views of the world, which frequently exclude other interpretations and understanding of existence that may not be considered to be 'proper maps'. Second, a deep examination of the gaze must be undertaken to avoid the transference of unresolved conflicts onto any new contestatory mapping projects. Without deep examinations of these conflicts and the gaze there runs the risk that all attempts to create counter-maps that follow traditional cartographic perspectives become co-opted by the cartographic gaze, and all those that reject the traditional cartographic perspectives are themselves rejected as not legitimate representations of space. To allow this is to once more unwittingly pass on own failings to the subjugated (Kapoor, 2005).

Finally, a third major issue here is that mapping maps onto other maps still falls to the same creators under this guise. The same issues arise around control of the maps, ownership of the computing power required to aggregate collected data sets and knowledges, and who is seen as a legitimate person or company to carry out such work. These issues mean that in mapping maps onto other maps the alternative narratives of counter-maps can be assumed within the new map, developed from a less critical position, and thus the alternative narrative can become occluded by the illusion of completeness that comes with drawing together multiple datasets. This concern can once again leave us feeling trapped and that there is no way out of the limitations of the cartographic gaze. However, this is not meant as an argument for a retreat into simple localism (Ellerman, 2002); rather, it calls for a change in cartographic practice. Such an engagement, however, must counter the unequal

power relations, seek to eliminate the cartographic gaze and move beyond a liberal conception of integrating subaltern knowledge as an addition to Western knowledge – in other words, a more radical conception is needed. While mapping maps and competing knowledges together is of the upmost importance, and something that can draw conflict to the fore (Robinson, 2003), the appropriation of subaltern knowledge must be avoided (Spivak (1988).

Conclusion

Late twentieth-century communication and information technologies have produced such a blurring of what is real and what is representation than the two can no longer be distinguished (Corner, 1999). Maps, be they cartographic, data visualisations, participatory or counter, all sit in this space between the virtual and the real. Here Winnicott's question on maps becomes salient in relation to data: *did you find the world or did you make it up?* The use of geographic information has changed dramatically in the past decade and continues to do so. The platforms and related tools available to make maps are important factors impacting geographic information use and counter-mapping narratives (Brown et al., 2013). In practice, though, PGIS and counter-mapping remain limited in their emancipatory potential. In the developed world, it has been largely subsumed into the burgeoning literature around participatory GIS. PGIS aspires to deliver a more democratic spatial governance, but the majority of this work still emphasises the incorporation of local voices into maps produced and controlled by specialists and articulating their agendas, rather than subverting mapping or changing what is mapped (Perkins, 2007). Counter-mapping has gone some way to challenge this, but the transformation is far from complete.

This chapter has sought to explore the issue of the cartographic gaze and the various modes that might enable its deconstruction, through counter-mapping, PGIS and contestatory cartographies. Each of these has been shown to have its limitations in relation to the cartographic gaze. This is hardly surprising when considering the notion that all representations have their failings. In pointing out these limitations, our intention is not to suggest that these new modes of working should be abandoned. Instead it serves as a call to question at every turn, every representation. It is well known that this is required, yet terms like participatory and contestatory, or mashup and counter-map, all too easily lure the creator and reader into forgetting the in-built biases of the platform, the coding, the symbology the creator and the reader that are tied up in the inescapable, yet very much challengeable, cartographic gaze.

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3

HORIZONTALISM IS A MAP

Nicholas Michelsen

Introduction

Whereas hierarchy has been a dominant ordering principle during the first half of the twentieth century, it has been argued that societal organisation principles have seen a shift in the second half. As Brandon Hookway (1999, 69) puts it, the

> [d]iagrams of Communication Flow are the abstract formulations of the distributed systems which form the dominant environment of the second half of the twentieth century. These distributed systems are driven by a new set of organization strategies; the signs of their existence are manifold, the scope of their effects pervasive.

In smoothing over 'the world's contradictions' our maps invariably mislead us (Toscano and Kinkle, 2015, 4). All maps of the world are distorted, for cartography is a practice defined by historical shortcuts expressed as 'geographic short-hands' (Kacandes and Komska, 2017, 2). In particular, as noted by J. B. Harley (2002, 257–259), 'the history of the map is inextricably linked to the rise of the nation state in the modern world' and to the hierarchical envisioning of the political which the state form inscribes in geographical space. It has become part of the common sense of critical cartographic theory that the spatial story of a world of hierarchical states is effective in 'blocking alternatives', regardless of its functional instability and representational inadequacy (Shapiro, 1999, 60). The vertical map of the state entails a 'moral cartography', determining actors as relevant or irrelevant. Surely, we need new maps, which can provide a 'viable glossary' for the critical transformations in world politics which are taking place on a horizontal axis of transnational movements, flows and assemblages (ibid).

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This requires challenging mappings orientated by the logic of verticality, so as to look for the layers of interconnections and networks that cut across the hierarchies that cartography has traditionally been orientated by. There is increasing awareness of ways in which 'connectivity, networked linkage, marginality, liminality, and transgression of linear boundaries and hermetic categories – spatial flow … render obsolete conventional geographic and topographic mapping practices whilst stimulating new forms of cartographic representations' (Cosgrove, 1999, 4–5). Yet with any project of critical unmapping comes the potential for a 'remapping' which may in turn become reified (Kacandes and Komska, 2017, 6–7). Abrams and Hall (2006, 12) argued that new kinds of

> mapping ha[ve] emerged in the information age as a means to make the complex accessible, the hidden visible, the unmappable mappable. As we struggle to steer through the torrent of data unleased by the internet, and to situate ourselves in a world in which commerce and community have been redefined in terms of networks, mapping has become a way of making sense of things.

Yet, as they go on to note, 'the network when viewed from above, faces the same charge of misrepresentation that Harley and a generation of critical cartographers levelled at the bird's eye view' (Abrams and Hall, 2006, 14). There are risks attached to new mappings of global interconnectivity (Toscano and Kinkle, 2015, 10). As we invent new diagrammatic means by which to capture the horizontal complexity of political dynamics, there is risk that rather than treating the new maps as 'the interpretations of information that they are, we often see them simply as representations and descriptions,' which are not only more accurate but politically and normatively better than those we relied on in the past (Kurgan, 2013, 16).

This chapter examines the horizontalist cognitive diagrams underpinning contemporary resistant and revolutionary political practices. It illustrates the ways in which mapping functions as normative theory and how horizontalist cognitive maps function as a guiding episteme in contemporary social movements. Interpreting horizontalism as a theoretical map provides a means to inserting greater caution into celebratory accounts of decentralised or networked political practices. I unpick the logic of horizontalism and make a case for why it should be interpreted as a map with ambiguous applications to politics, rather than an inherently emancipatory unmapping of the vertical cartographies of states.

Horizontal maps and digital rebellion

In developing an enquiry into the ambiguous functions of horizontalist mapping, it is necessary to analyse its applications in political practice. The Tarnac Nine were arrested on 11 November 2008 on the grounds that they had been involved in a series of sabotage actions against high-speed train-lines. In lieu of substantive evidence, the key plank in the French prosecutors' case was their alleged authorship of

a book entitled *The Coming Insurrection*, which had been published anonymously under the pen name of a group referring to themselves as the Invisible Committee (2008). This book set out a map of contemporary political conditions and derived from it a set of strategic principles for revolutionary action.

The text contended that contemporary power operates according to an immanent logic of horizontalism. The Invisible Committee argued that contemporary highly developed urbanised societies are determined by an 'architecture of flows' which leaves it 'one of the most vulnerable human arrangements that has ever existed. Supple, subtle, but vulnerable … . The world would not be moving so fast if it didn't have to constantly outrun its own collapse' (2008, 17). Modern society is defined by its pursuit of resilience through decentralised networking. That networked 'science of control' is read as implying the necessity of mirroring horizontal counter-conducts. The text calls for a unifying revolutionary strategic principle to 'jam everything' (ibid., 125). In recognising that 'every network has its weak points, the nodes that must be undone in order to interrupt circulation, to unwind the web', they called for a campaign of sabotage and disruption that attacks the very networks that modern society believes underpin its resilience:

> the technical infrastructure of the metropolis is vulnerable. Its flows amount to more than the transportation of people and commodities … sabotaging the social machine with any real effect involves re-appropriating and reinventing the ways of interrupting the network. How can a TGV line or an electrical network be rendered useless? How does one find the weak points in computer networks, or scramble radio-waves and fill screens with white noise?
>
> *(Ibid., 112)*

The decentralisation of modern power – the proliferation of 'just in time production' chains, for example – renders it uniquely vulnerable to a strategy of continuous interruption, which replaces the strategy of major interruption which defined classical revolutionary strategic thinking (ibid., 125). The political injunction of the Invisible Committee (2008) is to avoid at all costs any 'direct confrontation' with the vertical state. A counter-strategy of horizontal swarming is placed centre stage, through the creation of 'a moving multiplicity that can strike a number of places at once and that tries to always keep the initiative' (2008, 71). To occupy a defined space is always to fail in attacking an already networked horizontalist state. The secret to revolutionary success, they argued, is in disturbing the fundamental logic of the system, its 'perpetuum mobile', so that alternative networks can be constructed (ibid., 61). This parasitic strategic response is seen as a radicalisation of the self-organisation that occurs in moments of crisis, such as that witnessed in New Orleans after Hurricane Katrina.

The authors of *The Coming Insurrection* argued that revolutionaries should disrupt the normal flow of the city and then use those 'moments of instability … to consolidate or strengthen' and replace one network with another. The 'interruption of the flows' allows the putting in their place horizontal networks that prevent their

re-establishment – i.e. by building counter-state structures inside but out of sight of the state, providing alternative sources of aid and education that occupy the same territory as the state's structures. This is, they argued, why Islamist movements like Hamas are so successful: they mobilise crisis for self-organisation, providing assistance, education and social support in such a way that the states' networks cannot reform. The Invisible Committee refused any suggestion that territory must be occupied physically, arguing rather that resistance builds from a strategy of counter-horizontalism: 'increasing the density of the communes of circulation, and of solidarities to the point that the territory become unreadable, opaque to all authority' (ibid., 108). Their reading of contemporary power requires that revolutionaries have 'no leader, no demands, no organisation, but words, gestures, complicities. To be socially nothing is… the condition for maximum freedom of action'. Because 'power is no longer concentrated in one point in the world; it is the world itself, its flows and its avenues', the flows themselves must be the object and method of attack (ibid., 108). The project confronts the networked state with another horizontalism.

This map for political action upends the assumptions of a history of radical political and strategic theory, which viewed horizontal organisation and practise as a means to dialectically undermining the vertical logic of state. Carlos Mariguella (1971, 32), the author of the infamous *Handbook of the Urban Guerrilla*, advocated urban terror to precede and spark wider rural guerrilla war in precisely these terms. The city must remain, for Mariguella, an essential (though not decisive) area of 'complementary struggle' within a wider revolutionary project that seeks to capture the vertical state (Mariguella, 1971, 47). The city is the location for implementation of horizontalist diversionary techniques, to create tension and sidetrack the state's armed forces so as to prevent concentration on and encirclement of the rural guerrilla. Small urban groups involved in lightning strikes, ambushes, assassinations and sabotage strike at this unique vulnerability of the vertical state, keeping the revolutionary 'organisation free from complex command systems depending on internal hierarchies and a numerous and immobile bureaucracy at the top' that can be effectively targeted. Decentralisation allows the 'decisive moving force in the movement' to be 'the initiative of its revolutionary groups' (ibid., 40). This spirit of violent experimentation and networked distribution has been a lasting legacy of the handbook in revolutionary theory and practice.

Mariguella's text is a handbook of revolutionary swarming, which clearly sits as part of the intellectual genealogy of *The Coming Insurrection* – seeking to create 'a vast and indestructible network' in which every attack will be followed instantly by withdrawal. Harassing, disheartening and confusing the state, gradually eroding its capability and encouraging it to overreact. This horizontalist strategy centres on a 'war of nerves', in which the aim is to out-compete the enemy in resilience by fostering fear and uncertainty in the capacity of the vertical state to maintain social order (Mariguella, 1971, 90).

Here we see clear resonances with prior anarchist revolutionary theory and strategy built around distributed organisation, spontaneity and seeking to trigger a collective social uprising through acts of violent action. Anarchists were the first to

develop a political thesis around the urban propaganda of the deed, seeking to make use of assassinations, bombings and sabotage to spark a wider uprising (Bolt, 2012). Bakunin explicitly prioritised intensity of individual dedication and fullness of consciousness over the breadth of a revolutionary alliance, for this reason. He thought that only violent action could establish conditions 'favourable to the awakening of popular initiative … and shake the masses out of their sheepish state' (Bakunin, 1980, 412). The use of destruction would awaken the 'spirit of revolt, the source of all moral and material emancipation', by translating a universal but 'blind' instinct to rejection of hierarchy and despotism into conscious popular revolutionary will (ibid.). For Bakunin, violence would unleash a horizontalist urge already immanent to the masses. Sergei Nechayev, a disciple later disowned by Bakunin, took this appeal to horizontalist spontaneity to its limit in exhorting revolutionaries to break all bonds with the vertical social order, reject all established laws, conventions, doctrines and moralities and devote themselves wholly and fully to the task of the destruction of society, out of which horizontal emancipation would bloom (Nechayev, 1869).

The debate between Lenin and Luxemburg regarding the role of vanguards, spontaneity and the general strike was a cipher for the contest between the vertical and horizontal as maps for revolutionary theory and practise. As Kiersey and Vrasti (2016, 10) note, when 'Luxemburg endorses the general strike as a meaningful strategy for social change she was moving towards the anarchist side of the debate', but Luxemburg also 'accused anarchists of reducing the strike to a sort of starry-eyed instrumentality'. She argued for 'the historical significance of the strike as a training ground for revolutionary subjectivity' (Kiersey and Vrasti, 2016, 10). The strike was to be a training ground in horizontalism. The point of the general strike is to foster the right forms of political subjectivity in the masses, by prefiguring the horizontal map that should come next. The vanguardist ideal was critiqued inasmuch as it prefigured the despotic dominance of the Stalinist state. This account of politics that seeks to realise the horizontalist map in its practices goes beyond the methodology of the general strike. As Kiersey and Vrasti (2016, 8) observe:

> prefigurative politics, as it is known in anarchist parlance, assumes that the political is too important to be delegated onto elites or deferred into the future. The principles according to which another world should be organized (e.g. self-organization, voluntary association, mutual aid) should be applied in the here and now, by people directly involved in the situation.

The anarchist vision of revolutionary political action seeks to perform, in practice, the map of the decentralised and emancipated polity it wishes to actualise. This account of revolutionary action as seeking to achieve immanence with its abstract diagram is clearly part of the background to the argument of *The Coming Insurrection* but is also a widespread trope in contemporary accounts of the ways in which new media technologies have reinvigorated practices of protest, resistance and revolution.

Kiersey and Vrasti (2016, 3–7) trace the history of radically horizontalist revolutionary practices, which centred on the creation of zones that escape the forms of life and organisation that predominate in society. The 1960's counterculture aimed at the creation of molecular spaces of self-governing and saw a wide range of experiments with wildcat strikes, university occupations, pirate radio stations and refusal of work in favour of autonomous self-provisioning in communes. All of these sought to prefigure the kinds of world they wanted to realise, culminating in 1968's Situationism. This sense that resistant and revolutionary politics must be performative was also clear in worker autonomist movement, whose aim was to create molecular spaces of horizontal organisation in factories or squats. The Autonomen of the 1960s, 1970s and 1980s 'sought to create autonomous zones through squatting, such as the Kreuzberg neighbourhood in Berlin, where housing, social centres and entire districts were squatted, transformed and defended free of the hegemonies of family, state, nuclear power and the Protestant ethic' (Kiersey and Vrasti, 2016, 6). The horizontalist map also underpinned the new religious/cult resurgence in that period. Disastrous experiments in horizontalism, like the Jim Jones catastrophe, did not blunt hope in the promise of a molecular realisation of the pure horizontalist map (Michelsen, 2016, 169).

It was when the map of the 'decentralised horizontal network' moved online in the 1990s that it was seen to have found its perfect space of realisation. The movements that Wolfson (2014) referred to as the 'Cyber Left' have been characterised by a vision of horizontalist prefiguration – emerging in the rarefied purity of the online space. As Wolfson outlines, the Zapatista movement integrated Mayans, Marxists and transnational NGOs and called for a media-based strategy (or 'netwar' as Arquilla and Rontfeldt, 2001, put it), designed to support and give body to the horizontalist map. The birth of Indymedia was the direct product of this call. Set up in 1999 to report on the WTO meetings and counter demonstrations, it was bound up with critiques of mass media as fundamentally lacking diversity. Their motto, 'don't hate the media, be the media', expressed an ethos of horizontalist prefiguration, uniting activists, programmers, independent journalists, radio states, websites and community organisers (Wolfson, 2014, 44). This informed the creation of Peoples Global Action, the World Social Forum and the Alter-globalization movement. Popular interpretations of the practices of the Occupy movement and the Arab Spring are orientated by the anarchistic ethos that is deemed to be the common ground across these movements (Juris, 2009, 213). A current of presupposition, particularly in developed western economies, lead to the idea that the role of new networking technologies defined these events as expressions of a new and universalizable map for political action.

A political diagrammatic created during this prior history was increasingly deployed to make the case that new media technologies allow diverse and often contradictory movements, objectives and groups to be integrated together through networked organisational swarming, so as to attack the state, in the name of ecological, gender or racial justice. When Ad-buster's magazine called upon protesters to occupy Wall street on 13 July 2011, a series of protest events occurred that had

in common the attempt to occupy a square of public space in the belief that the act prefigured a new world of decentralised, networking, non-hierarchical organisation and 'DIY politics' (Halvorsen, 2012, 428). New social forces were seen as having been released by these events, to restructure and rewire national and international politics. Accordingly, the quite different processes taking place in Tunisia, Egypt and Syria in the early 2010s were read as chiming with those occurring in New York, Madrid and Ukraine. The subsequent viral collapse of authoritarian states in the Middle East and North Africa was read as consequent to the challenge that networked horizontalism inherently posed to global economic power. A new mode of resistance was envisioned, with the power to cross cultural forms, social movements and geographic contexts. William Connolly has recently developed this 'sense' that 'a variety of forces is converging creatively today towards distinctive images of activism, ecology and freedom' (Connolly, 2017, 121, 128).

Why was this fractal conglomeration of events understood as expressing a single structural dynamic? The answer is that a coherent horizontalist cognitive map was discerned beneath all these phenomena. Each event was read as an embodiment of the horizontalist tendency towards free open interaction; decentralised or consensus decision making, creating assemblages, self-organising from the bottom up rather than top down, and seeking to express through direct action the alternative world they wished to create. Each event was read as a local performance of the universal horizontalist map: the format of action contained its essential political meaning. Here, as promised by McLuhan, the medium was the message, often including humour, subversion and irony. As Graeber (2002, 61) has argued, 'these new tactics are perfectly in accord with the general anarchistic inspiration of the movement, which is less about seizing state power than about exposing, delegitimizing and dismantling mechanisms of rule while winning ever-larger spaces of autonomy from it.' The common concern for embodying in practice a horizontalist theoretical map often entailed seeking to instantiate forms of direct democracy that were expressively anti-authoritarian and consensual. The dream was that those who could take part in the pure map's realisation were in a 'position to fold an element of joy into dissident politics' (Connolly, 2017, 75). This pleasure principle would come to its apogee in readings of the Occupy movement, the key feature of which was that decisions occurred through horizontally organised general assemblies, harking back to the Greek Agora.

These events certainly appeared to share a distinctive horizontal organisational shape or diagrammatic form, expressed by self-organising crowd occupying public space. That common shape of politics certainly appeared to follow the pure map of an anarchistic understanding of struggle. Related to this was a surge in optimism about social media and its promise. The map of a mediated horizontal struggle, promising to prefigure and seed a wider rebellion, seemed to sit astride all these events. A utopianism of the swarm was clearly in evidence here, a belief that the horizontal offered a means for the assemblage of revolutionary constituencies across 'local, regional, class, racial, state and religious … loyalties and identifications' to

respond to and self-organise to challenge local political, social, economic and 'planetary' or climatic conditions (Connolly, 2017, 35).

Political ambiguities of horizontalism

Faith in the map of horizontal digital activism has recently been re-coloured by pessimism, reflecting the rise of authoritarian populism worldwide since Occupy and the Arab Spring. As Culp (2016, 7) puts it, remarking upon the romance of maps of connectivity: 'the first step is to acknowledge that the unbridled optimism for connection has failed. Temporary autonomous zones have become special economic zones. The material consequences of connectivism are clear: the terror of exposure, the diffusion of power, and the oversaturation of information.' Rather than embracing the romanticism of connection, Culp (2016, 16) suggests breaking the 'circuits', much as the Invisible Committee advocated. Similarly, 'complete transparency', he argues, is simply the 'realization of the techno-affirmationist dream'. The problem facing social movements today is whether they can now unpick their faith in abstract maps for political action; whether they are vertical or horizontalist.

The creation of the People's Global Action network and Alter-Globalization Movement (AGM), which in turn created the World Social Forum, was clearly prefigurative in function, seeking to 'create within the organization the structures, practices, and relationships you strive to create in the world' (Wolfson, 2014, 16). This was a movement for which decentralisation and horizontal organisation provided a matrix for all interpretation: their map was horizontalist. In adopting a loose organisation structure of swarming, decentralised global networks governed by shared rules, their vision of a utopian internal governance was orientated by direct participatory democracy. Jeffrey Juris's account of these movements as embodying the cultural logic of anarchist ideas into political practice recognised that while the AGM was not an anarchist movement in the strict sense, in a looser sense an anarchistic ethos was at play (Juris, 2009, 213). The abstract map that underwrote that ethos did not, and could not, provide a mirror for the global political territory.

Visions of a transformative utopian potential inherent in distributed network maps of the socio-political are certainly not new to the European political imaginary:

> [F]rom their earliest social applications, networks based on technical support invariably appeared to be the basis of new types of exchange between people, of a new democracy. Their ramifications appeared to irrigate a vast community, overcoming isolation, parochialism and vagaries of climate. Such a belief is already apparent in 1794 with in installation in revolutionary France of the first optical and sigal telegraph line, invented by the Chappe brothers. Some revolutionaries dreamed of putting the future lines 'at the service of the great democratic republics'. Capable of 'communicating their information and their

> intentions over great distances, so to speak, instantaneously', the citizens could revive the agora, but were no longer limited as in Athens to the public square. Disillusion was quick to set in. In reality the optical telegraph was put to use in the service of those in power. The technique quickly proved its strategic utility by connecting Paris to its fortresses and revolutionary armies.
>
> *(Mattelart, 1999, 176)*

The recent emergence of 'the network of cyberspace networks [as] an object of reverie' suggests that faith in horizontalist political mappings deserves more, not less, critical reflection (Mattelart, 1999, 169). This need is particularly evident with respect to the ambiguities of hacker ideology, which is tightly bound up with horizontalist maps for the political. Enthusiasm for hackers binds together libertarian technological billionaire elites with left-Marxist ideologues, suggesting that hacking is clearly not divorced from the modes underpinning contemporary governance (Wark, 2004; Chandler, 2018). Hackers are seen by some as the defining horizontalist "Freedom Fighter, living by the dictum that data wants to be free", personifying faith that decentralisation is an unalloyed good (Galloway, 2004, 329). Their transformation in the public mind, since the 1970s, into election fiddlers, terrorists, state sponsored bank heists, criminals, childish spammers, viral marketers, conspiracy theorists, trolls and misogynistic ideologues captures only one aspect of the problem here. Hacking advocates root their faith in the inherent creative potentials of the entangled network (Chandler, 2018): a belief that the decentralised protocols of the network will always make you free. Yet as Galloway (2004) demonstrates, the ethos of hacking is simply to exploit the possibilities that subsist within the protocols that organise the internet. This obviously leaves ample space for innovation (for example, in moral systems) that deviate in any direction. Network-entangled horizontalist experimentation is an open-ended beast, and the real-world manifestations of this map take various ugly political forms (Griffin, 2003, 27–50).

Libertarian advocates for crypto-currency, and blockchain activists also make clear arguments for horizontalism. 'Cyber-libertarianism', defined by its opposition to state regulation of internet, exists in perfect alignment with Barlow's 'Declaration of the independence of cyberspace' (Golumbia, 2016, 10).[1] Barlow believed that the internet is inherently linked to freedom, both functionally and causally due to its horizontalist structure. These are the values attached to billionaire figures in the tech industry like Elon Musk, Peter Theil and Eric Schmidt. Their commitment to freedom from government regulation is centrally a case for monopolistic control over market-capturing platforms and technologies (Theil and Masters, 2014; Taplin, 2017). Big data-gathering platforms like Facebook, Google and Palantir act directly against the very functionality of the vertical state map. Indeed, they show that the state map is inadequate to comprehend contemporary power – after all, the state now urgently needs their services. They are, therefore, the

1 Link to Barlow's Manifesto: www.eff.org/cyberspace-independence.

clearest advocates of a 'protocol'-based system of governance, supported by a technocratic elite that makes the internet work through designing the protocols themselves (Galloway, 2004). Their commitment to a networked, entangled non-linearity, however, also masks the important senses with which 'control has existed from the beginning', which looks nothing like the state map: 'Control in distributed networks is not monolithic. It proceeds in multiple, parallel, contradictory, and often unpredictable ways' (Galloway, 2004, 329). Failure to grasp that network distribution is a map that carries with it an architecture of control has resulted in misplaced faith in the horizontal as such.

The same map of social media distribution that created Indymedia has created Breitbart and 'The Rebel Media', mirror networks on the political right (Nagle, 2017, 46). What has come to be called the alt-right integrates, in a leaderless distributed network, a wide range of movements and figures; including neo-Nazis, white supremacists, antifeminists, paleochristian conservatives, hyper-libertarians and neo-reactionaries. This suggests, as Nagle (2017, 13) puts it, that 'networked, leaderless, internet centric politics now seems less worthy of uncritical celebration'. The transgression of the liberal state form by horizontalist networking is a central concern for most of the core works of the neo-reactionary online subculture (Sandifer, 2018). The Deleuzean Nick Land is perhaps the most curious of its constituent figures, with some suggesting that his presence as part of 'a far right Internet subculture is an Andy Kaufmanesque piece of philosophical performance' (Sandifer, 2018, 7). In him, the political ambiguity of the horizontal network is personified. Land himself views the constitutive elements of neo-reaction as internally incoherent.[2] The horizontal and vertical integrate and meet in 'meshworks' online, constructing the alt-right around a politics of feedback (Galloway, 2004).

The pervasiveness of feedback, 'pastiche and repetition' online is a key technological effect of network horizontalist cultures, which may allow us to extend Walter Benjamin's argument about the relationship between politics and changing aesthetic paradigms (Fisher, 2014, 20). Contemporary networked populisms reflect an acceleration in technological reproducibility, in which downloading is finally 'eclipsing the physical object' altogether (ibid., 20). The political effects do not seem to be aligned with Frederick Jameson's hope that 'an aesthetics of cognitive mapping' could resolve our political incapacity to grasp the networks in which we are now entangled (Holmes, in Abrams and Hall, 2006, 20). The political consequences of horizontalist mapping include the election of Trump, but also the proliferation of fascist aesthetics and hipster renditions of the alt-right online (Love, 2016), together with swarming conspiracy theories. As Jameson (1991) himself notes, conspiracy is precisely a function of cognitive mapping, seeking to simplify complexity and read the whole through a framework of abstraction (Toscano and Kinkle, 2015, 69). Horizontalism may have fostered the

2 Link to Land's blog entry: www.xenosystems.net/neoreaction-for-dummies/.

Alter-Globalisation Movement, but it has also created an online groupuscular network of hate and conspiracy (Griffin, 2003).

Faith in the map of the all-channel distributed network is clearly misplaced, for its feedback loops may well be as prone to murder as the hierarchical state (Nagle, 2017). Our horizontalist cognitive maps have omitted the fact that the politics integral to the horizontal network are only weakly parsed as a utopian good. In the networking of the state identified by the Invisible Committee we can adduce the call for an unmapping of contemporary political practices, and for the withdrawal of resistant strategic thinking from abstract theoretical diagrams. There is increasingly a synergy between technological and ecological changes, globalisation, neoliberal ideology, protest strategies, terrorism, means of surveillance and population management through strategic communication, which suggests a horizontal re-modulation of entire social formations, and with it the potential for the rise of political and ecological breakdown, as well as highly efficient societies of control that operate according to the logic of the horizontal. No utopia resides in the horizontal map itself. The operationalisation (or axiomatisation, to use Deleuze and Guattari's turn of phrase) of horizontal fluidity is simply the problematic of contemporary politics. The politics of the horizontalism, networks and the swarm are aligned neither sufficiently or necessarily with pluralistic politics or leftist ethical ecologies (Connolly, 2017, 123).

Unmapping horizontalism?

As Gerbaudo (2014, 264; 2017, 185) amongst others has noted 'the use of the internet and social media within contemporary social movements [often] brings about new forms of soft and distributed leadership'. Hierarchy is never removed; it is either explicitly tamed, or simply hidden.

> What we see in the current wave of digital movements is the rise of what can be best called as a 'digital vanguard'. These are digital communication teams, often bound together by links of friendship and comradeship who take the lead in initiating and steering relevant internet conversations. Terming these people simply as 'core producers' misses the point that the difference between these people and 'common participants' is not a difference in degree but a difference in kind. It is true that digital communication technologies make it possible for new leaders to arise fast, and thus make leadership more meritocratic, and it is also true that it expands possibilities of participation. But this does not elide that classic social movement distinction and asymmetry between organizers and participants. It only makes the dividing line more porous and renders leadership positions unstable. It is only if we hold to a notion of leadership that we can account for questions of power in contemporary social movements, and to maintain a sense of social movements as bestowed with a certain intentionality.
>
> *(Gerbaudo, 2014, 267)*

Hierarchies subsist within all, effective or ineffective, horizontal networks. The attempt to make universal consensus and inclusion the criterion for decision making obviously has limits in terms of operative strategy (Maharawal, 2013, 117–181), and laborious prefigurative systems like the 'progressive stack' often show the risks of relying on the pure map of the horizontal. The lack of scalability for horizontal map-based politics that was the end of Occupy, can be clearly seen in Tunisian and Egypt, where trade unions and football associations lived effectively, as hierarchies, within the horizontal, and played a more important role in these movements than the horizontal map would seem to allow (Srnicek and Williams, 2015).

Faith in the horizontal map of prefiguration made decision making difficult for the Occupy movement, as well as inhibiting long-time planning and social movement construction. The horizontal maps of online network politics were simply transferred to the real space of protest in the belief that positive effects would follow. In large part, they have not. Belief in the normative and practical value of the abstract horizontal map ignores the fact that networks are always integrated with hierarchies.

> There is no doubt that contemporary digital social movements are participatory. But what does participation mean? It is not a boundless expression of creativity, but rather the involvement in and contribution to a collective space, that leadership groups, and digital vanguards are largely responsible for setting up, by giving movements collective names, by coining a series of hashtags, of icons, of internet memes, and in so doing constructing a basic operational identity.
>
> *(Gerbaudo, 2014, 267)*

Online networks rely on a concrete set of 'technical procedures', which manage, disconnect and arrange hierarchically. The internet has a 'dual nature' folding together 'its horizontality (community networks; TCP/IP) and its verticality (its stratification; DNS)' (Thacker, in Galloway, 2004, xvii). This is clear in, for example, the material conditions for participation in crypto-currencies online (Golumbia, 2016). The internet functions at the intersection of the hierarchy and the swarm. Neither the map of the network nor the map of the state capture the mode of contemporary operation of power, which organizes the horizontal and vertical so as to regulate and modulate the flows. The horizontalist actors who seek to intervene in and resist such regulation come in many flavours, some seek to decolonise society, others are racists, some are cyber feminists, others hate women.

This is simply to note that we do not escape politics by mapping on the horizontal axis. Indeed, as Galloway (2004, 50) observes in Protocol, the 'internet is in a delicate dance between control and freedom … digital networks are structures for a negotiated dominance of certain flows over other flows'. While management is distributed on the internet, which is thus a space that is to some degree hostile to hierarchy and centralisation, such structures do not cease to exist. Furthermore, the

horizontal forces that arise from the distributed management of the internet do not mirror or follow predictable patterns. The abstract horizontalist maps we seek to impose onto networks are inadequate, for they fail to capture the filters that determine realisation in material and political forms. The problem here – a conflation of abstract political theoretical maps with the practical strategic territory they hope to represent – arises from the 'staggering' complexity entailed in the ways in which verticality and horizontal interact in the internet and its connected networks (Van Weelden, in Abrams and Hall, 2006, 26). The horizontalist map cannot be viewed as a good in and of itself.

Horizontalism is by definition uninterested in the traditional binary of left/right polarities on which political moralising tends to operate. Failure to recognise this has resulted in a leftist 'politics transmuted into pastime – politics as drug-experience', which gives rise to multiple oscillating political tendencies (Srnicek and Williams, 2015, 7). In the belief that performing the map should stand in for politics, horizontalist practice often results in theatrical protests without strategic sense of direction, providing little more than a space for voicing grievance. This feeds proliferating counter-horizontalisms online, with their own grievances to air. Such aestheticised politics has a long, dark and bloody history, which defined the twentieth century. Faith in the aesthetics of horizontal map is clearly not enough.

> [W]hen theorists face up to this question, vague hand waving usually ensues: moments will purportedly 'resonate' with each other; small everyday actions will somehow make a qualitative shift to 'crack open' society; riots and blockades will 'spread and multiply; experiences will 'contaminate' participants and expand; pockets of pre-figurative resistance will just 'spontaneously erupt'. In any case, the difficult task of traversing from the particular to the universal, from the local to the global, from the temporary to the permanent, is elided by wishful thinking.
>
> *(Srnicek and Williams, 2015, 35)*

A good example of such hand waving are recent texts such as Connolly's, which argues that horizontal swarming will 'enliven social movements on several fronts, to response to a new event with cross regional citizen strikes, and to fold modes of creativity into these actions to enable them to spread further' (Connolly, 2017, 144–145). The only problem Connolly (2017, 149) anticipates with a societal project of horizontal swarming is that 'the movement may take too long to mobilize as the irreversible effects of the Anthropocene accelerate'. He makes no consideration of the possibility that the political reality of the horizontal swarm may not necessarily reflect his pluralist ethos. Faith in the horizontal, the swarm and the catastrophic event is particularly problematic in light of the rise of populist, racist and misogynist autonomous zones online, in which the logic of networked horizontal distribution plays no less keen and significant a role (Culp, 2016, 46).

As Deleuze and Guattari (1988) pointed out, Fascism as a historical phenomenon is only comprehensible as distinct from totalitarian politics if we take its horizontalism into account. In closing, it is thus worth remembering that the horizontalist map is implicit to the far-right political strategy of leaderless resistance, rooted in the strategic rejection of hierarchical schemes of organization, and which underpin the lone-wolf logic of the mass shooter. As the US ultra-nationalist Louis Beam put it in his influential text:

> [T]he pyramid, is … not only useless, but extremely dangerous for the participants when it is utilized in a resistance movement against state tyranny. Especially is this so in technologically advanced societies where electronic surveillance can often penetrate the structure revealing its chain of command. Experience has revealed over and over again that anti-state, political organizations utilizing this method of command and control are easy prey for government infiltration, entrapment, and destruction of the personnel involved. This has been seen repeatedly in the United States where pro-government infiltrators or agent provocateurs weasel their way into patriotic groups and destroy them from within … . Like the fog which forms when conditions are right and disappears when they are not, so must the resistance to tyranny be.
>
> *(Beam, 1992)*[3]

Conclusion

Horizontalism has claimed to be the heir to the enlightenment's murder of god – it sets out to destroy his revenant presence in the form of the vertically organised state. Yet the urge to 'liberate the flows' does not guarantee emancipatory outcomes (Culp, 2016, 49). Caution is needed to avoid an excessively metaphorical understanding of what a network is that would result in underestimating their material, social and structural qualities (Galloway, 2004). The point is not that simply anything can be mapped as a horizontal network, but that the political effects attached to horizontalism are not utopian. As Gilles Deleuze (1992) suggested in a related context, there is no need for fear or hope: the horizontal map has always been there, doing all kinds of work, with, across, between and against vertical hierarchies. Galloway (2004, 5) suggests that 'the current global crisis is one between hierarchical centralized powers and distributed, horizontal networks. But the future one is likely to see bilateral organizational conflict, that is, networks fighting networks'. Perhaps this has always been the case. The history of the present is the history of the imbrication of horizontal and vertical. In reflecting upon the former, and seeking to unmap the latter, we must take care not to view horizontalism as providing an unproblematic map for political practice.

3 Link to Beam's essay: www.louisbeam.com/leaderless.htm.

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4

(ANALOG) MAPPING THE KNOWABLE AND WAYS OF KNOWING

Relational ontologies of chickens and ancestors in rural Sierra Leone

Caitlin Ryan

Introduction: 'Not a real ceremony'

The village headman crouched in front of us, holding a young rooster that was loudly protesting his capture and detainment. The headman held some grains of rice up to the rooster, who then 'refused' to eat. 'The ancestral spirit knows that what we're doing now isn't a real ceremony, that's why the rooster isn't taking the rice', said the headman. This 'not real ceremony' emerged as part of a method of mapping I used in rural, northern Sierra Leone. The ancestral spirit the headman referred to is the spirit to whom the community makes requests for good farming, through ritual practice. One of the first parts of this practice involves asking the spirit if they are listening and willing to hear the community's request. To get an answer from the spirit, rice is offered to a rooster. If the rooster eats, the spirit is ready to hear the request. If he refuses, the spirit is not ready for the community's request. At this moment, the spirit made the rooster refuse the rice, because this was not a real ceremony, it was a representation of a ceremony, put on for me, the Oporto (white person).

The maps I asked communities to make involve such representations, demonstrations, and the bringing of objects, in response to my questions about how people relate to one another, the land and ancestral spirits through ritual practice, objects and crops. What emerged was a multi-dimensional representation of space, relations and practice, where objects and non-human beings (chickens and goats) are explained in terms of the relations they create or sustain. I used this mapping as a method in part of a larger project that investigates the gendered processes behind making large-scale agribusiness investment deals (land deals) and their gendered effects in Sierra Leone. One question I wanted to explore was 'are different ontological understandings of land and social relations part of what make these deals possible?' To get at this question, it was necessary to develop an understanding of

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how land and its productivity are seen by local communities. Asking people why land was important, or what they got from their land, tended to elicit responses about the use-value of land (we grow it then we eat it). Asking questions about the 'space' of the community tended to elicit responses about the types of building or other material resources in the community.

However, through asking communities to bring objects or crops that help them sustain social relations, farming practices and ties to the ancestors, a much more interesting and complex representation of the community emerged: where, for example, ancestors influenced crop productivity, which crops were to be used in divination and ritual practice and could communicate through chickens. I argue that this picture is important because it is representative of how local communities' knowledge (of ritual practice, nature, resources, social relations, farming practices, etc.) are not treated as privileged or valid in relation to the knowledge of 'economic development' that drives large land deals. One part of what makes these land deals possible is the politics of determining what kinds of knowledge and ways of knowing are legitimate, and ancestors communicating to communities through roosters does not fit within the realm of legitimate knowledge in the post-conflict development context of Sierra Leone. Capitalist representations of land and space seek to render visible the areas of Sierra Leone that are most suitable for large-scale investment, and draw their knowledge from soil and crop science, topography and average yearly rainfalls to render which parts of the country are most suitable for different investment crops (such as oil palm, rice, pineapple and sorghum). In these representations of space, people, their social relations and their relationship to ancestors are absent.

There is a tendency in the West to view material space as a neutral and objective fact, as illustrated in the way that colonial powers viewed land and land-use practices in the colonies as 'wasted' or 'unused' when it did not clearly resemble the 'modern' land use practices of Europe. Such views are, of course, not neutral and reflect a particular, rather than universal knowledge about material spaces, which, in turn, shapes and constrains how that material space is used. Millar argues that in the globalised context of large-scale land acquisitions, labelling land as marginal 'dis-embeds it from norms unique to specific sociocultural settings and re-embeds it within universalised norms of control and authority applied by agents of the global neoliberal transition' (Millar, 2016, 201; Edelman et al., 2013). This is clearly relevant to the case of land deals in Sierra Leone, where the Sierra Leone Investment and Export Promotion Agency maps 'available' land for investors based on skewed definitions of use. It was these skewed understandings of use and value that encouraged me to look for alternative ways Temne farming communities understand land and its 'use' and 'value'.

The process of mapping differently in Temne farming communities demonstrates that the epistemic privilege of capitalist maps can and should be unsettled by considering the different realities of Temne worlds and ways of knowing. This reflects the radical alterity implicit in Viveiros de Castro's call to consider the discourse of the 'native' less in terms of knowledge or representation but rather as a

constitutive part of a different world. He relates this to broader discussions of cosmologies by insisting on the radical decolonial potential of decentring Western reality as the singular, universal reality through 'the elucidation of the terms of the 'ontological self-determination of the other' (Viveiros de Castro, 2014, 4). This is, of course, not without potential pitfalls, such as those echoed by Graeber: that we should be cautious of implying that ritual practices exist in a 'conceptual bubble, in which those ideas define their own reality' (Graeber, 2015, 9). However, in this chapter I seek to unsettle the universality of Western reality by considering the existence of Temne realities, not by claiming to know or see them.

The method of mapping I used provided enactments and enunciations of Temne realities and therefore challenges me to consider them, but this is claiming to know *of* them, rather than to know them. Such moves are necessary both intellectually, as a means to destabilise Western knowledge claims, but also politically, to undermine the ongoing colonial relations. As Mignolo points out: decolonial options have one aspect in common with de-westernizing arguments: 'the definitive rejection of "being told" from the epistemic privileges of the zero point what "we" are, what our ranking is in relation to the ideal of humanitas and what we have to do to be recognized as such' (2009, 3). From this stance, I argue, Temne maps where ancestors communicate with chickens can be a way of considering other realities and ways of knowing by changing 'the terms of the conversation' (ibid., 4).

Method

I conducted research for my wider project over the course of 12 weeks from October 2017 to January 2018 in Port Loko District, northern Sierra Leone. Port Loko is predominately inhabited by ethnic Temne people, one of the two majority ethnic groups in Sierra Leone. The northern region of Sierra Leone is comprised primarily of mixed forest-savannah and dominated by the farming of rice, native oil palm, ground nuts, pepper and cassava. There are also several important iron ore mines in the region. The Temne language is part of the Niger-Congo family, making it distinct from the Mende language spoken by the other major ethnic group. I worked with three research assistants (two local and one an MA student from my university who stayed for the first half of the project). Over the course of seven weeks we visited a total of 33 communities across seven chiefdoms. Of these communities, 27 have land under lease to a large-scale agribusiness investment project and six do not. The mapping we used was only one of several methods of data collection, we also held community meetings, visited farm plots with farmers and conducted individual interviews. Outside of the communities, I did key-informant interviews with the investing companies, relevant government ministries, local and customary authorities, and local and international organisations.

I tried two methods of mapping and abandoned the first based on its results and the responses of communities to it. At first, during community meetings I asked people to 'make a picture on the ground' of what the community had. Someone,

usually a teacher or youth, would be elected by the community to draw the road/path through the community and make drawings or markings indicating where there were houses, a school, wells or the mosque. The results were a bit dull, people didn't seem particularly interested in the process, and it didn't reveal anything I couldn't have seen by looking around. However, it was through the help of one of my research assistants that I was able to reflect on what a terrible method this was. During every meeting, one of the research assistants would translate the 'official' proceedings (the public record), while the other would sit out of the way and record the meeting's 'side talk' – the things people said to each other during the meeting. The aim of this was to reflect on how people perceived our presence, our questions and the public record that was narrated to us. During the first iteration of the mapping method we used, there was some side talk about how this exercise was making the community 'look like fools' because we were asking them to do something (make a map/picture) that they didn't understand. When I read a sentiment like this for the second or third time, I knew it was time to rethink the mapping.[1]

As a research team, we reworked the method, and developed and refined it over the course of the next few community visits. Reworking the method required multiple conversations with my local research assistants about the kinds of thing I wanted to learn. They knew that I was in Sierra Leone to learn about land deals and farming practices, so it generated some confusion when I explained that I also wanted to learn about relations between the community and ancestors and how ritual practice related to farming. As such, because of the way the mapping was introduced by the research assistants, in some of the first new maps the communities made, people spent a lot of time explaining what they grew and what they used these crops for. After more conversations with the research assistants we were all on the same page – the mapping should be introduced as a set of questions about how social and ritual practice helped to maintain relationships between the community, ancestors and land and between people within the community.

The result was what I refer to as 'casual mapping'. At some point during our visit, we would approach a group of people who were sitting together and explain that we were interested in what kinds of object they could bring to explain how they maintained or created relationships with each other, their ancestors or their land. We waited as people gathered objects (and often non-human beings) and then asked them to explain or narrate how the object was used, what it represented

1 I've thought a lot about the ethics of taking notes on 'side talk.' People's comments in the side talk gave me another means of reflexivity to improve my research methods, such as here with the case of the mapping that was making people feel bad. Side talk has also helped me understand and contextualise apparent contradictions in the public discourse. However, no direct quotes from side talk will be published because they were not made to us but rather about us or about the public discourse. In some cases, the side talk provided interesting or funny insight into what people thought of us, such as in one community where the side talk was a discussion of why my graduate assistant was writing slower than me.

or how it helped to produce or maintain relationships in the community. These maps were not flat spatial representations on the ground of what the community 'had' but, rather, lively and multi-dimensional representations of, for example, how and where the 'world of the ancestors' speaks to 'this world' through ritual practice, or how things like kola nuts[2] send different messages and have different meanings in different social and ritual settings. The 'flat' spatiality of representing the village on the ground couldn't have captured the complexity of Temne realities. I see this as an iteration of 'social mapping' from Participatory Rural Appraisal (Narayanasamy, 2009), but one that had more resonance with the people making the 'map' and which revealed cosmologies that were un-mentioned in the first iteration of mapping. Most importantly, the side talk recorded during this method included jokes, suggestions, laughter at the ignorance of the Oporto, and no mention of how anyone felt belittled or foolish by what I was asking them to do.

The casual mapping and the community's use of objects can be seen as what Henare et al. refer to as objects enunciating concepts, which in turn provoke in me, the observer, a consideration of Temne realities (2007, 14). The actual practices, objects, and places enunciated through mapping are inaccessible to me in actual space/time because of my status as a stranger, woman, and non-member of the powerful secret societies that govern ritual practice. However, these practices, objects, and places would also appear too 'flat' when rendered in ordinary discussions alone, but asking the community to bring actual objects, maps them and their role in producing knowledge in a more meaningful way.

The maps

I've grouped the realities and knowledge that communities expressed through the mapping into five themes: 1) requests/inquiries, 2) closure and secrecy, 3) rules of ritual and place, 4) social relations, and 5) exceptional non-humans. Within each of these themes, several objects appeared, and some objects appear across multiple themes, but in different ways. These themes should be seen as part of a *dispositif* of the knowable and ways of knowing in rural Temne farming communities, insofar as they are *one possible* set of themes, and the relations between them are governed by power-laden questions, such as: What is knowable? and How is it known? There is no clear-cut division between these themes, they are interconnected and fluid – the division is imposed here merely to make the objects in the map more legible based on their fluctuating functions.

The objects most frequently used in the maps are listed here, coded for which themes knowledge of them relates to. This is followed by an exploration of each of the themes, relative to the questions of the knowable and the process of knowing.

Kola: 1, 3, 4
Rice: 1, 3, 4

2 The caffeine-containing nut of the Kola tree.

Chicken: 1, 2, 5
Goat: 1, 5
Cloth: 1, 2, 3
Sheep: 1, 5
Calabash: 4
Rice flour and an egg: 1
Hot pepper: 3, 4
Groundnuts: 4
Medicinal herbs: 1, 3
Stones: 5
Cowries: 1

Requests/inquiries

Spirit ancestors are a constant presence in rural Temne farming communities, and they exercise a great deal of power over crop yields, health and community well-being. It therefore makes sense that requests and inquiries should be made to the spirit ancestors in order to ensure a good yield for an upcoming planting season, express gratitude for a strong harvest or ascertain the origin of someone's illness. These requests and inquiries are made to the spirit ancestors because of the spirits' privileged knowledge and particular power to influence the day-to-day reality in the community. Knowledge of how to make requests and who can make them is also privileged, and the demonstrations made for me were representations of the requests but not 'valid' because they were not conducted by the right person in the right place. That they were selective rather than wholly real representations is, in and of itself, important, and is discussed more fully in the theme of closure and secrecy. However partial, the knowledge of requests revealed to me tells us something interesting about Temne knowledge and ways of knowing.

Requests and inquiries were mapped through demonstrating how they are made through patterns of offering and asking. The first step is to make an offering, always consisting of rice pounded into flour and an egg and, sometimes, cowrie shells. The next step is to ask the ancestral spirit if they are willing to hear the community's request (such as for a good harvest or an explanation of illness). For this part of the mapping, the person explaining this often captured a chicken to illustrate their role in making the inquiry. When chickens were captured, they were always offered a handful of rice, as a way of demonstrating how ancestors communicate through them. The spirit ancestor accepts the community's request by making the rooster eat rice. However, chickens are not the only means of asking the ancestors questions. In the absence of a chicken, a kola nut, cracked in two, can be tossed on the ground. If it lands with both cracked surfaces up, the ancestor is willing to hear the request. Once the request is accepted, further offerings and sacrifices can be made, such as of sheep or goats. After the entire ritual is complete, the rice flour, egg and cowries are tied together in cloth and left as a sign that the spirit ancestor was appeased.

The person responsible for demonstrating this to us usually gave a full demonstration, along with a narrative of what they were doing and why. Some of these demonstrations also included singing and dancing. On two occasions, instead of the chicken and ancestor demonstration we got demonstrations of how the ancestors could be consulted about the origin of illnesses. If a person is ill, there is a consultation with the ancestors for the origin of the illness. If the origin is medical, the person can be sent off to a government health post. However, if the illness is spiritual and related to the ancestors, traditional medicine is mixed and given to the person.

Closure and secrecy

The question of closure and secrecy in the maps is primarily a question of *who* can access knowledge and how some knowledge is constrained within particular spaces and times. Secrecy and closure are pervasive in rural Temne Sierra Leone. Spaces, practices and knowledge are all subject to closure and secrecy determined by factors such as membership in a land-owning family, gender, age and membership in secret societies. Much has been written about secret societies such as Poro (for men) and Bondo (for women) in Sierra Leone, but broadly speaking they are responsible for socialising their members into the norms and expectations of adulthood, as well as bearing responsibility for various ritual practices (Leach, 1994; Ferme, 2001; Peters and Richards, 2011). People who are not members in Bondo or Poro are 'closed' from knowing what happens in the bush land set aside for these societies. This is illustrated in a map that includes a drum. The drum is used to inform members of Poro to go to the bush, and it also informs non-members to go inside their houses while the Poro members prepare. Similarly, members of Bondo wear particular cloth when they're going to the bush, transmitting both knowledge and secrecy to the community.

While practices of making requests and inquiries to the spirit ancestors were demonstrated to me, I was also informed that this was merely a reflection of the things the demonstrator *did* know, but that the actual practices were performed by special ceremonial chiefs brought in from outside the community. The demonstrator had enough knowledge to demonstrate the basic premise, but the ceremonial chief was ultimately 'doing secrecy' – a Temne phrase for a ritual practice that is unknown to all but the doer. There is further closure in the bush when these rituals take place, insofar as they are not open to everyone. In some communities, men said that women were not allowed to be present for making the request or the offering, their task/responsibility was only for cooking. In another community, the closure went even further. Despite gendered divisions of labour that pose women as responsible for cooking, this did not apply to times when requests were made to the spirit ancestors, and the men taking part in the ceremony would do their own cooking.

There is a further matter of closure and secrecy that is considerably less comfortable for me to consider. Reflexivity and conversations with my research

assistants helped me to begin to think about how my position privileged me to hear about the communities' knowledge. On more than one occasion it became clear that some of what was divulged to me was not generally considered to be open or public knowledge. One community brought a spirit ancestor in the form of a carved stone to the mapping. The presence of this spirit caused a stir amongst those sitting there, and people were scrambling to take photos of her. This spirit as stone was not commonly brought into the open, her form was not commonly seen as public knowledge, but because the Oporto had been asking questions about the spiritual ancestors, someone decided to bring her into the open. On other occasions, my research assistants expressed the fact they were hearing and seeing things that were totally new to them, and that they didn't expect that communities would be so forthcoming with secrets if it had only been them asking. That such privileged knowledge and secrecy is shared with me, an Oporto, is difficult to reconcile with my desire to practise decoloniality.

Rules of ritual and place

Yet another reason why the demonstrations I saw were 'not real' was that, with one exception, they were conducted in the open meeting spaces of the community, not in the places where the spirit ancestors lived. In some communities I was taken to these places, which included cotton trees, streams and *aboromasars*. [3] Different rules regulate social and material practices during rituals and in ritual places. These rules are gendered, insofar as different rules apply to women and men, such as dictating that women should not wear sewn cloth in these places, and should have their heads covered, even for some time after the ceremony is complete.

These ritual practices also change and regulate material objects – for example, food cooked for the community after making requests to spirits should not be brought back into the community but consumed or left in the place of the ritual practice. There are also regulations about which foods should be offered to the spirits and which are for the community to eat – for example, the spirits should not be given hot pepper. Several communities made stipulations about what parts of the sacrificed animal the community could eat and what parts were to be left for the spiritual ancestors, and several other communities stipulated that the food prepared should not be consumed by adults, only by children.

There are also rules governing how ritual medicine should be prepared. This was demonstrated in one map, where a female ceremonial chief demonstrated the making of medicine, calling my attention to watch the way her left hand crossed over her right and how the medicine should be drank twice from the right hand cupped on top of the left and once with the left cupped on top of the right. Between mixing and taking the medicine, she demonstrated the song and dance that must be performed. The knowledge of ritual is governed by rules and place.

3 Miniature houses built for the spirit ancestors and containing a multitude of stones, one stone for each member of the community who has ever died.

This demonstrates how meanings, practices and performances are dependent on place and are also the domain of those who have the knowledge to perform these rituals in the correct way.

Social relations

Kola, rice, groundnuts and the calabash all frequently appeared in maps of social relations, sometimes with other food crops as well. In part, this reflects crucial Temne social practices of hospitality and sharing. Strangers to communities, and relatives visiting from elsewhere are always offered food, and rice is a particularly important offering. This communicates the centrality of rice in Sierra Leone, where on any given day, a person has only eaten if they have eaten rice. Rice is more than a staple food, it is central to identifying as a farmer, and it is one of the most important ways you can welcome strangers or relatives to your community. Groundnuts (peanuts) were frequently a part of maps, partly I suspect because of their importance as a 'woman's crop' that allowed women some degree of financial independence, but also, I suspect, because of people's fondness for them. Groundnuts were in season during this research, and in almost every community people were eating them while we visited, offered them to us as gifts, and were sharing pots of boiled nuts amongst themselves. Their importance was described to me as not only a food or source of income but also a way to bring people together to talk through problems or enjoy each other's company. Kola is also offered, either to strangers or to hosts when someone arrives.

Kola also communicates particular messages, such as requests for marriage, where acceptance of the kola ties the future bride and her family to the family of the groom. It can also be sent to someone to inform them of the death of an in-law, which then requires a further set of social obligations from a husband to the family of his wife. In these ways, the giving of kola transmits knowledge as well as communicating the social obligations required because of this knowledge. Kola means different things in different contexts, whether it is used as a marker of respect (when given to a host), of welcome (when given to a stranger), of future family ties (when requesting marriage) or of bad news and the request obligations for assistance (the death of an in-law). These social functions of kola exist in parallel to its use in divination and ritual practice, as well as its more common but banal use in daily life as something you chew to stave off hunger.

During mapping, a non-verbal but crucial knowledge about kola became clear, almost certainly without the community intending to transmit such knowledge. If someone brought a kola nut to the map, the nut disappeared as soon as it was explained. The explainer (or sometimes another influential person in the community) would requisition the nut, even when it had been brought by someone else. The nut was cracked and shared, but never equally among all present. Kola nuts are always desired, and their distribution in banal daily practice is determined by power and influence. That a kola nut should be brought and set out in the open for the exercise for the Oporto almost surely means that it should be cracked and shared, reinforcing particular social ties.

In terms of how knowledge of social relations was transmitted, it is also interesting to note how bringing a calabash[4] to the map was gendered. Not every map had a calabash, but when they did, it was women who brought them. Calabash are sometimes used in normal daily life, but they have a particular importance in marriage proposals, because the bride price, and other material offerings to a potential bride are put into a calabash. A woman's acceptance of a calabash is her acceptance of marriage. The woman gives the material goods inside the calabash, such as thread or cloth, to her mother, as a symbol of recognition and gratitude.

Exceptional non-humans

Chickens as a medium for the ancestors to communicate to communities were frequently a part of the map. During the gathering of objects, someone would often grab a chicken, sometimes purposively grabbing the most 'accurate' kind of chicken (a white or red rooster), or sometimes grabbing whatever chicken or chick was most convenient. Sometimes, goats also appeared in the map, generally as representative of what would be sacrificed to the ancestors. On one occasion, during the gathering of objects, a pregnant woman brought a goat from nearby, and held on to his rope as she explained that the goat had been prescribed by a diviner (soothsayer). She had difficulty carrying a pregnancy to term, and the diviner she consulted told her to get a black goat to take with her wherever she went. For the duration of their role in ritual practice, these chickens and this goat are exceptional non-humans: more than just poultry as a food source, the chicken becomes a medium through which the spirit ancestor communicates.

Perhaps more exceptional are sheep that are 'different from the other sheep'. These are sheep that are given to the spirit ancestors as part of an offering or request. While sheep are sometimes slaughtered during this offering, other times they are not killed. These sheep become unlike any other sheep because they belong to the spirit ancestor. This special status conferred on them entitles them to a lifetime of freedom to do and go as they please. These sheep are free to eat whatever they like without interference, even if that includes people's crops. I spent countless interviews watching or helping respondents chase chickens, goats and sheep away from drying crops, but I also witnessed two of these special sheep running rampant and eating without interference.

There are also particular stones that are exceptional non-humans. There are some stones that are 'more than stones' because they are spiritual ancestors. These stones have the ability to 'give birth to other stones' – in one community, the mapping took place at an *aboromasar*, a house for these stones. Amidst a pile of stones, one stone was indicated to me as the spirit ancestor, which had given birth to all the other stones. Also in the *aboromasar* was a ceramic bottle of spiritual medicine, prepared to treat illnesses that come from the ancestors. This particular map was shrouded in secrecy and closure, unlike other maps that took place in the

4 Type of large gourd that can be hollowed out, dried and used as a bowl.

open and in full view of the community, for this map we were brought to the *aboromasar* by the village headman, the female ceremonial chief and the ceremonial chief in charge of caring for the stones. Their visit to the *aboromasar* necessitated these people taking some of the ritual medicine in the bottle, and also required closure from the rest of the community who were not privileged to access this knowledge.

Temne world(s) and ways of knowing them

The maps helped render Temne worlds visible and legible to me. For Temne farming communities, the day-to-day lived world co-exists with the worlds of spirit ancestors who can control the productivity of crops, sickness, death and community well-being. Attending to the spirit ancestors gives communities a measure of confidence in successful farming and health outcomes. Knowledge of the spirit ancestors and how to appease them is implicated in community power relations and controlled by practices of closure and secrecy that determine who can know. These relations were made visible during mapping through who spoke, how they spoke, and allusions to who was included in ritual practice and who was excluded based on descriptions of where these practices took place (spaces of closure). However, Temne realities are not uncontested, settled or frozen in time. There was not always total agreement about the ancestors, what ritual practice to communicate with them, or the role of that ritual practice in farming. Furthermore, this is not to imply that Temne realities are somehow separate and separable from 'our world'. It is crucial to note that Temne practice is influenced by the slave trade, generations of colonial rule, the war and post-war reconstruction (Shaw, 2002).

'Epistemic disobedience' and (analog) mapping the knowable and how it is known

In the pursuit of land for large-scale agribusiness investment, land is rendered legible through reading the topographic landscape, making assessments of soil taxonomy and rainfall, meeting with local power brokers such as paramount chiefs or members of parliament to see if they are favourable to the investment project, and recording the size of plots using GPS devices. The knowledge produced through these methods determines, according to the Sierra Leone Investment and Export Promotion Agency (SLIEPA), what companies need to know about where they can invest in land. What is knowable and how it is known reflects a particular configuration of power. Fairhead and Leach (1996, 11) point out that 'competing interests over resource use and management are generally resolved in ways that reflect broader relations of power and influence'. This is an easily acceptable interpretation, but it is clear that these relations of power and influence also determine which knowledges are legible to power and which are disregarded.

Decoloniality requires thinking critically about how different knowledges are regarded and how such knowledges are in turn represented (Mignolo, 2009; Grosfoguel, 2007). Hunt (2014) argues that part of the problem in turning lived

ontology into academic descriptions is that claims to any complete knowledge of indigeneity has colonising effects. Thus:

> One starting place might be accepting the partiality of knowledge. Its relational, alive, emergent nature means that as we come to know something, as we attempt to fix its meaning, we are always at risk of just missing something. If we accept the alive and ongoing nature of colonial relations, and the lived aspects of Indigeneity as critical to Indigenous ontologies, any attempts to fix Indigenous knowledge can only be partial.
>
> *(Hunt, 2014, 31)*

A decolonial approach to mapping the knowable and how it is known necessitates trying to think *with* those making the maps, rather than trying to think about them (Shilliam, 2015). Merely describing the differences in the knowable and ways of knowing of rural Temne farmers is meaningless as a decolonial method if I do not try to consider chickens as a medium through which ancestors communicate and the ancestors' sheep as 'different sheep'. Recognising different cosmologies required me to acknowledge the possibility of chickens as more than 'just' chickens in order to challenge the colonising view that the difference was merely a cultural one.

> In other words, difference is *not* about engaging across perspectives on or in a single world. Rather, it is about struggling and working to craft encounters across ontological difference and recognising the power at play in practices that convert Western realities into *the* reality and demote 'other' realities to differing representations of the world the colonisers have made.
>
> *(Blaney and Tickner, 2017, 298–9)*

The use of objects in mapping helps to reveal what is knowable and how it is known in Temne communities, but it also helps destabilise and challenge my own ways of knowing. In this sense, material objects are enunciations of concepts within Temne worlds (Henare et al,. 2007, 14). The process of mapping therefore helps me consider these enunciations and unsettle my own ways of knowing by disrupting what I think about when I see a chicken eating rice. 'Material evidence that accounts for lived everyday experiences attempts to 'undo' hegemonic representations of suffering and resolution and instead opens up a political imagination around resistance, social justice, and the politics of redistribution' (Segalo et al., 2015, 343). When people acted out rituals or used objects or exceptional non-humans to map their relations, these objects and non-humans were positioned in relation to each other, to the community and to the world of the spirits. Representing these ways of knowing visually made it easier for me to see these relations.

In the context of land deals, this matters because colonising encounters between communities and those promoting large-scale agricultural investment are underpinned by a logic that aims to render Temne worlds invisible in favour of promoting, as universal, a vision of economic development that is, in fact, *particular and*

situated, where land is a means of capital transformation. In this context, land's potential productivity is rendered legible not through knowledge of its control by spiritual ancestors but through knowledge of its soil taxonomy and average yearly rainfalls. This is not to say that knowledge about soil taxonomy is useless, but rather that such knowledge enjoys epistemic privilege that is colonial in its legacy – though claims that Western agricultural science represents superior and universal knowledge (a claim disputed by studies of local agricultural practice: see Richards, 1985). Such epistemic privilege divorces the 'science' of agricultural practice and resource management from the social relations tied up in land use (Fairhead and Leach, 1996).

Furthermore, the epistemic privilege enjoyed by the knowledge of Western agricultural science is colonizing in its effect – through claims that Temne ways of knowing are 'merely' cultural or religious practice that can/should be subsumed for the furtherance of economic development. Claims that different practices are cultural or religious rather than ways of knowing devalue their 'rationality' and render them invisible or invalid (Fairhead and Leach, 1996; Mignolo, 2009). Decolonial approaches must necessarily challenge the claim of 'one world, many cultures' because of the coloniality implicit in such a claim. This means taking seriously the claim that cosmologies are 'not simply matters of belief. They are also a *matter of reals*. What the world *is*, is also at stake' (Law, 2011, 1–2). When chickens are used as a way for the ancestors to communicate it is more than a matter of cultural belief, it is the real, where the world of spirit ancestors can influence the productivity of land – thus, a different *reality* is enacted by a different practice (Blaney and Tickner, 2017, 303). This is a difficult claim to make in the discipline of international relations, given how clearly it challenges the Western-dominated ways of knowing and being in the world. It's not an impossible claim, however, and it's a necessary one if we aim to decolonise the ways of knowing that have rendered ancestors communicating through chickens as irrelevant for economic development in Sierra Leone.

A plea for chickens as maps in a digital age

In no way am I trying to claim that digital mapping in and of itself is colonising, but rather, that in a digital age we should avoid giving epistemic privilege to digital maps. There are knowable worlds and ways of knowing that cannot be captured with digital maps, in part because of the incommensurability of the digital and ancestors speaking through chickens and in part because knowledge of digital mapping is not (yet?) universal. I could have made digital maps of the communities I visited, documenting their location in relation to investment projects or how those investment projects circulate inputs and goods within the global economy. Such maps would have been easily read at conferences or in journals, but they may have been meaningless or unintelligible to communities. This is not to say that the digital has no place in counter-hegemonic mapping (Hodgson and Schroeder, 2002; Huggins and

Frosina, 2017) but rather that its emancipatory potential can only be realised with investments into digital literacy, and even with such investments, the maps produced may not be capable of capturing the knowable of non-Western worlds. My plea, therefore, is that the digital cannot be treated with epistemic privilege, particularly when doing so renders chickens as mediums for ancestors illegible.

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PART II. GOVERNANCE

5

MAPPING EPIDEMICS

Securitisation, risk and geopolitics

Adam Ferhani and Gregory Stiles

Introduction

The recent so-called securitisation of health in (primarily) Western policy circles has undoubtedly been recognised in research (Rushton and Youde, 2014), yet scholarly engagement with the subject has paid little attention to broader contextual factors allowing for this security framing to occur. Consequently, the effects of digital mapping and how mapping of health 'crises' contribute to the *effective* 'securitising moves' of governance elites have been neglected in extant literature. Analogously the representative nature of digital mapping as a tool within international relations has been overlooked in research as to the scale of impact it has upon the construction of power dynamics in international relations, a factor that this book aims to engage with. As such, the focus of the present chapter is the digital mapping of health (in)security with an empirical focus on the 2014/2015 West African Ebola outbreak. It is contended that Ebola came – at least in part – to be understood as a security issue due to the reiteration of narrow Western conceptions of risk in digital maps. The use of digital mapping can therefore be said to contribute to the creation of a charged, affective climate of unease, enabling the securitisation of health and legitimising containment responses. Amplifying notions of risk enables Western elites to *define* and *govern* global health from a Western-centric, 'security-informed' perspective. The use of cartographic practices contributes to a dominant power structure within which Western elites are able to control the level of perceived risk associated with an epidemiological outbreak and, crucially, the (security-informed) response to it.

The chapter is comprised of four sections. The first section unpacks what is meant when we say, 'the securitisation of health'. What does it mean theoretically to say health has been securitised? Moreover, what does it mean in practice? This section provides a brief, critical analysis of the securitisation literature in

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international relations (IR), in turn showing some of the analytical shortcomings of this popular analytical framework. It then develops the linkages between the analytical gaps within the securitisation literature and how digital maps enable the securitisation of health issues. The second part engages with the broader impact that maps, and digital maps in particular, have had within the practice of international relations and highlights the existing gaps within the literature linking the use of digital mapping and continued Western-centric power structures. The third part of the chapter grounds the debate within the emerging discussions of security based around a 'risk society' rather than the traditional 'threat' framework. It grounds this analysis within the changing relationship between perceptions of risk and the expansion of the use of digital mapping to represent these understandings of risk. Finally, the chapter explores the relationship between the reproduction of risk and the mapping of the 2014/15 Ebola crisis. It draws together the representative links between maps used to show the spread of Ebola by both media and intergovernmental organisations and the heightened perceptions of risk associated with Western countries. The chapter concludes that while the digital mapping of health 'crises' serve to (re)produce and amplify risk, it would be essentialist to say mapped (re)presentations have an inescapable logic. Consequently, it is contended that these maps have the potential to attenuate risk as much as they amplify it and thus open avenues for resistance that require further exploration.

Maps and the securitisation of health

The linkages between health and security are by no means new, and can be traced back to at least the post-WWII period: for example, the original constitution of the World Health Organisation (WHO) in 1945 assumes that health is central to the 'security of all peoples' (Harman, 2011, 20). Nevertheless, recent years have seen 'a new sense of urgency to the connection between health and security' (Nunes, 2015, 60; Rushton, 2011). This growing traction is typified by the United States of America having its own national health security strategy, which is predicated on an 'interdependent relationship between national security, homeland security, and national health security', aimed at dealing with 'large-scale incidents that have threatened human health, such as natural disasters, disease outbreaks, and terrorism, including the use of weapons of mass destruction' (USDHHS, 2009). Similarly, the European Commission's Health Security Committee is equipped with 'mechanisms and tools for Europe-wide coordination of prevention, preparedness and response' to threats such as 'communicable diseases and substances related to chemical, biological and radio-nuclear (CBRN) agents' (CEC, 2009; Nunes, 2014). The past twenty years are replete with instances of health and security being coalesced: since the turn of the new millennium pandemic influenza, SARS and vCJD have all been understood as security threats (Peterson, 2002; McInnes and Lee, 2006; Davies, 2008; Enemark, 2009). Similarly, and arguably most prominently, is HIV/AIDS, with a strident shift in (primarily) Western policy being apparent: HIV/AIDS went from being understood in the United States as a domestic public health

issue in the 1980s to being understood as a matter of national and international security in the early 2000s, requiring attention beyond 'normal' political processes (Elbe, 2006; Sjöstedt, 2010). Most recently, and following this trend of health and security being merged, is the 2014/15 West African Ebola outbreak. It was not understood as a humanitarian crisis per se, but was instead linked with national and international security by elites (Enemark, 2017; Roemer-Mahler and Rushton, 2016). Echoing Joao Nunes:

> [The] notion of 'health security' has become common parlance in policy-making circles. This is *particularly visible* since 9/11 and the 2001 anthrax attacks on the United States, which placed health squarely within the context of broader security anxieties.
>
> *(Nunes, 2014, 940, emphasis added)*

In short, what can be suggested is that in recent years health has been 'securitised': it has become almost axiomatic to suggest that health is something with the potential to 'threaten' national and international security.

Given the merging of health and security in policy, the Copenhagen School's popular securitisation framework has intuitively become a popular lens for analysing the social and political processes through which the two are merged. Indeed, securitisation has seemingly become *the* dominant approach for the study of health security compared to say national or human security perspectives (Nunes, 2014, 2015). In the relatively few years since its emergence – most cohesively expressed in 1998's seminal *Security: A New Framework for Analysis* [1] (hereafter *Security*) – securitisation theory has contributed much to the research agenda of security studies more broadly. Under the capacious appellation of critical security studies (CSS), securitisation has become one of the most dominant, yet seemingly contentious, approaches to security, facilitating the development of critical approaches to security and the exploration of the implications of an agenda beyond the militaristic, state-oriented assumptions that were paradigmatic throughout the Cold War. What exactly is securitisation theory, though?

For the Copenhagen School, security is not an objective condition (i.e. the absence of inter-state conflict). Instead, it is the *product* of a social process, and an issue can be said to be securitised when it has been 'presented [in a speech act] as an *existential threat* requiring *emergency measures* and *justifying actions outside the normal bounds of political procedure*' (Buzan et al., 1998, 23–24, emphasis added): the 'distinguishing feature of securitization is a specific rhetorical structure (survival, priority of action "because if the problem is not handled now it will be too late, and we will not exist to remedy our failure")' (Buzan et al., 1998, 26). As Steve

1 Though synonymous with B. Buzan, O. Waever and J. de Wilde (1998), some key features of the securitisation framework (and the Copenhagen School more generally, for instance 'societal security') may be traced as far back to the early 1990s (Weaver et al., 1993; Weaver, 1995).

Smith suggests: an issue is labelled, imbuing 'it with a sense of *importance* and *urgency* that legitimizes [sic] the use of *special measures* outside the *usual political process* to deal with it' (Smith, 2005, 43, emphasis added). In short, the securitisation process dictates that a *securitising actor* must declare a *referent object* to be *existentially threatened*, which in turn calls for *emergency measures* to counter said threat:

> The way to study securitization is to study discourse and political constellations: When does an argument with this particular rhetorical and semiotic structure achieve sufficient effect to make an audience tolerate violations of rules that would otherwise have to be obeyed? If by means of an argument about the priority and urgency of an existential threat the securitizing actor has managed to break free of procedures or rules he or she would otherwise be bound by, we are witnessing a case of securitization.
>
> *(Buzan et al., 1998, 25)*

For an issue to be successfully securitised, it must meet with *audience acceptance*. Despite the centrality of audience acceptance to securitisation, the Copenhagen School is, admittedly, rather ambiguous about what is meant by it, and is often neglected in accounts of securitisation (Balzacq, 2005, 182). As Buzan et al. identify no specific criteria, it is unclear what acceptance means and, therefore, what signifies it. Seemingly quiescence and acceptance are taken to mean much the same thing. Given the securitising actor must, in essence, persuade the audience (by the resultant force of an illocutionary speech act) that the issue poses existential danger, it must therefore, seemingly, be to a referent object that is *valued* as a collective (Buzan et al., 1998, 31; Curley and Herington, 2011, 144). Christian Enemark usefully suggests that with securitisation of infectious disease, an element of *fear* is essential for audience acceptance: 'the health threats most suitable for securitisation are outbreaks of infectious diseases – specifically, those that inspire a level of dread disproportionate to their ability to cause illness and death' (Enemark, 2007, 8, emphasis added). Therefore, if a threat is feared, an audience will inexorably accept a securitisation: this further augments the ethical debate at the heart of designating Ebola as a security threat, as collective imaginations are informed by imperatives of fear in relation to a subjective existential threat. Within the context of 'risk society' (Beck, 1992, 1999) the securitisation of Ebola, whereby the prevalent sentiment is that of fear, may certainly go some way to explaining not only *why* some outbreaks of disease are securitised in the first place but also *how* they come to be accepted, as security discourses and practices are bound up in a desire to control future(s), in turn potentially inciting greater levels of insecurity. The 'fear/audience acceptance nexus' within the context of the securitisation of Ebola will be unpacked in greater detail later on in this chapter.

On the face of it, securitisation theory – in its original formulation outlined above – corrects *some* of the assumptions of more 'orthodox' approaches to health (in)security: i.e. both realist and human security perspectives assume health security to be a self-evident response to objective, 'concrete security threats' and crucially

fail to question *how* health and security have been linked and *why* this seems natural. By its very nature, securitisation certainly stresses that there is nothing self-evident or natural about health security (McInnes, 2015; Nunes, 2014), rather that it is the product of contingent social processes. However, securitisation's conceptualisation of security is a narrow one, and allows for few insights beyond its analytical limits: focusing on speech acts is not enough, and consequently relatively little is known about the processes through which diseases come to be understood as matters of security, and why these linkages seem so natural. Within critical security studies more broadly, numerous theoretical revisions of securitisation are evident (Balzacq et al., 2016), which shift away from focusing on the overt expression or utterance of 'security' in speech acts – such as notions of 'visual securitisations' considering the extent to which images serve as communicative acts and 'speak security' (Hansen, 2011; Williams, 2003). Other developments include 'sociological' perspectives (Bigo, 2002), which 'argue that the conceptualisation of securitisation through discourses of drama and emergency misses […] bureaucratic routines' (Buzan and Hansen, 2009, 217). These studies suggest that security and its effects (i.e. power effects) should be understood as continuous, and not exceptional as securitisation posits. Similarly, notions of macrosecuritisation stress the error of methodological reliance on speech. These approaches analyse *overarching* securitisations, which in turn serve to contour identities and relations around broad issue areas, in turn serving to 'pre-condition' linguistic structures, and thus social/political relations, hence giving rise to specific securitising moves (Buzan and Wæver, 2009). Developments such as these highlight the importance of looking *beyond* speech acts and towards the role maps play in governing moves towards securitisation.

Indeed, within the field of geographic analysis the use of maps as tools of socially constructed knowledge, rather than neutral representative images has been under-explored (Bargués-Pedreny, Chandler and Simon, in the Introduction to this volume). Yet it is this lack of exploration that this chapter engages with by challenging the widely accepted premise that maps are primarily inert or passive representations of landscapes rather than refracted images that influence power dynamics (Harley, 2004, 278). In doing so, this chapter fills a gap within the field of international relations that has hitherto lacked focus on the importance of cartographic processes in influencing and shaping the international relations field (Tickner, 2013, 628). By challenging these 'authoritative' contributions to knowledge and understanding and updating the process to the digital age, the chapter explores the role that digital maps play in influencing global health governance responses to disease outbreaks (Tickner, 2013, 639).

This expansion, therefore, of digital maps as tools within international relations has allowed the continuing issues surrounding authorship and design to be overlooked, in particular the impact this has upon the usage of digital maps for securitisation (Balzacq, 2005). Indeed, it is the use of censorship within the cartographic field of digital mapping for 'expediency' or 'necessity' that remains an under-analysed element of Western-centric power dominance within international relations. Due to this lack of analysis the potential for challenge to this system of Western-

dominated cartographic processes has been overlooked (Harley, 2004, 288). Analogously, therefore, digital mapping allows for clear delineation between Self and Other: in the most literal and obvious sense, the process of mapping (re)produces the spatiality that (Western) policy elites seemingly propagate as the norm for the practice of international relations more broadly (Walker, 2006). The mapping of health 'crises' is no different in this respect. It is contended herein that these distinctions between Self and Other 'borders' enable the securitisation of global health issues: the paradigm that has overwhelmingly come to dominate 'global' health governance (Rushton, 2011). The use of digital maps to monitor and extemporise the spread of communicable diseases, such as the 2014/15 Ebola outbreak, reduce these indivisible borders to mere promises of security that can no longer be maintained without a securitised response, ergo serving to legitimate and naturalise health security and, crucially, naturalise the imperative of containment. These demarcations create the perception that there is no guarantee of 'safety' between those citizens of the West and those 'Others' that are perceived as subordinate. The speech acts that have been previously described as essential to the securitisation of issues are not to be repudiated – rather, it is contended these practices themselves are facilitated by the geopolitical imaginary that digital mapping provides. In some respects, the mapping of the Ebola outbreak *at source* provided justification for a *response* of some description: an unfortunate health problem localised within African nations, a humanitarian problem requiring (Western) assistance. Yet the mapping of the *spread* of Ebola from West Africa provided justification and legitimacy for the securitisation insofar this mapping rendered Ebola a security problem: the Other became threatening, and 'contagious' rather than victim (Campbell, 1992).

Health 'risk'?

Speech acts entrench this anxiety over those who may be affected within these mapped borders of a separate continent that is to be provided with assistance to allow domestic health institutions to deal with a localised health concern. The mapping of the Ebola outbreak *crossing* these mapped borders from a continent of 'others' to the Western 'secure' continents (Dionne and Seay, 2015) provides the socio-political context for Obama's speech act when he described the spread of Ebola as a global threat that must be contained:

> Now, here's the hard truth: In West Africa, Ebola is now an epidemic of the likes that we have not seen before. It's spiraling out of control. It is getting worse. It's *spreading faster and exponentially*. Today, thousands of people in West Africa are infected. That number could rapidly grow to tens of thousands.
>
> And if the outbreak is not *stopped now*, we could be looking at hundreds of thousands of people infected, with profound political and economic and security implications for all of us. So this is an epidemic that is not just a threat to regional security – it's a potential threat to global security if these countries

> break down, if their economies break down, if people panic. That has profound effects on all of us, even if we are not directly contracting the disease.
> *(The White House, 2014, emphasis added)*

This speech act was contextualised by the mapped visualisation of Ebola no longer belonging to the 'Other', instead the 'uncivilised' virus has reached the 'civilised' world and had altered the context from an isolated health incident, to a security issue for Western states. The fact that these borders have been visualised as no longer secure, allows Western policy elites to place their speech acts within the context of the digital maps that *seemingly* show a clear and present danger to their societies. This further imbues the outbreak 'with a sense of *importance and urgency* that legitimizes [sic] the use of special measures outside the usual political process to deal with it' (Smith, 2005, 46, emphasis added). This context creates the framework by which Western policy elites reinforce their 'common sense' approach to health security: that of containment rather than prevention (Rushton, 2011). The mapping of the *spread* of Ebola *across* borders reinforces this logic of containment by the visual representation of the virus being pushed back from the borders of Western states to its point of source and the securitisation of the efforts to contain it on location. This securitisation process sediments within the popular consciousness the importance of securing the borders that maps (re)produce in order to prevent the further spread of the virus and the 'Other', i.e. migrants who are infected by or escape from Ebola. Thereby entrenching a 'common sense' approach to health security: the importance of (national) boundaries and borders that are vital to (health) security such as those represented by maps. This continuation of containment processes when dealing with global health 'crises' reinforces the policy dynamics of Western nations that wish to continue to establish the security of their borders, rather than approach the spread of an epidemic in the context of a 'global' health issue.

Mapping Ebola and the (re)production of risk

In part the mapping of the Ebola crisis follows a pattern of Western-centric viewpoints that establish the assumption that 'we' are able to distance ourselves from the subject matter to the degree that an accurate representation of the picture may be established (Campbell, 1998, 500). This principle is tied to the implementation of containment goals or outcomes such as a quantitative understanding of the spread of the Ebola epidemic, which are premised upon the conceit of doing no harm through the successfully neutral representation of facts (Campbell, 1998, 500), as a key part of solving a health crisis. This assumption of neutrality, enhanced by new technologies, rests upon a flawed understanding of the geopolitical power dimensions that play out in both the field of international relations (Feigenbaum and Specht, this volume) and contemporary understandings of global health issues that are rendered as insoluble facts. By challenging this establishment of 'truth' it is clear that theory does not mirror nature, rather political perceptions are a process of information conversion

which play out underneath the traditional Western-centric power dynamics of imperialism that modern digital maps continue to represent (Tickner, 2013, 630).

To understand these continuing Western-centric power dynamics requires consideration of the original perceptions of the maps themselves. As with images, whether they be pieces of art in a gallery or images captured in a newspaper, it is rare to encounter said image without a written label or contextual note (Hansen, 2011; Rose, 2012, 16). This broader intertextual context provides the key to understanding the continued power dynamics in the mapping representation of the Ebola crisis. Indeed, it is the maps represented in this chapter, such as the European Centre for Disease Control's map showing repatriation of Western citizens from Ebola-infected West African countries, that reinforce these power dynamics of 'them' and 'us' through the securitisation of the disease. Produced by a European health agency, the map represents the safe evacuation of European citizens from the 'risk' zone of Ebola (ECDC, 2014). Yet the map also provides the image of a linkage between the source of the disease and the European countries that are at 'risk'. In other words, this written context provides a twofold power dynamic that controls the representative power of the digital map itself. First, the information provided, whether numerical or not, shows a contextual analysis and interpretation of the increased risk from the scale of the Ebola epidemic. The representation of the Western countries in a digital map alongside the source site of West Africa establishes a linkage that reinforces the idea that when looking at maps we never look at just one thing, rather we are always concentrating on the relationship between those represented images and ourselves (Berger, 1972, 9). This linkage between ourselves and the 'Other' is reinforced through the use of mapping that provides a clear border delineation between that which we regard as our own, the nation state of origin, and that which is 'other'. The immediacy of this comparison provides the visual stimulation for differentiation between 'them' and 'us' that is provided context by the numerical or written labels that exist on the digital maps of the Ebola epidemic. The contextual nature of these labels reinforces the perception of threat through the increase in either numerical cases of Ebola or the language used to describe the increase in threat to those nation states represented in the digital map.

Second, the labelling of the digital maps representing the spread of Ebola has provided the establishment of authority in the reliability of the facts rendered. For example, both the BBC and NBC digital maps representing the spread of Ebola are aimed at establishing a baseline of reliable information in outlining how the disease has reached Western countries (BBC, 2014; NBC, 2014). In other words, the 'accuracy' of these representations provided by digital maps is given context by the label of organisations that have an established reputation for reliable fact promulgation. In the case of the examples used in this chapter, the BBC, CNN, AFP, NBC and ECDC have established global reputations for providing impartial facts as well-regarded news organisations, while the European Centre for Disease Control is an international organisation tasked with dealing with global health issues on behalf of European governments. This reputational labelling implies a pre-established distancing from the subject matter that grounds the digital map with a

perception of doing-no-harm (Campbell, 1998, 500) due to the reliable nature of the source material. This assumption reiterates the flawed perspective of the digital mapping of the Ebola crisis, that of impartiality and accuracy based on objectivity in the creation of these maps (Harley, 2004, 287), as to the threat of the epidemic to Western nations. In this case, an image or a digital map is rendered within a particular social context that mediates how it is received, a rendering that is premised on the perception of fear associated with the *spread* of Ebola (Rose, 2012, 15). In other words, the digital maps created by these organisations, such as the BBC map showing numerical the spread of Ebola cases to Western countries or the NBC map which draws a direct 'representative' line between West African countries and the USA, are created with the social context of the fear of the *spread* of Ebola, a fear that plays into the very nature of the need to create said maps, as well as the reception of those digital maps (BBC, 2014; NBC, 2014). It is not simply the digital map that is important, rather it is the context in which these maps are seen by those who view them (Rose, 2012, 13), a context that is predicated on the idea of the social fear of the 'Other' spreading across borders into Western countries. For example, the BBC digital map representing the spread of Ebola cases to Western countries provides a cartographic image purporting to represent those countries that are affected by the disease. Yet the contextual information supplied only informs the recipient of the number of cases that have reached Western countries. The digital map does not show an equivalent representation of those cases that exist in West African countries. This 'representation' therefore undermines the purported accuracy of such a cartographic representation as it equates the level of 'risk' of Ebola in West African states as the same as in Western countries. This BBC map therefore reinforces a narrative that those citizens of Western countries are at a similar level of 'risk' as those citizens of West African states.

This development of a 'risk' narrative is linked to the general lack of knowledge among the public of Western nations about international affairs (Moeller, 1999, 57), a lack that creates a dependency upon media outlets as sources of information to make sense of the Ebola crisis. This reliance is paradoxical in nature as the source of this information is based upon a degree of focus that is established only around novel or violent incidents that are perceived as posing a danger to Western interests (Moeller, 1999, 59). In fact, the best predictor of the availability of this knowledge is coverage designed to highlight the 'risk' to Western society (Moeller, 1999, 58). The digital maps used as examples in this chapter all provide varying degrees of heightened 'risk' perception to Western nations. Some examples show distances between outbreak source and Western countries as clear linkages of 'risk' (CNN, 2014; NBC, 2014; ECDC, 2014). Indeed, the CNN digital map highlights the prominent 'risk' to Western societies by arbitrarily overlaying a circular parameter for Ebola upon a map of the world. This parameter of 'risk' bears no relation to the actual spread of the disease, rather it exists to show the viewer the distance between the West African outbreak source and a myriad of countries. In doing so, this cartographic representation goes beyond a neutral image of the spread of the disease and instead represents the heightened possibility of where the disease *could* spread to.

The perception implied, therefore, is of the immediacy of the 'risk' to Western countries from the spread of Ebola. What these digital maps do not highlight are the significant barriers to the spread of the disease over large distances. Instead, the CNN map for instance enables the recipient to understand that the disease is only 'x' amount of miles/kilometres from their country, the implication being that this distance does not present a barrier to the disease. This risk perception is compounded by examples of other digital maps showing the cases of Ebola that have reached/broken out in Western countries as disproportionately large in comparison to actual case figures (BBC, 2014; AFP, 2014). The BBC's representation of the spread of Ebola outside of West Africa, for example, denotes the countries that the disease has spread to. This means that the visualisation of 'risk' is perceived to be the same in Europe as it was in West Africa, even though the reported number of cases in Europe and the USA were no more than a handful. The map does not, however, show a differentiation between the level of cases in West Africa and those *threatening* Western countries. This is a further reinforcement of the reification of ostensibly reliable sources of knowledge: an outbreak of Ebola does not become an 'epidemic' in the eyes of the public until reified by the media as a threat to Western countries (Moeller, 1999, 66). Importantly, while this power of images has been previously studied as an aggravating factor in the process of 'risk' (Moeller, 1999, 66), the relationship between digital maps and the media's use of them is less understood.

With specific reference to the Ebola epidemic, the digital maps that were produced showing the *spread* of the outbreak were done so through processes of *interpretation* and were not contingent on objective information for their veracity (Campbell, 1992). Instead, the maps depicted an *increased risk* to the security of Western states through the predominance of North American and European states in the visual mapping of the spread of the virus. The focus on states that had proportionally lower cases of the Ebola virus in comparison to West African states allowed for the politically credible construction of a security threat to obtain legitimacy through a process of naturalisation of the political analysis of the ongoing health crisis (Anderson et al., 2015). Western governments and media organisations drove the framing of the epidemic, and this arguably resulted in Ebola being framed as a security problem, rather than a global health or humanitarian issue, due to the very nature of these sources of knowledge. Echoing Beck (1992, 52) therefore, the citizens of Western societies are typically often prosperous and also well-educated and informed regarding global events. However, this level of education and information access does not necessarily reduce the affective impact that these maps have upon the collective perception of risk associated with the Ebola epidemic. This is because

> the very element that makes *visual imagery of all kinds* distinct from texts, is its *sensual immediacy*. This is not at all the same thing as simplicity, but there is an undeniable impact on *first sight* that a written text cannot replicate.
>
> *(Mirzoeff, 2000, 15, emphasis added)*

Digital mapping thus contributes to the discourse surrounding the health crisis to be developed into the *confirmation* of a danger to their self, which would mean irreversible harm, thereby transforming the epidemic from a projected threat into a 'concrete' one through mapping:

> Socially accepted knowledge that stems from visuality, thus, is constituted by how the dominant practices interpret images and visual phenomena. Such practices are in turn always reshaped by the images they serve to interpret. Visual power, therefore, is at once socially constituted by the practices of production and interpretation in society, and at the same time participates in the re-shaping of these practices. Indeed, visual production of truth works through different mediums and practices.
>
> *(Anderson et al., 2015, 97)*

As such, the apparent permanence of maps imparts a sense of authority and legitimacy to their (re)presentations (of health (in)security). The very nature of digital mapping thus allows for the continual manipulation and alteration of the visualisation while maintaining the same level of authority within the substance of the material. Subsequently, the deliberative nature of the mapping of the *spread* of the Ebola epidemic is not intended purely as a process of knowledge production but rather as a process of visualising *who* is affected by this process and the extent of the risk (Beck, 1992, 54). This 'works' through the use of digital maps visualising the *spread* of the virus to states that are outside of the source countries and the relative increased spread over time: the approaching threat can be described as a threat to not just the existence of individuals but to a society as a whole (Nunes, 2014, 2), thereby becoming a security issue. Analogously, if words can be described as not only signifying a thing but also signifying the enactment of a thing (Butler, 1997, 44) then arguably the same thing can be said of mapping.

The mapping of the spread of the Ebola virus beyond West Africa can therefore be seen as *signifying* not only the development of a security threat but also that the visualisation of the maps are in and of themselves an enactment of the securitisation of the epidemic. The visualisation of the Ebola threat through mapping projects the hazard onto the daily life (Beck, 1992, 54) of individuals, the use of these maps by media organisations such as the BBC and CNN and governmental organisations such as the ECDC mean that this threat perception is now sedimented both consciously and subconsciously within the mindset of those knowledge seekers. However, the maps themselves now call upon policy experts as sources of answers to the questions that have been raised regarding the security threat. This security risk is then replicated both structurally, through the continued use and adaptation of these maps, and through the development of the narrative (Campbell, 1992, 195) surrounding the rising security threat from the spread of the virus. This risk then functions as a code between the civilised North and the barbaric South where the security threat is perceived to have originated (Campbell, 1992, 195). In developing this narrative of an external threat from the Ebola virus, rather than

perceiving it as a global health issue to be dealt with outside of a security framework, understanding these maps plays a key part in revealing how the IR literature has overlooked the impact cartographic practices have upon the development of health as an international political issue.

Therefore, if social and political life, whose components are a set of practices in which there are constituted processes of dealing with them (Campbell, 1992, 4), then the mapping of the spread of the Ebola outbreak compromises the practice of securitising the virus as a threat to Western nations once it has spread beyond its point of source. This mapping allows Western policy elites to develop policy responses that work within the historical convention of what works (Butler, 1997, 33), through the process of containment rather than prevention. Just as words are instrumental in 'getting things done' (Butler, 1997, 44), so are maps. Through the use of mapping to securitise the spread of the outbreak, Western policy elites were able to develop a narrative for investing *national* interests in the successful containment of the virus at its point of origin in order to halt any further spread over national boundaries. Digital maps showing the decline in the number of declared cases of Ebola in Western countries established and entrenched a continued precedent that the policy of containment is both successful and the correct/'right' response from Western nations to deal with the security threat. Thereby this reinforces the common-sense approach to outbreaks of this nature, that they should be contained at source rather than dealt with as a global health issue that requires the development of policies of prevention and structural change within both nation states and global health structures.

The highlighting of *proximity* of risk, prominence of risk and the emotional appeal of risk by media organisations, assisted by the promulgation of digital maps showing the perceived growth of the Ebola crisis, has contributed to what has been termed the 'Ebola Standard' (Moeller, 1999, 95). This standard, whereby the spread of a disease moves beyond the understood limits of a health threat to more than a localised population to a global 'risk' to Western society, has roots in the early outbreaks of Ebola that pictured the disease coming 'out of Africa' to threaten Western nations (Moeller, 1999, 91). However, the spread of digital maps in the modern age has allowed a proliferation of cartographic practices that purport to show reliable facts from authoritative media organisations providing the public with vital knowledge for the protection of society from 'risk'. This chapter has highlighted the false dichotomy that exists between the purported neutrality of digital cartographic practices and the reality of modern security debates. In doing so it further highlights the need for an exploration of the linkages between 'risk' in global health and the tools available to attenuate this risk.

Conclusion

It is doubtful, therefore, that the original contributions provided by Mercator's projection of the world for the use of navigators would have allowed Mercator himself to perceive the true extent to which his representation would have

reinforced such strong Western-centric viewpoints (Harley, 2004, 290). Indeed, it is this dominance that this chapter seeks to challenge by highlighting the need for greater focus within academic fields of the importance of modern cartographic processes. For without challenging the perceptions of Western-centric dominant maps, the potential for resistance to these practices is nullified. In other words, it is the deepening of understanding surrounding the power of modern cartographic practices that opens up the possibilities of challenging this Western-dominated 'risk' culture. In doing so, this chapter has established that this risk is predicated upon the acceptance of 'accurate' maps from 'authoritative' sources that purport to do no harm by simply visualising the spread of Ebola. In reality, these maps have assisted in framing the security debate surrounding Ebola by heightening the sense of 'risk' attributed to the crisis. The existing lack of analysis of the role these digital maps play in shaping debates within international relations posits a significant gap within the academic field understanding the governance of health crises.

As such, further research is required into the role that digital maps can play in attenuating the development of this 'risk'. By the very nature of digital maps, the shaping of societal interpretations and the assumed permanence of mapping visuality, the current dichotomies that exist between Western-centric power structures can be challenged through the shaping of digital maps to counteract assumptions of 'risk'. Conversely, the assumptions established in this chapter by their very nature have the potential to be reversed in terms of their power dynamics. A first step towards this, however, will be the recognition within the international relations field of the importance of digital maps to both understanding, and challenging power dynamics.

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6

ABOUT 'TERMS AND CONDITIONS'

The Aadhar biometric identification programme as a mapping analytic

Harshavardhan Bhat

Introduction

India since 1947 has not had a single universalising identity card programme – until Aadhar. The Hindi word *aadhar* translates roughly as 'foundation' in English. It relates to the 'base' or the 'substructure', the 'ground' on which something rests or becomes. It is also the brand name of the world's largest biometric identity system. It passed 1.1 billion enrolments in 2017 (Pandey, 2017) and continues to expand. Until the establishment of the Unique Identification Authority of India (UIDAI), identification (ID) systems varied. From ration cards for subsidised food supplies to passports for international travel to Permanent Account Number (PAN) cards for tax payments, to driver's licenses, voter's ID, etc., the regime of identity of persons, was a matter of choice and federal function. Each of these documents carried with them nuances of the federal system. They each also carried with them the weight of governmental histories – the cartography of how a structure of identification came into being. Aadhar as an identity object consists of a unique 12-digit identification number (printed as a card) linked with biometric data (fingerprints, iris, facial photograph) and demographic data (date of birth, age, gender, address, mobile number, email), stored by the Unique Identification Authority of India. At a point of service, such as a bank, a customer verifies her/his identity by disclosing their Aadhar number, which is then matched by the system with their biometrics, i.e. fingerprints. The unfolding of these objects – as cards and machines of authentication – unfold an infrastructure in the space of the nation and the space of the body.

In this chapter, the human resident of the state is observed to be transitioning from a body of personal identity to a biometric body to an active body of economic transaction-ability. The rationale of proving one's identity is entangled with the ability to enact a transaction – aggregating data points, exchange and life. As

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Murphy (2017, 137) comments in relation to the issue of economisation: 'As a hegemonic figure of aggregate life, population is knotted into the perpetuation of global infrastructures that unevenly invest in and abandon life'. This practice, I argue, is a process of mapping – of constructing, layering and designing maps upon maps. These are maps of flux because they are constantly changing. As an expanding map, it requires enrolments – and thus a need for maintaining an influx of bodies to authenticate. As a digital map, it requires transactions – and thus a need to be connected to other devices and commercial engines. As a governmental map, it requires security – and thus a need to constantly deflect or address, as a system, any question that asserts otherwise. So a system of mapping that starts out by enrolling data such as of the biometric of the human body, with the pure intent of matching data as an active authentication practice, ends up in the production of data worlds – built, shared expanded. This does something to the way a world is represented – the formal framings of politics and accountability, of the state and of its citizens – while for the body it becomes a question of the changing textures and ability of a body to retain or even have the capacity to participate in the authentication practice when required.

The identity of a person is transformed to a universal numerical system aligned with specific biometric data from the body. For example, it maps epidermal data that peels, rips, tears, ages, fades, grows, dies, disappears and mutates while digital data remains in circuitry, operating according to a very different metabolism of survival and maintenance. The authentication regime functions as both a modernist practice and a capitalist practice that inherently continue to direct the state's gaze at everyday human life and allow private commercial regimes to entangle with data worlds, interests and transactions. The politics of the digital fuses modernist thinking with capitalist modes of immaterial jurisdictionality – a certain regime of affect. The digital in this mode renders a capacity for auto consent because of its perceived immateriality. This perceived immateriality does not, of course, excuse its absence in the economy. Instead, it accentuates it and helps it expand and multiply. Immateriality is jurisdictional and affects do produce regimes, as Philippopoulos-Mihalopoulos (2015) notes regarding space. It is also a unique moment of affect (Massumi, 2002) because the body is helping the state reproduce an image (or images) of parts of itself into a greater becoming of a governmental and economic assembly.

The government mandates its use for a wide range of purposes – from buying a sim card to operating bank accounts, accessing welfare schemes, subsidies and insurance – within an expanding array of basic and advanced services offered by both the state and the private sector. There is also strong indication that Aadhar, as an identity authentication protocol, will be used for everyday retail services such as Amazon (*Economic Times*, 2017), Microsoft Skype (Nagpal, 2017) and even Google Android (Alawadhi, 2017), as the government negotiates these new relationships. The grand claim of this technical-biometric regime, as Maya Ganesh writes (2018), is a 'claim to 'reduce friction' and increase trust – in people, but mostly in big data infrastructures'. This process depends on an act called 'linking'.

To link is to associate a service-object with an Aadhar account. A service-object can also be another form of identity, issued for another purpose such as paying taxes (PAN cards) or driving a vehicle (driver's license). As multiple service-objects link with respective Aadhar accounts, the specks of little human cartographies begin to emerge. The government's demand for critical services across the spectrum to be linked with Aadhar numbers calls, in practice, for a structural readjustment of the relationships formed between the body, the documentary object of evidence that proves the body's unique identity, and services, allied under the gaze of the state. It is structural because it is an introduction of an entirely new identity governance system across interfaces between the state and society. It is a readjustment because it involves the body in a consent mechanism that fundamentally reattributes accountability from the citizen subject to the contingent life of the body.

The gaze under the premise of authentication is calibrated by an application program interface (API) system, allowing private sector services to request access to the authentication service offered by Aadhar. With the lack of adequate data protection and privacy laws as of 2017, Aadhar has opened up, via its storage, transmission, linking and stacking, a complex ecology of data life. Most importantly, Aadhar becomes, through this process, the possible dominant medium of identity authentication. Dots on the map populate. The dots connect as a map. As Fuller and Goffey (2012, 4) write when looking at what they call 'evil media', the media and medium enter the 'calculus of decision making of all sorts'. From the federalised and decentralised nature of departmental databases to the centralised and universalised numerics of names, Aadhar has the capacity as a methodology to enable the sorting of numerics and the allied affiliations of bodies connected to these numerics. While the capacity to sort is not unique to this project or to the function of government, the biometric regime as a turn in the interpretation of the body between the state, the individual and the service provider indicates not just the emergence of new maps of the human but also the capacity to render these maps with the power to instrumentalise this relationship. As Usha Ramanathan (2017) argues, the project operationalises with the principle of the 'state assuming power over the body and data of every person which it then allows corporate interest to use'.

The chapter takes up four potential avenues of engagement with the dynamics inherent in the digital biometric mapping of the population in India. First, in a discussion of *triage,* whereby biometric data draws connections between and across bodies and public and private agencies, enabling a dynamic of expansion and providing mapping with an indefinite ground of extension. Second, through a discussion of the role of the *glitch* in the mapping regime, which provides a more distributed and contingent framing for the intensification of the regime. This is followed by discussions of the role of the *platform*, where the regime and the interface meet in co-producing a biometric population as an experimental map or governmental surface, and finally, *subtraction*, a speculative call for imagining possibilities other than those already mapped by the Aadhar project.

Triage: the act of sorting

In this first analytic section, the idea of triage is developed to express the capacity 'carried' by an apparent science of governmentality. This apparent science of the biometric and its software construct are part and parcel of particular narratives of society and progress. The narrative produces the framework for a linear methodology of validating identity and the consequences thereby. Aadhar initiates the obsolescence of other identity objects. In a country as diverse and plural as India, it formulates an ability within a system of governance to finally rely on just one numerical system of listing. Passports issued by the Passport Authority, drivers' licenses issued by state governments, PAN cards issued by the Income Tax Department and voters' identification issued by the Election Commission of India are all actually addressed by different departmental functions and governed by different rules and often jurisdictions. In this democracy, Aadhar invents an opportunity of a single listing. The Aadhar number as a technology of linking with other identity objects creates a plane on which everything assembles to a unique – and, arguably, single – list. It creates the condition for the analytics of a laboratory. The laboratory here is a space where an operational framework is created for the testing of a hypothesis. The substance of the experiment is the state and the people that inhabit it.

In his 1987 paper, 'From the Annals of the Laboratory State', Shiv Visvanathan argues that with the emergence of 'triage as a formal concept, modernity has come full circle' (Visvanathan, 1987, 48). He argues that the modernist scientific project and the markets view these acts as systematic and rational – that the sifting through and sorting out of knowledges, bodies and practices creating obsolescence thereby becomes a process of logic and technology. In this settling of a pattern on a cartographic body, the map as a gesture of reinvention can be aligned to logics of disposability. The biometric haunts the future of this notion of disposability. When a notion of truth is aligned with an image of a body feature as a universally valid project of inclusion, it limits the format of knowledge that constitutes the body. The map in this condition is never static. It is an electronic, biometric, synthetic, codified and algorithmic set of practices that create a mappable surface through the generation of data.

Data in this condition of triage is an aspirational project and an ever-expanding territory. It is based on the ability of a techno-political material moment to assert a connection between a human body and access to a form, space, service or product by holding the rights of information to a biometric feature of the body. The institution of power in this context holds the designed right to the informational image of the biometric body. The institution assumes and requires a static state of biometric privileging – of bodies retaining the contoured details of their fingerprints and iris for the purposes of authenticating themselves to the system – while denying the body the right to withdraw the 'image' from the system. Furthermore, the institution of power also licenses access to this instrumentalised format of authentication for the wider experience of the economic world. A transaction is

thus more than a cash exchange – it is a forced becoming with the assemblage of data points unified by the practice of biometric authentication. Under current UIDAI norms, once a user enrols in the system, they cannot be withdrawn, cancelled or deleted (Government of India, 2017). The medium is therefore, in fact, a consistent form of reassurance to confirm that two image values match: one value being lively and hopefully present in the response of one's finger to the expectation of the machine; the other, the frozen data of a moment in a finger's life – its print in the form of an image. The oils of the body meet the reader through the affective flow of movement, of touch. The medium, as interface, authenticates a human moment in a more-than-human data assemblage.

The friction ridges of the fingerprint and its ability to remain static over extended periods of human life – to the satisfaction of consumer access points where authentication deems access – form the basis upon which a consistent relationship between the mapped body and the coded electronic body is maintained. The ethics of this practice is a constant negotiation between abilities and disabilities of human bodies with the nuances of a machine, service providers and the state. It creates an affective jurisdiction that is in fact multiplying even when it is not necessarily seen. The mechanics of this infrastructure are also highly dependent on human effort as a multiplier. The production of this infrastructure is as much human as machine, as much economic as electronic. So in order to produce this infrastructure, the labour of the human (as resident and customer) is entangled with the labour of government and material infrastructure. Telecommunication infrastructures entangle capacities with those of banking infrastructures. Smartphone manufacturers entangle with interpretive biometric regimes. Government school attendance, pensions and food rations become dependent upon the quality of infrared light and glass surface a fingerprint scanner possesses. Integrated into this relationship, the state takes on the role of securing and controlling the submitted body in a presumed act of solidarity.

Dreams of development map the present. The conditions of the numeric listing of humans map the biometric world, a world created by an act of listing as a function of power. For example, according to reports from early 2018, a government department in Andhra Pradesh had created a publically accessible database of over 130,000 Aadhar identity numbers linked with their respective castes and religions (Scroll Staff, 2018). The UIDAI does not store data on caste and religion of persons. However, a project of universal numerical listing does create a condition for other power structures to reorient and redesignate new maps based on the associated data they hold. A listing structure unfolds because of allies seen and unseen – known and not yet known. In discussing sorting, Fuller and Goffey write,

> As a stratagematic force in its own right, therefore, sorting should be understood both as something that yields results, in the form of a ranking, and as something that generates its own terms of composition, shifting relations

> between things that are sorted in ways that imply multiple kinds of use and attention.
>
> *(Fuller and Goffey, 2012, 71f.)*

While a certain condition of triage is created, it is uncertain what its future would hold and/or what its premise would be. The biometric data is thus not the map itself but a component in the infrastructure of the map, a requirement for a map to function according to its design and potential.

Glitches in the mapping regime

The Merriam-Webster (2018) dictionary defines the word glitch as a 'usually minor malfunction' and/or 'a false or spurious electronic signal'. In an otherwise functional architecture, a glitch then is the usual recurring of a minor anti-function of a function. This section seeks to analytically highlight the role of glitches during the preliminary experience of the Aadhar regime. During this time, it can be argued that the role of the glitch was determinate in its evolution as a 'glitch-scape' of reactions and responses assimilating and functionalising contingent and unexpected malfunctions. Thus, 2017 saw reports of farmer deaths, pension denials, students missing attendance, bank accounts being cancelled – accounts being mixed, accounts reconstituting and re-assembling – because of authentication failures and other complexities of the register.

The fact is that Aadhar is a radically evolving techno-political subject. One that, at the time of writing (2017/18), was involved in an ongoing case in the Supreme Court of India where the project is being challenged on the basis of its ethical and constitutional validity. The sensorium and articulation of the mapping regime is an incomplete one. It is both a technical and legal glitch-scape, articulated for example by the arrest of a man who got his dog an Aadhar number (Jain, 2015). The recurring event makes a glitch valid by constituting the visibility of an act that has not been legislated for. In this case, an agency involved in providing registration services for the Aadhar programme had registered a non-human animal in the system. The fingerprint is in this event, replaced by the furry paw, the body of which retaining its facial image as Tommy Singh (the name of the dog), leaks into the system.

The mapping regime as an ongoing negotiated regime of glitches leaks out into the everyday effect of what people think they know and how they go about resolving issues with the interface. The context of India also gives the glitch a very particular kind of agency. India's complex plurality – uneven geographies of access, infrastructures and technocultural diversity – makes the glitch regime an experience in itself: folding with the reality of the experiential world, yet unfolding onto situated practices and situated views. This also makes the work model, designed around the software complex, called the 'update' – i.e. the antidote for the bug – an issue for democracy itself. Why? Because updates require electronic syncability to be an environmental condition.

A glitch model substitutes for the lack of cellular interconnection for informational flow by allowing for the infrastructure and its humans to make errors. Errors are not just mistakes, they are also values the system requires to remain within the glitch-scape. For the human, the glitch is possibly catastrophic. Imagine, for a moment, a glitch versioned as an authentication failure – the production of an inconsistency, an error that cannot be reconciled. Imagine, for a moment, a glitch versioned as a narrative of history – when things worked for you and when they did not. What makes these choices? The manual labour your hands participate in? The syndrome that lifts your upper epidermal skin painlessly into the air? A mysterious internet and cable infrastructure that disobeys the rhythms of a routine? A structure of humans and non-humans that don't see a way, otherwise?

Through its mechanisation of the glitch, it scales an electronic worlding of consistently displacing materials before and after a moment of registration. Tracking the discourse left behind by @UIDAI on Twitter, for example, also reveals the displacement of a rights-based discourse reattributed through a notion of transparency as a fact of good behaviour. Its discourse on data breach (Gopinath, 2018) and constant misleading of Aadhar's requirement for services such as telecommunications (Sachdev, 2018) are good examples, among many others. However, it is the glitch-scape that is constantly curated and co-produced by existing systems, biometric infrastructures and the hubris of allocating truth to an authentication practice. The authentication practice seeks therefore – as a post-modern, post-human, post-governmental moment – to reallocate responsibilities to the interface, effecting a sublime faith in the electronic highway, with its wavelength integrity and encrypted transmissions.

Sajida Begum, a leprosy patient finds herself denied access to basic services because of noncompliant fingerprints (The Wire Staff, 2017). An 11-year-old girl in Jharkhand dies of starvation because she is unable to link a ration card with an Aadhar number (ibid.). India in 2018 has seen hundreds of these stories of people in precarious conditions being denied access to basic governmental and private services because of some mode of Aadhar non-compliance. This type of mapping non-compliance is a more-than-human act. The biometric contours of the finger interact with materials and environments. Touch in this case combines the material with the affective. Touch exposes the agency of more than one. Just as labour with concrete and mud might impact the quality of readable fingerprints, so do allergy and disease internally displace the qualitative and quantitative textures of a mapping regime.

A mapping regime like Aadhar, I want to argue, is a regime of material protocoled choices. These are not choices that people necessarily make entirely by themselves. They are choices made for the human through the situational context of incompatibility, determined via the interface. Humans produce the interface and experience the consequences of the interface but they are not the interface itself. They are also present in the mechanism of maintenance and hence responsible for the expansion and upgrading of interface infrastructure – in the 'terms and conditions' embodied in each layer of electronic protocol. Each layer of protocol imposes a term and possible conditions. Each electronic flow creates the conditions

for the implementation of terms. 'Terms and conditions' form this architecture of the interface. It is uncertain how democracy and power will interact, co-producing and changing each other in these relations – as the interface blurs these connections. Aadhar is a requirement for the issue of death certificates in some Indian states (NDTV, 2017). This is an example of a protocoled premise that refuses the governmental certification of death without an active act of mapping compliance while being alive. The condition of an Aadhar number for the issuance of a death certificate represents, philosophically, a new typology on which contracts can be made, i.e. that death itself does not bypass the contract made in and with Aadhar. The biometric as a pre-emptive regime exists before life itself. It is a regime that only sees life in its condition of being able to be biometric.

So Aadhar forms the basis upon which new contracts can be formed. This form of identity is leveraged as a tool of and for authentication. It phrases a future for the formal economy – an institution of measurement. The mapping regime through the validation of a person's identity makes it easier for a person's transition from an informal economy to a formal economy. The formal economy is catalogued in the state's measurement of growth and economic development. Furthermore, the mapping regime requires that the state transform the authentication function of a body's measurement (such as one's fingerprints) into a state of stored centralised software. The fingerprint here, as a mapped commodity, becomes entwined with software, in the act of authentication. A certain technosphere is glitched into being with the biometric – and the capital – that commissions it.

Constructing the platform

Software takes on the mapping regime in expanding 'terms and conditions' to constitute new maps and possibilities. This section discusses the construction of the Aadhar platform and its conceptual complexity as a member of the platform economy. As Bratton (2016, xvii) notes in suspecting the end of theory and the emergence of software, 'Software seemed to displace theory as a tool for thought'. In the production of the mapping regime, the epidermis is only an element in the collective of the emerging interface. In the commercial process of accumulating registrations, the basis of a speculative infrastructure is being formed. As Bratton (2016, 40) writes, 'The state takes on the armature of a machine, because the machine, The Stack, has already taken on the roles and registers of the state'. Bratton argues that platforms are never just 'plug and play'. The transformative outcomes through the interplay of value models and the politics of a platform can never be fully anticipated in its construction. Aadhar as an economic and technical system was built as a platform. The platform is the active digital archive of biometric data of residents of the Republic of India.

Commercial and public interests opt (by law and/or choice) to plug into this system so that residents/consumers (by law and/or choice) can verify to commercial or public interests that they are who they say they are. It is also the unifying platform for other modes of identities to be linked – from tax registers to crime

registers, bank registers, insurance registers, land registers, food registers, health registers and death registers. It makes intentional a transfer from an imagined Indian modernity to a software identity complex. The process of linking therefore surfaces a world where registers are not just material stacks of inks on paper. Registers, in the Aadhar complex, constitute the digital where biometric acts and linking pull together data assembled on one human body in different registers as linked moments of state attribution. This is backed by the numerical consent, i.e. the consent to be a biometric-tagged unique numerical figuration of that one human body.

Beyond these ideals is the glitch-scape of digital 'microdecisions' (Sprenger, 2015) – interrupted, stored, shuffled, sold, hollowed and played. These decisions are often not automatic protocols but rather are part of material and circuit assemblages, which means that the ideal of the inside of a machine is interrupted by the outside of the digital machine in tangible material space. In the technosphere, then, just as in space itself, there is perhaps no outside (Philippopoulos-Mihalopoulos, 2015). Narratives of data security aligned with Aadhar tend to interestingly fail upon the realisation that certain kinds of data at the edges of its centralisation can be part of copy-paste protocols too. Khaira (2018) reports on the details of millions of Aadhar numbers being sold for a few hundred rupees by anonymous groups via WhatsApp, allegedly owing to operators (currently decommissioned) having had access to data in the Aadhar process. After the story was published, the government filed an FIR against the journalist who was responsible for the news report (Bhandari, 2018). Software ideologically denies alternatives when it takes a governmental form.

A governmental notion of data security, for example, does not acknowledge, in this case, the realities of copy-paste opportunities at the edges of centralisation. The image of a biometric feature might be stored and transmitted securely, but the number present in the card and the hands used in the everyday life of the human offer other forms of access to the wider world. Security here is therefore more-than-machine. A biometric software infrastructure cannot be composed of just one approach to a security rationale. Designing for this version of democracy is, it seems, glitch by default, requiring a re-versioning of what a rationale is in the first place. A USB stick, a private contractor, an encryption key, a bad internet day, uneven regulatory policies and the coded informational image all acquire values of security in transit and transition. While many of these values may not result in the intended consequence of design, they do add value to the glitch as a performer, speculative and often unpredictable. The glitch renders value to rupture, anomaly and a lack of function.

As Sprenger (2015, 76) notes, infrastructures are political 'because at their level micro-decisions are made about who can communicate and who cannot, what can be transmitted and what cannot, who is connected and who is kept apart'. The platform as a medium of access and economisation is, as Sangeet Paul Choudary (2015, 18) writes, a 'plug and play business model that allows connected users and things to plug in and orchestrates them towards efficient interactions'. There's a certain conceptual clarity and cleanliness in the concept of the platform and the

platform economy. The glitch confronts the clarity of this map. The glitch-scape is its own map. Glitches unify in making maps not just because of their inclusion of things but also because of their exclusions. As of 21 March 2018, there have been nearly seven million deduplication rejections on the Aadhar system. This means that for any number of reasons (fraud, error, mistakes, biological and digital object anomalies, etc.) seven million people or attempts to enter the Aadhar system have actually been rejected by the value system of the platform itself. A deduplication measure is essentially to ensure that no repetitions of an identity (as interpreted by the system) exist – that a system only has 'one for one' and 'one of one' in a system of many. The enrolment of 'one' requires, therefore, in deduplication, the assurance that a match will not occur during the process of registration as a new entry in the system. This therefore requires a unique match to the value of one for every entry, when a registration takes place. The complexities of the many confront the image. The complexities of the image confront the value of authentication. The value of authentication is confronted by change – biological, chemical and conceptual.

What also makes Aadhar unique as a platform is that, unlike others in the platform economy where interface is bare connector or a medium between terms or identities, Aadhar makes identity the platform itself. Authentication takes away the jurisdictional claim of who a person is and who a person claims to be. While Aadhar does have features of platform design, the term which I draw from Choudary (2015), it is not a conventional one. Neither is it a business, for which normative platform design is conceptualised. It is in fact an engine of truth for the process of economisation. As economisation, in this format, requires the standardisation of identities, objects and process in protocol-able flat truths, Aadhar assists in the standardisation of identity. Politically, Aadhar was advertised as a programme to help the government reduce leakages in the public welfare system. As an anti-corruption political project with an intended positive outlook, Aadhar implies an auto-correct in what seems to be a vast, complex network of finances and financing.

Platform thinking has had powerful consequences at the operational intersection of digital and government, with case projects from Estonia to the United States, Singapore and South Korea. Aadhar stands out not just for its scale but also for the underlying template that presumes and rests on biometric truths for universal services for an entire population. While it takes on the burden of data security, it does not take on the risk or accountability in case of failure, either systemic or particular to an event – failure that impacts on the everyday life of people. While this may change in the future, what is certain is that glitches constitute the design on which this map is built. India as a test site for the identity platform makes its construct even more valuable to the glitch-scape. Democracy is tuned to operate with Aadhar, even as it is the house of democracy that allows Aadhar to exist as legislation. Legislation secures democratic credibility, while the call centre and Twitter handle of the authority test the accountability of recourse. Does recourse have accountability to itself?

Infrastructure, on the Aadhar construct, is what it becomes – because of itself. Premised as a platform yet centralised by design, it becomes the guarantor of human identity between service provider and human. There is no decentralised possibility for a truth to concur. Any transaction becomes a medium between more than two parties. Aadhar becomes the medium and the guarantor. It is the speculative foundation for a data assemblage to aggregate. Aadhar scales, quite literally, a very particular mode of 'citizenship' into implementation. Technically, Aadhar is not proof of citizenship but of residency. The fact that it's a requirement for humans in a territory to access services makes it an act of regimented citizenship. The temporality of residency does not concern an Aadhar construct because for deduplication to apply, the resident must become a permanently mapped image. The image becomes the resident. So, as a centralised infrastructure with performative leakages and operational glitches, does it really map the human or does it map itself? Is it a map for the fantasy of its own making? Like the predesigned architectural map of the future – a science fiction that comes into being when its code is set free and materials are brought together to implement the code in space – Aadhar forces a map of objects onto the world. It emerges, and seems to multiply quite naturally, as more than just a generator of anxiety: as a techno-political material demanding adoption and adaptation.

In this system enabling, driven by both intentional and contingent dynamics, infrastructure operates on a norm-based obedience model – 'terms and conditions'. The infrastructure is more than the calculative commute, a mathematical abstraction for identity verification. Commercial APIs make this more than a map of demographic authentication – this is not a map of humanity and not just a map of the state's gaze. This is a mapping where, once mapped, you are not just a map yourself but a constantly accumulating transactional figuration that adds to the stack and its complexity. These visible and invisible terms and conditions state that you are who they say you are. The body in flesh with fingers and eyes does not construct these terms and conditions. Fingers and eyes are conditions held by the life of the body. Consent is the body itself. It's unlike a moment of consent verbalised and/or typed as a password, held as a material key or encryption pass. One can contest that the storage of the biometric image is secured by the government. One can also contest that a moment of authentication is only created when an Aadhar number is associated with a specific set of biometric data. It does not, however, change the fact that the body is in all of these instances consent itself. It produces a philosophical and sociologically unique gesture that the ink of truth is in an image-interpretation of the body.

In September 2017 the Civil Aviation Ministry announced the prototyping of an Aadhar-based check-in process at airports (Kumari, 2017). Biometric authentication, according to this speculative trial, shall replace other forms of verification in the airport at check-in, security and boarding. Body as consent and permission inspires governmental speculation. The Aadhar stack is a curious construct. This trace, or tracing, as seen in governmental speculation of tracking the human body in the airport, for example, also follows the notion of the biometric trace. This

assurance of a very particular kind of evidence as irrefutable is very interesting. As Susan Schuppli (2013, 160) notes, 'This guiding principle, which students of forensic science still learn today, is called the Locard Exchange Principle. It posits that in any encounter between bodies, objects, materials, and spaces, certain residual traces are deposited and exchanged.'

Schuppli argues that this principle is operating in a similar way, both physically and digitally, in the development of surveillance systems. She notes how, just as every fingerprint leaves behind, through the ridges of the fingers and its oil, imprints on dust and surface, 'every digital contact continues to leave an electronic trace' (Schuppli, 2013, 164). This forensic reliance on photography is, Schuppli suggests, an understandable one, but its extrapolation and use across categories manipulates subjectivities and is also transmitted to the politics and confines of the present, where it enables power to take new forms. The platform appropriates this power by becoming the guarantor of the trace. The traces of one body create one flow within one map. The traces of many bodies create multiple flows on the map (s). The lines left behind by traces suggest layers, maps deposited in a digital archive, posed as numbers.

Subtraction

Subtraction in this case is an act of speculation because it has not already happened. Subtraction is a theory of a future with a different Aadhar – literally the ground and the foundation, as the translation indicates. Unlike a mathematical subtraction that can invoke the disappearance of a number, a subtraction of Aadhar is both material and digital. This section discusses the possibility and/or impossibility of subtraction. Materially, as a physical infrastructure – the question arises – can infrastructure fold? Can machines and circuits be folded back into the bag? Like traces in the airport, which cannot be untraced – what does it mean to imagine a material subtraction of Aadhar? I draw the word 'subtraction' from Keller Easterling (2014), who proposes that subtraction in architecture is not just a possibility but a requirement. She argues that if we can design protocols of expansion, we should be able to design protocols of subtraction too. Aadhar as a mapping infrastructure – a practice of multiple mapping practices, both material and digital, accumulating as a glitch-prone programme – makes subtraction a challenging proposition.

Aadhar constitutes multiple layers and interfaces. So to invoke the bag where the folds fall back, what is the speculative future of all the machines and devices made for a project of biometric governance? The limit of a material fold is a decommissioning of its function. Parts of material infrastructure such as cameras, fingerprint readers, scanners and computer modules, wires and cables fold back into this speculative bag. The vast hardware of networked state security, critical infrastructure and administration confronts subtraction as a conceptual framework – because the bag is simply too small to hold something so vast. However, as traces can leak, be copied and multiplied, subtraction is registered in the confusion of the

material itself. If the glitch becomes the norm from the anomaly, the infrastructure becomes redundant.

Easterling's (2014) proposal for subtraction is, I suggest, something interesting to think about in relation to the Aadhar project. What does it mean for a multi-billion-dollar project in the world's largest democracy to subtract its infrastructure from space? What does it mean for identities under the state's gaze to be democratised? These are speculations. The unfolding of a basic computer with a fingerprint scanner in bandwidth space (Easterling, 2016), linked with Aadhar infrastructures, is not valid just by its being as a unit of one but because of the active form (Easterling, 2018) of many. Drawing from Easterling, Aadhar here therefore is not just the script but also the protocol of material multiplication. It attempts to become a medium for transactions but transforms instead into a biometric sorting mechanism. Aadhar is not just *design* but a medium of choice for exclusion and/or inclusion. As I suggest with the concept of 'terms and conditions', the designer (human and/or non-human) makes this choice of inclusion and exclusion in collaboration with glitches (known and/or unknown), scaling with them.

Easterling (2016, 62) suggests that the mapping of the 'incentives, scripts and technologies on the city itself is an enormous yet undisclosed political change that simultaneously delivers bandwidth, wealth, security …'. The costs of the objects of the active form reduce as they multiply, scaling an economic relationship. Just as fingerprint readers, iris scanners, handheld computers and software become cheaper, the mineral intelligence (Bratton, 2017) scales. The term mineral intelligence, drawing upon Bratton, here refers to the intelligence of mineral extractive ecologies – transported, reorganised, processed and implemented into electronic, electrical and digital intelligence. The optimal and economic extraction of minerals directly impacts the optical and economic extraction of the biometric image and transaction regime of the Aadhar complex. In some sense, at these moments of loss, as Bratton (2016) suggests, we are inside the stack and the stack is inside of us. All that we can see and think is abstracted.

Every moment of forensic detail – techno-political, legal, jurisdictional – is melted into the fibre-optic haze of the underground and the insides of a USB stick coated with plastic. Where is the mapping regime? Where is the biometric truth? In this confusion between bodies and the image of a moment of the body, stored in binaries, translating to a future of commercial desires – what is the rationality of the map itself? Aadhar is thus more than a proposal to software and a theory of government. Aadhar is about the complexity of new maps that transmit between bodies and involve the human, the nation state, the mineral, the economic, the compositional and the delivery of commercial worlds to the body and back. Hence subtraction, as a task, transforms into an intervention of becoming with and intervening for the future of a different kind of glitch. It's not about the identity of the human itself but about allowing for new relationships between circuits and servers to exist, in the realisation of these opportunities with glitch*scaping*.

Conclusion

The legal and political landscape of Aadhar continues to evolve. As of May 2018 the Aadhar case has completed three months of hearings at the Supreme Court. However, this chapter was not intended to be a comment on the political and legal issues of Aadhar. Instead it has sought to encapsulate Aadhar as a theory of the glitch, its scape, its present and its speculative future. Its framework provides a basis for the construction of a mapping regime. Its glitches deflate the modern construction of the human as citizen/consumer subject to a task of figuring in the margins. Yet, its glitches bring a whole new electronic materialism into being, inspiring imaginations of subtractive futures. This task of thinking Aadhar as theory confronts both the body of the human and the nation in acknowledging entangled complexities of one image pollinating the other. The nation enters the biometric and the body enters the nation through its ability to give away the biometric.

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7

MAPPING AS GOVERNANCE IN AN AGE OF AUTONOMIC COMPUTING

Technology, virtuality and utopia[1]

Antoinette Rouvroy

Introduction: mapping and governing the virtual

Objects and technology do have a complicated relation to society. As Langdon Winner (1986, 19) writes,

> the machines, structures, and systems of modern material culture can be accurately judged not only for their contributions to efficiency and productivity and their positive and negative environmental side effects, but also for the ways in which they can embody specific forms of power and authority.

'Autonomic computing' per se is difficult to circumscribe as an object for theoretical inquiry. IBM, which first coined the term, explicitly acknowledges that the definition of autonomic computing is likely to change 'as contributing technologies mature'. It nevertheless lists eight defining characteristics and presents the vision of 'computer systems that regulate themselves much in the same way our autonomic nervous system regulates and protects our bodies'. The eight defining principles of autonomic computing IBM lists include: self-knowledge (the system must somehow know itself and be able to identify its own components); autonomic and dynamic self-reconfiguration and adjustment; constant optimization of its own working, self-prevention and reparation of malfunctioning caused by internal or external events; detection of and protection from attacks against the system's security and integrity; and context awareness and autonomic adaptation of itself or

1 This chapter is drawing upon some material originally published as 'Governmentality in an Age of Autonomic Computing: Technology, Virtuality and Utopia' in Antoinette Rouvroy and Mireille Hildebrandt (eds), *Autonomic Computing and the Transformations of Human Agency: Philosophers of Law Meet Philosophers of Technology* (Abingdon: Routledge, 2009).

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even the environment to the circumstances. An autonomic computing system will anticipate the optimized resources needed while keeping its complexity hidden. It must marshal IT resources to shrink the gap between the business or personal goals of the user and the IT implementation necessary to achieve those goals – without involving the user in that implementation (IBM Research).

As of today, autonomic computing is nothing more than a 'vision', which is not (or not yet) embodied in any specific 'artefact', scenario or application that would give rise to actual practices from which to start our study. As a 'vision', or a 'paradigm shift', autonomic computing is aimed at facilitating and enhancing the functioning of a wide variety of information systems, going from the traditional laptop to the most complex computer-sensors networks one may imagine being involved in futuristic scenarios of ambient intelligence. The prospective stance one is unavoidably caught in does not allow for any clear view of the future. Nevertheless, assessing how our notions of gesture and agency, subjectivity and identity mutate in the presence of real-time, dynamically varying media managed by autonomic computing therefore becomes crucial. Katherine Hayles rightly observes that,

> [e]nmeshed within this flow of data, human behaviour is increasingly integrated with the technological nonconscious through somatic responses, haptic feedback, gestural interactions, and a wide variety of other cognitive activities that are habitual and repetitive and that therefore fall below the threshold of conscious awareness. Mediating between these habits and the intelligent machines that entrain them are layers of code. Code, then, acts as both linguistic and nonlinguistic human behaviour.
>
> *(Hayles, 2006, 140)*

My departure point is not a contemplation of how human subjects actively interact with autonomic computing systems (there are currently no actual instances where this happens except in laboratory, experimental conditions where prototypes are being developed), but how human subjects are taken as objects of observation, classification and forward-looking evaluation by such autonomic systems, and what the consequences may be of the 'production' of such statistically based knowledge (Gandy, 2008). In other words, I wish to reflect on how these autonomic machines map, translate or transcribe the physical world, its inhabitants, their trajectories, behaviours, actions, choices, preferences and attitudes, etc. Because (as everyone knows) there is no neutral map or transcript of the 'real', I wish to identify the underlying 'bias' governing the regime of visibility and of intelligibility implemented in this way.

Autonomic computing as governance

The questions I am concerned with are the following: what are the specificities of the new modes of intelligibility of the 'real' or of the new rationality that such mapping technologies enable? What 'axial principles' (Alford and Friedland, 1985, 165) does autonomic computing serve? The 'political' question is thus:

what is the kind of power that the new regimes of visibility and intelligibility accompanying the deployment of such technologies are aimed and capable of bringing forward? To what type of governmental rationality are these artefacts instrumental? And, finally, what impacts would the deployment of such artefacts have on the processes of subjectivation, and on the collective capacity to invent new political and social ways of life?

My approach to mapping as a mode of governance is very much influenced by Foucauldian scholarship and 'governmentality studies' (Foucault, 2007, 144).[2] I wish to consider the impact of autonomic computing (embedded in systems of ubiquitous computing and ambient intelligence) through the transformations of knowledge and of the modalities of power (and resistance) that such technological developments implement. The issues I am concerned with relate to the 'regimes of truth' (in a Foucauldian sense, Foucault, 1980, 93),[3] the categorizations and (sometimes performative) predictions these systems are capable of establishing, maintaining and propagating in their manifold fields of application, ranging from security to entertainment to marketing and health management. Because these 'truth regimes' result from technological (rather than human) observation, detection, classification and forward-looking (and thus predictive rather than purely descriptive) evaluation processes, individuals – diversely apprehended through the prism of profiles built on numbers and data – will not retain much power over their recognition, interpellation and classification by and within these new systems.[4]

2 Foucault states: 'What I would really like to undertake is something that I would call a history of "governmentality". By this word "governmentality" I mean three things. First, by 'governmentality' I understand the ensemble formed by institutions, procedures, analyses and reflections, calculations, and tactics that allow the exercise of this very specific, albeit very complex, power that has the population as its target, political economy as its major form of knowledge, and apparatuses of security as its essential technical instrument. Second, by "governmentality" I understand the tendency, the line of force, that for a long time, and throughout the West, has constantly led towards the pre-eminence over all other types of power – sovereignty, discipline, and so on – of the type of power that we can call "government" and which has led to the development of a series of specific governmental apparatuses (appareils) on the one hand, [and, on the other] to the development of a series of knowledges (savoirs). Finally, by "governmentality" I think we should understand the process, or rather, the result of the process by which the state of justice of the Middle Ages became the administrative state in the fifteenth and sixteenth centuries and was gradually 'governmentalized' (2007, 144).

3 'My problem (…) is this: (…) what type of power is susceptible of producing discourses of truth that in a society such as ours are endowed with such potent effects? What I mean is this: in a society such as ours (…) there are manifold relations of power which permeate, characterize and constitute the social body, and these relations of power cannot themselves be established, consolidated, nor implemented without the production, accumulation, circulation and functioning of a discourse… We are subject to the production of truth through power and we cannot exercise power except through the production of truth' (Foucault, 1980, 93).

4 'Our capacity to reflect upon ourselves, to tell the truth about ourselves, is correspondingly limited by what the discourse, the regime, cannot allow into speakability' (Butler, 2005, 121).

Fragmented as they will be into a myriad of 'correlatable' data and aggregated with others with whom they do not share anything more than the simple fact of having exhibited similarly correlated biographical, behavioural, or other elements, the profiled individual will not necessarily be able to contest or resist the autonomic assignation of profiles and the practical consequences ensuing in terms of access to places, opportunities, and benefits.

> Through the lens of representations thrown off by these practices, individuals, once understood as moral or rational actors, are increasingly understood as locations in actuarial tables of variations. This shift from moral agent to actuarial subject marks a change in the way power is exercised on individuals by the state and other large organizations (…) The effects can be discerned on the way we understand ourselves, our communities, and our capacity for moral judgment and political action.
>
> *(Simon, 1988, 772)*

What I am concerned with is precisely the relation between how, on the one hand, in a 'world of autonomic computing', the technical process of mapping the physical world and its inhabitants makes them visible and meaningful, enables states of affairs to be seen and evaluated and enables evidence to be produced and presented; and, on the other hand, new practices of 'government' emerge, whereby:

> '[G]overnment' [does] not refer only to political structures or to the management of states; rather, it [designates] the way in which the conduct of individuals or groups might be directed. (…) It [does] not only cover the legitimately constituted forms of political or economic subjection but also modes of action, more or less considered or calculated, which [are] designed to act upon the possibilities of action of other people. To govern in this sense is to structure the possible field of action of others.
>
> *(Foucault, 1982, 790)*

I thus refer to governmentality in a Foucauldian sense as the 'conduct of conduct' (Foucault, 1991), identifying how new mapping regimes of visibility and intelligibility impact on how we conduct ourselves, how we attempt to conduct others, and how others attempt to control our conduct. On Judith Butler's account, governmentality

> is broadly understood as a mode of power concerned with the maintenance and control of bodies and persons, the production and regulation of persons and populations, and the circulation of goods insofar as they maintain and restrict the life of the population. Governmentality operates through policies and departments, through managerial and bureaucratic institutions, through the law, when the law is understood as 'a set of tactics,' and through forms of state power, although not exclusively.
>
> *(2004, 52)*

'Governmental rationality' is 'a way or system of thinking about the nature of the practice of government (who can govern; what governing is; what or who is governed), capable of making some form of that activity thinkable and practicable both to its practitioners and to those upon whom it was practiced' (Gordon, 1991, 3). At a time where the next step in the development of our information society may be a turn towards autonomic computing, I believe that borrowing from the 'governmentalist' perspective may be highly suggestive and helpful to assess why, and, above all, at what price mapping the world through autonomic detection, classification and forward-looking evaluation will gradually assist or even replace human observation.

Towards a statistical (or actuarial) mapping of the 'real'

> What is real – if something like that can ever be supposed to exist in itself – does not matter; what matters is what is taken as real and in modernity what is taken as real is statistically recorded.
>
> *(Skouteris, 2004, 15)*

We are familiar with the benefits that ubiquitous and autonomous computing, multimodal observation, ambient intelligence and other new mapping technologies are purported to bring, making our lives safer, easier, more efficient and enjoyable as we increasingly colonize the physical world through digital technology. Their celebrated capacity to detect, sort, evaluate and, most importantly, predict our desires and preferences, needs and propensities and also customize and adjust deliveries, services and offers to our individual profile, as if digital networks knew us better than we know ourselves, is held to spare us time and discomfort. We are told that new powers of computation will enable the authorities to target more accurately and objectively the individuals whose trajectories and attitudes put them at a higher than average probability of committing a criminal offence or being involved in some way or another in a terrorist attack. These new processes and practices are said to allow more selective security screenings and leave the 'good guys' in peace, rendering counter-terrorism policies less obtrusive to citizens' everyday life. Unobtrusively, governance will be mapped so as to render your environment responsive to your unique personality (yes, you are unique, and the system will reassure you on that point) while eliminating most frictions with the unexpected, unpleasant, time-consuming, tiresome aspects of choices or routine security checks.

In order to perform their tasks as intelligent interfaces or smart mediators (and, possibly, agents) between human users and the humanly untameable complexity of the global digital and physical universe and to deliver their individualized, dynamic functionalities, the new information infrastructures map, 'translate' or 'transcript' the physical space and its inhabitants (that's us) into constantly evolving sets of data points. The optimal functioning of this mode of statistical intelligibility presupposes the non-selective collection of as much data as possible, a priori independent of any

specific finality. At odds with the modern ambitions of deductive rationality – linking observed phenomena (that is, phenomena previously selected, on explicit or implicit criteria of interest, as objects for observation and analysis) correlated to their effects – the rise of autonomic computing attests to a broader epistemic shift. The new 'perceptual regime' appears to follow an inductive (rather than deductive) logic. Indifferent to the causes of phenomena, it functions on a purely statistical observation of correlations (untainted by any underlying logic) between data captured in an absolutely non-selective manner in a variety of heterogeneous contexts.

This translation and processing of reality reduced to data points and rendered predictable – in a data-rich environment such as ours, 'anything can be predicted' and 'crunching numbers' is 'the new way to be smart', Ian Ayres (2007) suggests – appears reassuring at different levels. It appears reassuring especially at a time where 'narratives' have become more than ever suspicious due to the experienced difficulty, in a multicultural, globalized society, to find common languages and emotional harmony with our fellow human beings. Rather than understanding the biographical trajectory and exotic world-view of their foreign neighbour just moving in next-door, Mister and Miss Anybody are interested in knowing in advance what risk the newcomer represents for their safety and tranquillity.

At the political level, the turn towards autonomic computing and a statistical mapping of the 'real', for its orientation towards prediction, is a gesture that is both encouraged by and reinforcing a governmental rationality whose central figure is contingency and where prediction and avoidance of danger and conflict has replaced the identification and remediation of its causes (Ullman and Wade, 1996).[5] Globalization seems to have ended the time – if there has ever been such a time – when governments could act towards an identifiable common good or protect themselves and their constituencies against identifiable and locatable enemies. How indeed could such a common good, or a 'common enemy' (to speak in Schmittian terms), be identified in a global society such as ours, characterized above all by its cultural, economic, linguistic, religious fragmentation, by the palpable intensification of morally indefensible disparities in terms of health, wealth, and spending of scarce resources, and by intensifying complexity and feedback loops,

5 Ullman and Wade identify, as challenges to traditional military approaches, (1) the changing nature of the domestic and international environments; (2) the complex nature of resolving inter- and intra-state conflict that falls outside conventional war, including peacekeeping, and countering terrorism, crime, and the use of weapons of mass destruction; (3) resource constraints; (4) defense infrastructure and technical industrial bases raised on a large, continuous infusion of funding now facing a future of austerity; and (5) the vast uncertainties of the so-called social, economic and information revolutions that could check or counter many of the nation's assumptions as well as public support currently underwriting defense. These listed challenges thus inspire the need to extend the field of military operations beyond the battlefield, to the totality of social reality: 'It is clear that these so-called grey areas involving non-traditional Operations Other Than War (OOTW) and law enforcement tasks are growing and pose difficult problems and challenges to American military forces, especially when and where the use of force may be inappropriate or simply may not work.'

making threats both intangible and ubiquitous, distributed and constantly moving within the very fabric of the globalized networked society?

Political, ecological and economic instability are the hallmarks of our 'risk society'. We live in polities where the ubiquitous figures of contingency and risk have come to take the central space formerly (ideally) occupied by the figure of the common good, or utopia, and where the prevention of insecurity, rather than the pursuit of any collectively identified common good, has become the most important role of governments. At a time when individuals are governed and socialized through 'fear', it is little surprising that a new mapping imaginary has emerged: that autonomic computing, allowing for the complex operations of data-mining and precise and dynamic profiling, will render the world and it inhabitants predictable. This imaginary provides the ideological background for enthusiastic support for any technology promising to help taming the chaos (Žižek, 2008). The ubiquitous threat of virtual danger acts as a powerful incentive to eradicate pre-emptively whatever, in the human being, remains uncertain, virtual, or potential (Massumi, 2010).

Epistemologically, I would suggest that this is the backdrop to what Slavoj Žižek has identified as a shift from a modern rationality to a post-modern rationality, that is, the gradual replacement of 'transparency', allowing the understanding of profound mechanisms behind appearances, ('transparency' as such was the privileged mode of modernity) by 'simulacra', the presentation of an impenetrable, but convivial surface. Ironically, according to the IBM vision of autonomic computing, the system will be 'transparent' not in the modern sense that it will allow the user to understand the deep mechanisms on which it functions, but in the sense of a total invisibility and imperceptibility of these mechanisms.

Such a 'post-modern' rationality fits our 'post-modern' governmentality. In the field of security, what disappears is the need to understand, explain and address the (too complex to grasp and address) causes of feared dangers. In the field of marketing, the logic relieves all actors from the burden of reflecting on the possible discontinuities between (technologically persuaded) consumers' demands and their actual needs. The mobile, constantly reorganizing and readjusting images of the 'real', highly relevant for private and public bureaucratic purposes, appear evaluated increasingly according to the criteria of flexibility, speed and relevance, and decreasingly according to the criteria of truth, objectivity and justice. Isn't this the sign that, in the passionate pursuit of an imaginary of absolute predictability of events and persons, we are building simulacra, which, according to Baudrillard, are nothing but a 'copy without original' or a 'representation hiding the absence of reality (hyper-reality)'?

The need for critical appraisal of statistical (or actuarial) mapping

By comparison with human observation, technologically intermediated observation may appear more 'objective': it appears to attest to a victory of rational analysis over deceptive human sensorial perceptions. Involving multimodal observation,

these systems detect phenomena as they surface in physical and digital spaces, and privilege information ensuing from observation of, for example, the human body (making meaningful 'data' from previously unnoticed (involuntary and unvolunteered) bodily movements, or attitudinal and physiological changes). This assumption follows the logic that, unlike subjective human reasoning and judgement, objective human bodies do not lie.[6] The question is thus the following: when individuals are subjected to the mapping 'gaze' of multimodal observation dispositives, functioning through autonomic computing, and when forward-looking statistical evaluation and classification becomes the privileged vector of governmentality, aren't individuals deprived of occasions and, in the long run, their capability to form and implement moral judgments and develop their normative reflexivity?

The same danger, of 'depoliticization' and 'demoralization', is clear in the new forms of 'technological paternalism', which are present in any technology designed for the purpose of enforcing a certain 'regularity' of behaviours or of rendering practically impossible certain behaviours attitudes or actions that were previously 'simply' forbidden by morality or law (Spiekermann and Pallas, 2006). These pre-emptive, and therefore ontopolitical dispositives, in so far as they succeed in their regulative and normative tasks, simply bypass conscious acceptation or contestation of the norms they enforce and are at odds with an agonistic conception of politics (Castle, 1998), or, as Foucault would have it, with the possibility of politics at all, if, as he argued: 'nothing is political, everything is politicisable, everything can become political. Politics is nothing more nor less than that which arises with resistance to governmentality, the first uprising, the first confrontation' (Foucault, 2007, 390). The possibility, the potentiality, of dissent, contestation and insurrection demarcates power from violence, force or domination. Power, that which allows some to drive the conduct of others, the 'conduct of conduct', always presupposes the possibility, for the individuals and groups targeted, of counter-conducts. The possibility of counter-conducts is what is threatened whenever power (or, one could say, domination) arises at a pre-emptive, pre-conscious stage.

Besides this important aspect, one may also note that the postulated reliability and impartiality of 'autonomically produced predictions' is vulnerable for a series of reasons identified by Oscar Gandy as:

- the possible inaccuracy of data used, or invalidity of models or routines;
- the fact that these are correlations-based systems possibly relying on categorical variables rather than causal inquiry;

6 This is very much in line with the statements of Robert Boyle (doyen of the Royal Society's experimental philosophers who established the scientific credibility of laboratory objects at the expense of the untrustworthy humans), quoted in Shapin and Shaffer, 1985 and Shaffer, 1992, 328: 'inanimate bodies … are not capable of prepossessions, or giving us partial information', while 'vulgar men may be influenced by predispositions, and so many circumstances, that they may easily give occasion to mistakes. So, an inanimate body's deeds could function as signs of some other state of affairs in a way that stories of vulgar humans could not.'

- the fact that these systems may produce 'rational' (factually non-biased) but 'unfair' results (further victimizing already vulnerable groups, in contradiction with common views of justice or fairness);
- the 'lack of ground truths' to evaluate the validity of detection mechanisms aimed at preventing certain behaviours from happening (in a security scenario), or to detect users' preferences and consumption propensities (in a marketing scenario) as, by hypothesis, these detection systems also impact on the material or cognitive preconditions of actions. *(Gandy, 2008; Rouvroy, 2008)*

When, in marketing or entertainment scenarios, profiling systems are embedded in 'ambient intelligent' systems aimed at complying with users' unexpressed needs or preferences, no ground truth exists either to measure the performance or the accuracy of profiling: these systems indeed influence needs and preferences, according to the logic of 'dynamic nominalism' exposed by Ian Hacking (2007), which will be considered a little later. In a security scenario, the criminal action, that targeted persons are evaluated at be at a greater risk of committing, will not happen (the detection system can thus not be 'tested'). If the validity of the profiling will therefore never be verified; it is truly impossible to say whether the system catches too many false positives. When detection systems are used to 'incapacitate' potential criminal or terrorists – that is, to impact on the preconditions of actions, disallowing certain actions through incapacitating those actors profiled as most susceptible to commit them, so that some actions are not performed at all – the number of false positives (of those identified by the system as potential criminals who would never commit a crime) is truly incalculable.

Thomas Hammarberg, Commissioner for Human Rights of the Council of Europe, has acknowledged the lack of accuracy or reliability of this type of profiling:

> We are rapidly becoming a 'Surveillance Society'. This is partly the result of general technical and societal developments, but these trends are strongly reinforced by measures taken in the fight against terrorism. In the context of the fight against terrorism, this means individuals are at risk of being targeted for being suspected 'extremists' or for being suspected of being 'opposed to our constitutional legal order', even if they have not (yet) committed any criminal (let alone terrorist) offence. 'Targets' of this kind are moreover increasingly selected through computer 'profiles'. Even if some may be caught, there will always be relatively large numbers of 'false negatives' – real terrorists who are not identified as such, and unacceptably high numbers of 'false positives': large numbers of innocent people who are subjected to surveillance, harassment, discrimination, arrest – or worse. Freedom is being given up without gaining security.
>
> *(Hammarberg, 2008)*

Moreover, the type of knowledge so produced is in no way 'objective' in the sense one has long been used to speak of the objectivity of scientific knowledge. The information systems embedded in ambient intelligent systems are not intended to observe the unique complexity of each human being but to sort individuals into a variety of heterogeneous categories for the purpose of predicting their willingness or need to buy specified commodities, to make claims on health and disability insurance, the danger they represent for themselves or for others, or other propensities that marketers, insurers, law enforcement officials and many others may find useful to know and to manage. Nikolas Rose summarized the phenomenon in these words:

> reduction of complexity by numbers can be neither ideologically nor theoretically innocent: hence the social enters the statistical through the 'interests' of those who undertake this task. The processes of simplification embody the expectations and beliefs of the responsible technicians and officials. The discretion that they inevitably exercise is dissimulated by their claim that their expertise, whilst indispensable, is 'merely technical'.
>
> *(Rose, 1999, 204)*

These classifications, made on the basis of statistical correlations, have a feedback looping effect. Ian Hacking conceptualises this in terms of 'dynamic nominalism': when people are taken as objects of scientific or bureaucratic inquiries for a variety of purposes (from controlling them to helping them, organizing them or keeping them away from places), such classifications affect the people classified, and these effects on people, in turn, change the classification (Hacking, 2007) in ways that are contingent on the type of categorisatons and applications of the system (which is difficult to predict in advance). This results in the reinforcement and the 'viral propagation' of norms, of the criteria of normality and desirability against which individuals are being evaluated, with rewards for compliance and sanctions for the others.

Norms have always had a viral character. As Georges Canguilhem explained, the specificity of an object or fact said to be 'normal' by reference to either external or internal norms raises the possibility that it becomes taken as a reference for objects awaiting their characterization (Canguilhem, 1943, 181). This viral character is only amplified by the intensification of profiling and the ensuing phenomena of anticipative conformity, self-censorship or preference falsification. This process of amplification has important effects when meaning can be ascribed to even the most trivial and fugitive image, sound or movement transpiring from actions, following a governmental rationality fitted to a world in which unpredictability and spontaneity are decreasingly tolerated (driven by both the conception of the ubiquitous threat of the virtual danger and the wish to adapt consumers to what the market has to offer rather than to adapt market offers to the genuine needs and preferences of consumers). The process of mapping as governance thus provides almost irresistible incentives to eradicate what, in the human subject, remains uncertain,

potential or inactual. The actualization of such an imaginary of a world liberated from contingency and unpredictability comes at a high price, as (or so I wish to argue) the potential and the inactual are the modalities of individual and social existence which, through the conjugated powers of virtuality and utopia, provide the 'natural' preserves for individualization (or the flourishing of singularity) and social change.

Technology, virtuality, utopia

Notwithstanding the unresolved(able) conceptual disagreements about its exact meaning, the 'virtual' has to do with the capacity human beings have to think and act by reference to something unfitted to the language and structure of the actual society, despite the inescapable fact that, as subjects, they are shaped by this actual language and structure. Disentangling the notion of the 'virtual' from contemporary fallacies, it is important to insist, with Gilles Deleuze, Felix Guattari and others, that the 'virtual' does possess a full reality, as virtual, and should not therefore be opposed, as it often is today, to the 'real':

> We opposed the virtual and the real: although it could not have been more precise before now, this terminology must be corrected. The virtual is opposed not to the real but to the actual. The virtual is fully real in so far as it is virtual. Exactly what Proust said of states of resonance must be said of the virtual: 'Real without being actual, ideal without being abstract'; and symbolic without being fictional. Indeed, the virtual must be defined as strictly a part of the object– as though the object had one part of itself in the virtual into which it plunged as though into an objective dimension.
>
> *(Deleuze and Guattari, 2014, 208–9)*

The virtual is as real as anything one can touch, except that it is not 'actual': it is a (potentially infinite) bundle of possibilities, living an existence which is parallel to the actual world of things and matters. Virtuality, or our virtual dimension, has to do with the capacity we have to suspend any definition of ourselves, our capacity to 'think of ourselves beyond ourselves' in a cultivation of ecstasies or self-transcendence, self-overcoming or self-deconstruction (Scott, 1992, 106–7). Virtuality refers to the kind of contingency and unpredictability in the form towards which individual personality may flourish. The 'virtual' layer of a person's self, or whatever name one wishes to give to that fundamentally, and essentially, indefinable 'blind spot' that a 'subject' always consists of for himself, and which, one may argue, the right to privacy contributes to safeguard, can arguably only be exercised in 'spaces' or 'territories' either mental or physical, which are not already saturated by meaning.

Mapping as a way of substituting or adding technological detection, classification, and forward-looking evaluation to human observation and judgement appears as a way of bypassing ordinary biases and prejudices. However, subjective

judgements, selective choices and emotional biases are all essential elements of the human cognitive process, allowing individuals, unable to cope with the totality and complexity of the world they live in, to prioritize certain (visual, sensorial, audial) information and to ignore or forget a sufficient amount of the rest so as to be able to keep reflecting and acting, which would be just impossible if they were constantly overwhelmed by information.

The fact that some things are forgotten and others are remembered is what gives human history its meaningfulness. This filtering of the 'real' through human memory and historical inscription is how humans transmit normative evaluations from one generation to the next. Individual and collective human memory are of course not objective, but that lack of objectivity has proved absolutely necessary for the functioning of individuals and the organization of societies. What all this suggests is that an intensive replacement of human observation, evaluation and prediction by autonomic processes might well deprive us, in part at least, of our ability to make normative judgements and, more fundamentally even, set new norms.

Jean Baudrillard, posited a contemporary strategy of 'seduction' making individuals disappear into 'ever more sophisticated methods of biological and molecular control and retrieval of bodies', where 'the destiny of signs (…) is to be torn from their destination, deviated, displaced, diverted, recuperated, seduced'. 'Everywhere', he continued, 'one seeks to produce meaning, to make the world signify. We are not, however, in danger of lacking meaning; quite the contrary, we are gorged with meaning and it is killing us' (Baudrillard, 1988). To become saturated with 'meaning' is problematic for human subjectivity because it narrows and, in fact, removes the space for alternative or virtual processes of self-becoming.

Autonomically produced mapping profiles rely on digital, rather than human, memory and therefore benefit from digital memories' virtually unlimited storage capacity in which, by default, everything is recorded, even the most trivial events, our most trivial, conscious or even unconscious gestures, and nothing is ever forgotten. As a result, the construction of profiles, of the 'digital image' of individuals, is, from the perspective of the later, a heteronomous construct at odds with what, from an individual's point-of-view, counts as explanation, as agency, as causality, and at odds with how the individual could give an autobiographical account of himself as a being 'always over time', never fully comprised in the present, whose virtualities are never completely actualized, as a being who is in process of becoming rather than a fixed and totally knowable substance.

The possibilities for the self-construction of a meaningful world, and of alternatives to the present, become increasingly constrained. Whenever (if ever) these detection, classification and forward-looking evaluation technologies – functioning on the basis of massive interpersonal effects – become pervasive, ubiquitous and 'transparent' in the sense given by IBM to 'transparency' ('The system will perform its tasks and adapt to a user's needs without dragging the user into the intricacies of its workings'), with a network of sensors deployed everywhere in our daily public and private environments, the vision becomes clearly frightening. However, projecting ourselves in such a dystopian picture allows us,p to identify what we are not

ready to pay for living in a technologically tamed universe. Here we can at least pose a normative judgment. Against this dystopian projection, one may venture on to the intimidating battlefield of values.

In a letter to Karl Jaspers, in which Hannah Arendt confessed herself to be uncertain, she wrote:

> What radical evil is I don't know, but it seems to me it somehow has to do with the following phenomenon: making human beings as human beings superfluous – not using them as means, that does not infringe upon their humanity but merely upon their dignity of human beings, but rendering them superfluous despite their quality of being human. This happens as soon as unpredictability – which, in human beings, is the equivalent of spontaneity – is eliminated.
>
> *(Arendt, 1993, 166)*

I usually feel rather uncomfortable with the concept of human dignity, but this passage from Arendt allows us to bypass the difficulty. If I understand her correctly, the idea is that when one infringes upon the dignity of a human being, using him as a means rather than as an end in itself (following the famous Kantian formulation), one does not necessarily infringe upon his humanity. Infringing upon a being's humanity supposes the elimination of that being's unpredictability or spontaneity. It seems to me that this insistence on unpredictability and spontaneity as essential elements of what makes a being human is extremely important. It is anyway highly relevant for what I wish to say about the 'virtual' as an essential dimension of human beings: that 'virtuality' – as unpredictability, as spontaneity – appears as the essential core of what deserves the protection of the law not only, or even not necessarily, because failing to protect the unpredictability or spontaneity would infringe upon human dignity, but because it would directly infringe upon humanity itself, upon that which identifies beings as humans.

The 'virtual' layer was, similarly identified by Gilles Deleuze as one of the inherent characteristics of human beings. I understand this as implying the fact, that for the human, being is never being fully comprised in the present but is always a process of becoming 'over time':

> In any case, the relation between the actual and the virtual is not that which one can establish between two actuals. The actuals imply already constituted individuals, and determinacies by ordinary points; whereas the relation between the actual and the virtual shape an individuation in action or a singularization by remarkable points to be determined in each case.
>
> *(Deleuze, 1996, 185)*

This has much to do with what Michel Foucault called the process of subjectivation: the path through which individuals become subjects, a tension between the two poles constituted by on the one hand the self that I am, which I never

completely possess – dependent as I am upon interactions with others, on my capacity to give others an account of myself (Butler, 2005) or to be interpellated by others (Althusser, 1971) –and on the other hand the self I might, I may, I wish to become in the future and which I cannot know in advance.

This unpredictability of human individuals, their spontaneity, is not merely worth preserving because of its contribution to making us human, it is also a necessary precondition for the vitality of society as a whole, which must remain open to changing its own basic rules and structures whenever these become too far removed from the ideal of justice people are able to imagine. Virtuality is to the individual human being what utopias are to societies. They are preserves for the 'flourishing of individual personality' and for fundamental changes in our social existence. This articulation between virtuality and utopia appears, in a subtle form, in Frederic Jameson's writings:

> Utopian form is itself a representational mediation on radical difference, radical otherness, and on the systemic nature of social totality, to the point where one cannot imagine any fundamental change in our social existence which has not first thrown off Utopian visions like so many sparks from a comet. The fundamental dynamic of any Utopian politics (or of any political Utopianism) will therefore always lie in the dialectic of Identity and Difference, to the degree to which such a politics aims at imagining, and sometimes even at realizing, a system radically different from this one.
>
> *(Jameson, 2005, xii)*

Autonomic computing, as a mapping vision, is an ideological imaginary. Together with the increasingly 'intelligent' and 'autonomic' systems it is aimed to reinforce, it crystallizes the dominant technological, economical and political projections or worldviews of our contemporary moment, but the specific representational regime it implements makes it more difficult for individuals and groups to dissent. Mapping technologies blurring the separation between the 'physical' and the 'digital' on the one hand, and between the 'actual' and the 'virtual' on the other hand, unavoidably reconfigure human experience, setting new governmental regimes of visibility and intelligibility and, as a consequence, impacting on the terms through which one should think of power relations in society (Foucault, 1990; Curtis, 2002).

Conclusion

The hypothesis forwarded in this chapter was that the virtual dimension of individual human personality, which is constitutive of subjectivity itself, is incompatible with the actualization – through technological or other means – of a depoliticized, statistical governmental rationality indifferent to the causes of phenomena and chiefly oriented towards the annihilation of contingency. Mapping as a form of governance through autonomic computation was therefore problematized on the basis that the eradication of virtuality (or subjectivity) is incompatible with the

emergence of utopias. Utopias have a crucial role to play in sustaining the vitality of democratic politics, either under the form of deliberative democracy or of agonistic pluralism (a reformulation which may be particularly tempting as it implies the key thesis that, far from jeopardizing democracy, agonistic confrontation is in fact its very condition of existence) (Mouffe, 2000).

Thinking beyond oneself, individually, and beyond current societal configurations, collectively, are the indispensable reflexive capabilities that enable individual self-determination and constitutional self-government. Governing through mapping in a digital age, as in this consideration of autonomic computing – just as other technological artefacts – is therefore problematic to the extent that it may decrease rather than enhance these capabilities. Thus, the key problem is not that of technology per se but rather the governmental (or bureaucratic) rationality it is meant and able to serve. Choosing which technological evolution we wish to emerge in our life world cannot be done without first having chosen which governmental rationality one wishes to have ruling our society. The debates must identify what the central figure of that governmental rationality should be. Currently, the focus on contingency and risk minimization has overshadowed other political goals.

Identifying the available options for preserving or fostering the virtual dimension of human subjects and the utopian creativity of human societies require that we transcend our primary (over-)reactions vis-à-vis technology: no sustainable solution will emerge from either the demonization or the uncritical endorsement of technology. A more promising path proceeds through the meticulous identification and scrutiny of the specific governmental rationalities (or forms of governmentality) (Lemke, 2000) technological systems may further sustain and the careful targeting of resistances and struggles against such governmental rationalities whenever their implementation – through technology or other means – may drive us towards a situation incompatible with the flourishing of virtuality and utopia.

Given the ubiquitous character of technology and the propensity of technology to shape the contexts and conditions of human experience and action, to reconfigure and restructure human interactions and the patterns of private and public spaces, involvement is needed with technology, whether one likes it or not. The building of an informational infrastructure allowing for the flourishing of human virtualities, even when these virtualities may give rise to radically new and unexpected individual and societal forms of existence, is a matter of public interest and should result from intensified interactions between humanities scholars, computer scientists, governmental and industrial stakeholders, and citizens. New modalities and forms of societal dialogue and new mechanisms of participation must be (re) invented, which would allow for the representation of all stakeholders, even those whose voices are usually weaker than the voices of the majority: there is no other way to render our lifeworld – be it depicted as the 'information society' or the 'surveillance society' – humanely sustainable.

At the individual level, subjectivation (understood as the affirmation of singularity and resistance against subjection, or against attunement to the dominant

scripts and norms) of profiled and predicted individuals may take the form of an engagement with technology. Engagements with technology, whereby the subject, from a mere passive object of detection, observation, classification and forward-looking evaluation by technological systems, becomes an active subject and regains agency, may take various forms, including reconfigured experiences of techno-physical embodiment, of subjective reappropriations, re-finalizations and displacements of technological artefacts by individuals reclaiming, in a radical manner and against the profiling machinery, their status of subjects and authors of their own biographies (Velleman, 2005), reclaiming both the authority and responsibility to produce meaning and assign symbolic values, of which they can give an account, to the variety of objects – including their own body – they are presented with or themselves create.

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8

MAPPING WITHOUT THE WORLD AND THE POVERTY OF DIGITAL HUMANITARIANS

Pol Bargués-Pedreny

Introduction

Maps divide nations and peoples artificially. They convert hybrid identities into homogeneous nation states. They reduce complex social institutions to uncanny symbols. They alter coastlines, aggrandize lands and distort buildings. They are the product of a long and contingent process of (mis)calculating and (mis)managing data. They are ideologically driven and disavow provinces, peoples and conflicts. 'Maps are authoritarian images', wrote J. B. Harley (1989, 13), and he linked maps to colonizers, monarchs, rulers, bureaucrats and the maintenance of the status quo. At least since the 1970s in geography and since the 1990s in international relations (IR), critical scholars have exposed the inextricable relation between maps and power and undermined the assumption that maps represent territories (Wood, 2010). They have noted the impossibility of representing an outside reality without generating remainders; they have depicted maps as power assets that generate political and social consequences. And yet, despite the fact that critical scholars have annulled the authority of all maps, by deconstructing them and revealing their necessary affinities with power, digital maps have mushroomed.

Today, maps have gained popularity. We zoom in and print routes from Google Maps, travel with GPS or carry smartphones that guide us along a real-time route from one location to the next. In the field of humanitarian action, digital maps have been introduced – alongside other digital technologies and intelligent processes like Big Data analysis, robotic devices, autonomic computing, or crowdsourcing – to guide international agencies for relief efforts. For the common man, the question is: if maps are false representations of the world and deceitful, as theorists have suggested, how could explorers have navigated oceans and travelled to distant hinterlands? Or more recently: how could Laura Decker, a thirteen-year-old sailor, complete a solo circumnavigation of the globe? Comparably, for the

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academic, the puzzle is expressed like this: how can maps be reconstructed and appreciated after their deconstruction?

This chapter explores this question. It suggests that the recent enthusiasm for maps is linked to a shift in the interpretation of maps: from understanding maps mimetically as tools that reflect (or cannot reflect) reality to theorizing maps pragmatically, as useful tools that do not represent any territory outside the map but do enable us to move or to travel. This argument is important to read against a dominant critique in geography and IR that accuses maps of being false or limited representations of space, an extension of 'the same modernist process of the production of statistical truth' (Read et al., 2016, 1326). Instead, digital maps are gradually overcoming questions of representation and seem increasingly untethered from a reality 'out there'. Thus, this chapter suggests that critiques should aim rather at unravelling these new rationalities – of 'mapping without the world', as it will be conceptualised here. The consequences for the field of humanitarian action flow from this analysis. As will be sketched, digital humanitarians deliberately see through digital maps to obtain real time, immediate and objective information to the detriment of their capacities for creativity, judgement and action. Their maps provide them with concrete and flexible data, but they are stripped of their value as cultural resources and expressions of a common humanity.

Deconstructing maps to rescue 'the remainders'

The 1990s witnessed a growing hostility towards maps and mapping in IR. During the Cold War, the state-centric map of the globe had given a sense of coherence and confidence to the discipline and reinforced 'friend–enemy' perceptions among foreign policy and security strategists. Nation states were seen as sovereign units interacting rationally in a system without an ultimate arbiter (Waltz, 1979). The internal affairs of states, unrepresented in the map, were not relevant and were left to other sub-disciplines of political science. Yet IR scholars changed focus, as geopolitics evolved and the borders of states blurred. Critical perspectives – in particular, those of post-structuralist scholars – posed questions of power and knowledge and challenged the representations and world maps projected by positivist theories. The work of David Campbell (1998, 1999) and Michael Shapiro (1996, 1997) is illustrative of the post-structuralist critique of cartography in IR. They destabilized the mimetic understanding of maps as tools that reflect or mirror reality and instead theorized maps as power assets that are necessarily selective and have social and political effects. This critique is examined in turn.

In the 1990s, post-structuralist scholars in IR joined critical geography in writing against the understanding of maps as scientific and objective representations of any terrain. Since the Enlightenment, or so the critics asserted, European traditional cartographers supposed that they could access reality by the means of cartographic rules, measurements, scales and instrumentation. They believed that scientific developments could help to progressively draw a more exact, correct or synchronous picture of reality. They ranked maps in terms of objectivity, accuracy and

truthfulness and thus assumed that European maps were more truthful than maps in the past or the ones from non-European map-makers (Harley, 1989; Hart, 1986; Huggan, 2008). But this mimetic understanding of maps, which has been ubiquitous in IR through much of the twentieth century, came to be considered untenable. Maps are instead, Campbell argued, 'performative practices of representation' that fulfil 'a double function': 'imagining homogeneity by making heterogeneity unimaginable' (1999, 401). That is, maps organize, represent and structure spatial reality in a particular way, but in so doing they necessarily silence and make other entities, relations and alternative forms of mapping unimaginable. For example, state-centric maps have enabled the theorization of nation-states interacting in an anarchic international realm, but have also excluded nations without states, cultures, religious movements, indigenous peoples, refugees, disputed borders – you name it.

This reading of maps draws on Michel Foucault's notion of discourse or Jacques Derrida's text. Maps, like discourses or texts, are understood to fix and reveal one possible truth among many; and in presenting themselves as true expressions of the world, they become assets to distribute power and authority (Campbell, 1999, 401–2; Shapiro, 1996, xvii–xviii). The argument is that maps have power effects *not only* when they are manipulated or falsified by monarchs, institutions or foreign offices. Regardless of intentions, power is omnipresent in all maps and forms of knowledge. J. B. Harley made this clear:

> All maps state an argument about the world and they are propositional in nature. All maps employ the common devices of rhetoric such as invocations of authority (especially in 'scientific' maps) and appeal to a potential readership through the use of colors, decoration, typography, dedications, or written justifications of their method. Rhetoric may be concealed but it is always present, for there is no description without performance.
>
> *(1989, 10)*

Far from being value-free productions, maps and mapping are seen to operate on a specific socio-cultural milieu that gives them utility and value. Maps cannot be separated from the rules, tastes or technical abilities of societies that produce them, nor from the political effects they carry when they are used by these societies.

The purpose of critical analyses is thus considered to be twofold: first the invalidation of the resemblance between map and reality, showing it to be only one interpretation among many, and second the unveiling of the ideological underpinnings, and denouncing of the socio-political effects, of maps. Genealogical and deconstructive strategies therefore seemed best suited for the task. As Graham Huggan wrote in the late 1980s:

> The relevance of this disruptive process [engendered by deconstruction] to the practice of cartography is considerable; for not only is the metaphorical resemblance between the map and the reality it purports to represent

> invalidated, or at least called into question, by the displacement of the ontologically stable relation between the 'original' and its 'copy', but this proposed resemblance is discovered to be the product of an ideological imposition which traces back to an identifiable rhetorical bias.
>
> *(2008, 26)*

These strategies permeated the critiques of international interventions in countries affected by conflict or natural disasters. The aim was to critically trace the social and political consequences of cartographic practices and ultimately highlight how heterogeneity had been overlooked.

For example, in the context of the dissolution of the former Yugoslavia, Campbell (1998) showed how maps and population censuses contributed to the problematization of a place affected by ethnic conflict requiring particular policy solutions – such as the separation of ethnic groups in different territories. Yet this problematization of Bosnia ignored the contingency and complexity of Bosnian life and its plural identity formations: 'Purporting to show the spatial distribution of identity groups, ethnographic maps have often served colonial practices of government through their reduction of dynamic social situations to conceptions of homogenous territory' (Campbell, 1999, 401). The problem, Campbell explained, is not only that these maps have reduced heterogeneity in pursuit of intelligibility. It is that, in aligning identity and territory, maps in the Bosnian peace process have reproduced the nationalist imaginary that fuelled the war in the first place. 'If the map enacts immanent national units, and the census populates those entities with fractured subjects, then the writing of a historical horizon that locates these features in a linear narrative secures the teleology of conflict' (Campbell, 1998, 80). Campbell compared the logic of mapping used by external diplomats to the practices of ethnic cleansing perpetrated during the war, undermining international interventions.

Writing in the 1990s, the critiques of mapping-as-representation called for constantly unsettling and unmapping the boundaries that had been appropriated by discourses of power. The way forward for Campbell was 'remapping Bosnia' beyond enclaves, with their partitionist and statist logics (1999, 428–9). For Shapiro, after examining processes of state formation as diverse as those of Israel-Palestine, Australia and the United States, the alternative was 'unreading, unmapping and rewriting': 'it is time to unread the old map and begin the process of writing another one, a process without limit' (1997, 196–7). According to both authors, remapping involved a process without end, as new maps would render some identity experiences unimaginable and thus further remapping would be required. 'While new and different forms of mapping would be better, they would not in themselves be the answer', stated Campbell (1999, 430). New maps are necessary to give a feeling of intelligibility and location, but they are fated to perpetually confront Derrida's aporia. In Shapiro's words:

> Inasmuch as any system of thought will always produce its remainder, any final recovery of what is remaindered is impossible. Yet an ethics, embodied in

> Derrida's deconstructive practice, recognizes the necessity of pursuing that remainder nevertheless.
>
> *(1997, 199)*

Maps seemed to lose their value at the end of the twentieth century, as they were considered incapable of representing the totality of everyday life. Remapping was deemed important to pursue the 'remainder' produced by previous maps. Yet new maps would also generate exclusions. Again, they would be questioned, taken with a pinch of salt or even set aside. Maps were in danger of extinction, but the arrival of the digital was to change the future of the map and mapping.

Traveling with non-representative maps

How are we to explain the recent enthusiasm for maps, if maps were critiqued and devalued at the end of the twentieth century? The argument is that post-structuralist critiques challenged the idea that maps are representational systems, and, in consequence, they opened the door to thinking of maps differently: as useful navigational tools, which are not representative of a world but enable people to reach destinations and relate phenomena. In the context of earthquakes, maps can validate roads or identify the location of people trapped under rubble; or, in the case of viral diseases outbreaks, maps help to track disease spread and orientate teams amidst communities in need of vaccination. This understanding of maps, advanced by critical geographers and other scholars like Bruno Latour, no longer considers maps as representations of a given territory. Instead, they tend to argue, maps are inscriptions that are useful (or not) in the world. This insight will be used in this section to illustrate the current reinterpretation of mapping and can be usefully grasped by making a short detour through American pragmatist philosophy of the late nineteenth century.

One of the central contributions of philosophers like William James or John Dewey was to call true ideas the ones that are meaningful in practice, thereby critiquing the assumption that our beliefs correspond to a mind-independent and observable reality (McDermid, 2006, 5–45). According to James, a true idea was not true because it was in agreement with reality. Truth or falsity were not characteristics or properties of ideas or concepts. A true idea was one that worked: 'an idea is useful because it is true' and 'it is true because it is useful' (James, 2012, 98). He continued: 'true is the name for whatever idea starts the verification-process, useful is the name for its completed function in experience' (ibid.). Similarly, John Dewey affirmed: 'the result of one operation will be as good and true an object of knowledge as is any other, provided it is good at all: provided, that is, it satisfies the conditions which induced the inquiry' (Dewey, 1984, 157).

For James and Dewey, knowledge and truth are closely connected to usefulness and must be verified through experience, rather than deduced or assumed a priori. Thus, there is no separate truth in the things themselves; knowledge is rather acquired in relation, through a process of interaction with things. Therefore, we

acquire knowledge whenever we reach conclusions that satisfy the initial problem of inquiry. James introduces this everyday example to clarify what he means by truth:

> The possession of truth, so far from being here an end in itself, is only a preliminary means towards other vital satisfactions. If I am lost in the woods and starved, and find what looks like a cow path, it is of the utmost importance that I should think of a human habitation at the end of it, for if I do so and follow it, I save myself. The true thought is useful here because the house which is its object is useful.
>
> *(2012, 98)*

A pragmatist lens helps to think maps anew. A map of the woods where James was lost would only become true if it led him to the cottage where he could eat and rest. For James, maps were considered true objects only *after* they helped captains reach new harbours.

What difference do maps make for our lives? Maps become a set of practices that can solve spatial problems. They are not universal solutions to problems – as if finding something on the map would be equal to finding the route through the forest or across the sea. Maps 'become' useful or truthful in their enabling of practices of mapping and solving relational, context-sensitive and historically dependent problems (Kitchin and Dodge, 2007, 337–42). The sceptical commentator would nevertheless baulk at such proposition. She would wonder: 'why are maps useful? How can maps be useful to people, from expert sailors to amateur users, if they do not represent reality?' 'Give me a map', she would show off, 'and I will travel across the world.' Sure, she could, but certainly not because maps mirror the territory or have a mimetic dimension. They do work and are useful because they have been historically and culturally coded, coloured and drawn; and people have learnt to read and interpret them through practices (Pickles, 2004). Rob Kitchin and Martin Dodge write:

> [A map] is brought into the world and made to do work through practices such as recognizing, interpreting, translating, communicating, and so on. It does not re-present the world or make the world (by shaping how we think about the world); it is a co-constitutive production between inscription, individual and world; a production that is constantly in motion, always seeking to appear ontologically secure.
>
> *(2007, 335)*

Maps, cartographers, compasses, algorithms, institutions, sailors and explorers are 'co-constituted'. Hence, maps are used by the ship's captain that they help to qualify. The map makes the mapmaker and the mapmaker maps the countries that do not, as yet, exist.

In their critiques of mapping as representation, post-structuralist thinkers in IR were well aware of the co-constitutive nature and navigational understanding of maps. Campbell, for instance, in his *Writing Security* did not give space to a reality outside of constitutive performative practices:

> with no ontological status apart from the many and varied practices that constitute their reality, states are (and have to be) always in a process of becoming. For a state to end its practices of representation would be to expose its lack of prediscursive foundations; stasis would be death.
>
> *(1992, 11)*

But Campbell and others did not want to save the navigational purposes of maps. Their critical dagger was aimed at destroying maps, as maps had contributed to enslave 'the rich ambiguity of existence' (Campbell, 1996, 7). As Laura Lo Presti argues in this volume, they did not appreciate the living spaces and creativity engendered by maps, but appeared as 'exhausted cartographers' who merely beheld the destructive and deadly power of mapping.

Post-structuralist critics reduced maps to failed representational tools and maps could not easily live with this failure. The critics assumed (perhaps unwittingly) that maps were separated from the world and unjust to its pluralism. Life had been impoverished by maps and thus new maps had to be drawn to praise the remainders generated and forgotten by previous maps. They were trapped in what Jeremy Crampton (2010, 177) calls the 'cartographic anxiety': mapping and yet unmapping, so as to avoid being complicit with imperial and colonial power. Post-structuralist thinkers discovered and condemned the traces of power in maps, but they travelled nowhere.

Instead, Latour and other contemporary critical geographers are more confident with the non-representative nature of maps. They seem less preoccupied by the exclusions and deviations of maps than the post-structuralist thinkers examined above. The distinction between the two is heuristic – admittedly, a bit caricatured too – but it is necessary to appreciate the two dominant conceptualisations of mapping. The former (the earlier, post-structuralist) critique urged the disclosure of the subjective perspective implicit in any map and constantly pointed to the exclusions generated by it and thus permanently sought to revise, undo and discard maps. The latter (more recent, pragmatist) critique, while admitting that no cartographer can draw a map detached from power, is much less blunt when discussing the possibility of forsaking the map. In its place, the pragmatist-informed understanding of mapping seeks to forsake questions of representation, thus saving cartography:

> it is only *once* we stop asking the mimetic question that there is no longer any doubt as to how connected we are to the real 'outside' world. The 'correspondence theory of truth' – to use a cliché dear to epistemologists – is much more sturdy once many real correspondences have been established between

> two successive elements along the way. It is much safer to fumble from one signpost to the next than attempt to jump daringly from words to world or from maps to territory.
>
> *(November et al., 2010, 589; emphasis in original)*

November, Camacho-Hübner and Latour welcome the crisis of representation. They have assumed that there is no world set asunder, beyond or underneath maps. That maps are 'real' and that everything can be mapped: from reefs to risks like unemployment, pollution or fire, so that maps can be useful to the population (ibid., 592).

The key to the argument is to understand that maps never had the abstract and representational value adjudicated to them by 'the Moderns' – to use Latour's phraseology. The Moderns perhaps believed so and fantasised about the possibility of mapping the cosmos so that it could be explained, travelled and won. But their practices were no different than ours. They experimented with maps during difficult voyages, and it was only after they arrived at the destination that they knew. As powerful as they were, maps have never been independent from the object they map or separated from their use and the consequences they have brought about.

The advent of digital mapping and digital technologies has made this evident, accelerating the shift in the reinterpretation of cartography. Digital maps have pushed the masses to see heterogeneous sets of data and multiple layers of information in a map (November et al., 2010, 582–3). The sceptical commentator will see no big difference between a paper road atlas and Google maps. Digital maps, she will infer, are like a road atlas but with more actualized data and layers of information. November et al. disagree:

> Even though the experience of digital navigation may at first sound like a mere *extension* of the older experience of looking at geographical data and combining it with some other types of information, after a while the number of new traits is so large that one is forced to confess that this is indeed a new experience.
>
> *(2010, 583 emphasis in original)*

One can experience maps as 'navigational platforms', but only because the chain of production is permanently visible. When reading old paper maps, the process of map-making and thereby the process separating the map from the territory was left behind: it was not part of the experience. Digital maps offer users a very different experience of updates, zooming, software, alerts, advertisements and real-time information, as they actively make choices during the process of navigation (ibid., 584). These choices hold no allure, as they seem free, easily accessed or dismissed with a mouse-click. Moreover, users reinterpret maps as navigational tools as they become familiar with making changes or adding information to their maps. As maps are used and modified by the masses, questions of representation, power and knowledge lose appeal. Regardless of whether they agree with the state of the

world, users create and update maps to enable their activity in the world. As explored in the next section, these activities can include embarking on humanitarian projects to mitigate the effects of disasters (Meier, 2015).

In short, since the Enlightenment, if not since geographers, like Mercator, first mapped the world, the chasm in cartography has been between those who presumed that maps corresponded to reality and expressed eternal verities and those who argued that maps could not neutrally represent a world outside. Now digital technologies and theorists like Latour are making another distinction, unfolding two radically different ontologies of mapping. On one side of the distinction, quarrels over representation continue. Some argue that maps are right or truthful if they seemingly represent the territory, the ocean or the globe; whereas others imply that all maps are necessarily wrong, limited, biased and distorted because they cannot represent the totality of the territory or the globe they intend to represent. On the other side of the distinction, maps are not right or wrong in relation to a territory or a space or a globe 'out there'. Drawing on pragmatism, maps are truthful if they enable users to travel somewhere, monitor risks or save lives. There is no space beyond or ontological level that maps are pointing at. Maps are not mere pictures or prejudices of an underworld, but real navigational tools; and thus, they enable humanitarians to respond to crises as they emerge.

Mapping 'without the world' in humanitarian crises

In crisis mapping initiatives, humanitarian organisations use the information details introduced by community volunteers on previously created satellite imagery to track and respond to crises and assist the most vulnerable places in the world. Unlike historical war maps that were static and planned 'from above', these maps are updated, shared in real time and launched by ordinary people or volunteers who cooperate to reveal food shortages, lost pets, violent assaults, military tanks, and all sorts of unpredictable risks (Meier, 2012). For example, hundreds of volunteers of the Red Cross travelled to border communities in West Africa to introduce data sources in OpenStreetMap so that this information could be used by humanitarian agencies if another epidemic like Ebola occurs in the future. In Zambia, a risk map was created to locate malaria cases and thus predict the areas at risk in the event of future outbreaks (Bernson, 2016). In 2011 in Libya, in the context of the Arab Spring protests and subsequent conflict, the network Standby Volunteers Task Force for Live Mapping scanned and tagged specific features to locate human rights abuses. Other digital platforms, like the Verificado19s project, used the information reported by people to map and facilitate responses to the earthquake that affected the centre of Mexico in September 2017. The UNDP (2017, 19) launched Matcheli, a map of the centre of Yerevan, Armenia, useful for physically challenged people, which was created by citizens themselves. Other initiatives, like the Missing Maps idea, are helping to put on the map poorly charted places like disaster-affected regions and inner-city slums.

These digital maps show massive amounts of real-time and heterogeneous data, from road networks to damaged infrastructures to ramps for the physically challenged to random incidents to virus trajectories. Instead of experience-distant cartographers, information is collected, updated and verified regularly by volunteers or local people in contact with the field. Of course, gathering so much data can generate information that is unhelpful or sometimes wrong. Yet not missing any potential important information is better than making small errors or creating a few false alarms. As Antoinette Rouvroy and Thomas Berns (2013, 173) remark: 'the aim is to not miss any true positives, irrespective of the rate of false positives'. Patrick Meier's *Digital Humanitarianism* narrates the process in which a group of students launched a digital crisis map for the 2010 Haiti Earthquake. They collected data about the disaster from diverse social media – mainly tweets – and added them to a map, expecting that this information could be put to use by agencies working in the field. When explaining the microtasking efforts, Meier accepts that information could be misleading but insists on the utility of not missing any information that could meet humanitarian demands: 'Even though social media may be biased, unverified, and at times false – like 911 calls and humanitarian surveys – some relevant and meaningful signals can still be gleaned from crowdsourced information' (Meier, 2015, 43). The more data that is introduced the better, so that more information can be verified and exclusions can be minimized.

However, a common critique is that new digital maps cannot avoid exclusions (Burns, 2014; Read et al., 2016; Feigenbaum and Specht, this volume). Rather than being truly 'bottom-up' maps that are made by the people and for the people, these maps are seen as tools that rely on platforms and filters designed non-locally, sometimes by humanitarian agencies and their networks of funders, which establish what may appear and what may be written out. For example, Ryan Burns observes how the existing platforms, metrics and schemes used by digital humanitarians leave out certain types of knowledge, like forms of 'collective memory', 'a community's non-visible knowledge of an area in particular danger', 'affective geographies' or indigenous representations of nature that do not conform to 'Cartesian space' (2014, 54–7). Along these lines, in the concluding words of their chapter in this volume, Anna Feigenbaum and Doug Specht explain:

> All representations have their failings. In pointing out these limitations, our intention is not to suggest that these new modes of working should be abandoned. Instead it serves as a call to question at every turn, every representation. It is well known that this is required, yet terms like participatory and contestatory, or mashup and counter-maps, all too easily lure the creator and reader towards forgetting the in-built biases of the platform, the coding, the symbology the creator and the reader that are tied up in the inescapable, yet very much challengeable, cartographic gaze.

No matter how detailed, adaptive and complete maps become, or how experience-near the volunteers adding information are, for critics like Feigenbaum and Specht, digital maps cannot map the whole universe of relations emerging in a crisis zone.

In so doing, maps, at best, fail to represent the plurality and fluidity of emergent crises; at worst, they are used to further some malign interests of humanitarian agencies that halt progress.

This critique cannot be neglected, and it appears accurate when, for example, Médecins Sans Frontières (MSF) claims that via the Missing Maps project 'we can help build a detailed and useful map of the world that is so much more than the sum of its parts'. When MSF attempts to create a complete picture of the world to help responders to make decisions regarding relief efforts, no matter how many parts are assembled or how much concrete information is introduced, critics are astute to assert that the world is always wanting. This argument is correct to the extent that it is always able to identify a 'lack' in the process of mapping (something was absent, someone was omitted); yet in so doing, in pointing to an unreachable world, this critique is the source of contemporary nihilism (Baker, 2018).

The difficulty is that such a critique may well be actually missing the target, as the target has moved: digital humanitarians no longer want to grasp the world as an object that can be mapped and held in place, claimed or governed. Instead, they are mapping specific aspects and relations rather than fixed territorial regions or parts of the world. They may be tracking the infinitesimal details of a specific street, surveying its complexity, its life, and adding as much data about entities and relations as possible, but this is not to make a modernist claim to knowledge and control. The whole is becoming irrelevant: the map does not disclose how many damaged buildings or hospitals are in the city, but that *this* building has collapsed or *this* road no longer leads to the hospital. There is no aggregated structure, no world, as information is gathered on the basis of specific and emerging information, as different volunteers add, subtract or validate data haphazardly. As Latour et al. explain in relation to digital databases, 'there is more complexity in the elements than in the aggregate' or, as he adds counter-intuitively, 'the whole is always smaller than its parts' (Latour et al., 2012, 591, emphasis removed). The data seems to be related in 'a non-total, ragged way', forming 'a weird implosive whole', as Timothy Morton (2017, 1) might put it. It is in this sense that critiques of digital maps cannot point at the remainders that have been neglected. The map is never final, it is not a representation of the city, the region or the entire humanitarian disaster; there is no totality, no world, and thus no remainders.

Rather than looking at digital maps as failed representational tools, therefore, the suggestion is to examine them through a pragmatist lens. Only in doing so will critics perhaps save ammunition and hit the target. Only in doing so we are able to foresee the trajectory taken by governance rationalities. Rather than pre-tending to map correctly or objectively, according to universal laws of accuracy and objectivity, the real tipping point in the processes of mapping is obtaining information that can be generated from below and is untainted by pre-existing assumptions. People are encouraged to join humanitarian mapping projects and map or report anything that is happening around them. And whereas traditional maps were accused of imposing ideological biases that would then serve the interests of powerful rulers, digital humanitarian maps increasingly reveal information

without a normative background. There is only the hunch that maps may be used by humanitarian agencies in the future, but there is no idea of *how* the information will be used and *what* purpose it will meet. The priority is to map and introduce new details so that correlations may be inferred and used by disaster field agencies before long. In mapping without an apparent purpose, mapping presents itself as if it could circumvent the problem of imposing the normative baggage of the cartographer onto the process of drawing the map.

The map is thus considered to provide a real picture of the world, rather than an 'objective' or simplified abstraction of it. It is not constructed by liberal humanitarians and their norms assumed to be rational and global nor by local actors for the setting of specific agendas. The map reveals the world as complex or 'raw' material and thereby as 'pure', crowdsourced by anonymous volunteers that have gathered or verified the data. Rouvroy (2013, 147) writes:

> Such 'knowledge' thus does not appear as a 'production of the mind', with all the artificiality and cognitive and emotional biases unavoidably connoting mental productions, but as always already 'given', immanent to the (digitally recorded) world, in which it is merely automatically 'discovered' or from which it literally flourishes thanks to algorithmic operations rendering invisible correlations operational.

The ideal of 'pure' or 'raw', rather than 'objective' or 'abstract' knowledge, free from politics and reflexive subjectivity, seems to come true with digital mapping as used in the context of humanitarian crises (Rouvroy and Berns, 2013, 169–70). The knowledge produced by digital maps is not 'about the world', constructed through an abstract representation; it is instead a knowledge 'from the digital world', obtained in real situations (Rouvroy, 2013, 147). The artificial separation between maps and world is finally becoming undone, and now mapping operates without the world.

Conclusion: the power to flatten the world

Does it mean that politics (or power) are absent in digital mapping? Certainly not, alas, but maps no longer have the power to build, exclude or contest worlds. They instead provide the means to depoliticise and flatten them. Digital mapping brings 'correlations' into existence, but deters reasoning and judgement: 'this represents a move away from always trying to understand the deeper reasons behind how the world works to simply learning about an association among phenomena and using that to get the things done' (Cukier and Mayer-Schoenberger, 2013). Instead of revealing the causes of why phenomena occur and thus planning an intervention to solve or transform the problem, digital maps show correlations of what is occurring or may occur, enabling the governance of 'effects' (Chandler, 2018; Chandler, this volume). Digital humanitarians can only see what is, a snap-shot of the present: they do not (and cannot) explore why conflicts emerge, why rebellions occur or

why buildings collapse. They do not seek to understand, evaluate or make suggestions regarding what should be done. They track tweets and satellite imagery so that agencies on the ground may follow.

Although humanitarian agencies can now claim to be less constrained by ideological biases and to have minimized the problem of marginalising important data, digital maps offer an impoverished version of humanitarianism. Focusing on correlations is a much less forward-looking endeavour than attempting to represent reality or to understand and address the causes of events. As humanitarian agencies react to or adapt to crises instead of solving problems, they have degraded their role and drain humanitarianism of its founding ideals. Digital humanitarians lack a broader or more meaningful project of transformation, and this makes it less likely that they will leave their mark on future disaster recovery. Moreover, their tools – digital maps – are frail and transitory too, regardless of how accurate or useful they may appear. Digital maps disclose remote streets, lost temples, debris, broken roofs and violent incidents, but mitigate against the possibility of reflecting upon the whole city and the common world, displacing the historical value of maps as cultural resources and expressions of a shared humanity.

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PART III. IMAGINARIES

9

POST(MORTEM) CARTOGRAPHIES

Reframing the cartographic exhaustion in the age of mapping's excess

Laura Lo Presti

Cartographic overloads

Nowadays, due to digital advancements in technology and thanks to the growing momentum of participatory practices and platforms, we are currently observing the most intense explosion ever of cartographic visualisations, accompanied by a concomitant invisible proliferation of mapping circuits and networks. We live in an epoch in which the map and its metamorphosis increasingly involve multiple referents, users, media and practices: orienting, visualising, surveying, controlling, locating, catching, mining and tracking all sorts of data on places, bodies, objects, movements and habits; as well as walking, exploring, travelling, drawing, writing, connecting and assembling look to have all been phagocytised by the semantic field of mapping.

Mapping has been chosen as the preferred imaginative and navigational tool for Western and global spatial narratives and analyses, and maps have passed from being defined as symbolic, approximate and reduced – and therefore limiting – representations of space, to being praised as amphibian objects able to infiltrate an increasing number of grammars and iconologies (Bargués-Pedreny, Chandler and Simon, introduction to this book). As one enters the contemporary 'cartosphere', he or she may feel that maps, especially addressed as 'mapping' (Dodge et al., 2009), can be and do everything; they look surprisingly alive.

Throughout time, scholars have pointed out the accrual of the intensity and feeling of mapping's 'excess', variously theorising the map as an 'impulse' (Alpers, 1983), a 'desire' (Pickles, 2004), a 'spatialisation without temporality' (Massey, 2005), a 'problem-solving practice' (Kitchin and Dodge, 2007), or a 'story-telling device' (Caquard and Fiset, 2014). However, adherents of critical geography, who have been mostly trained to think that the map and all the positivist, objectivist, geometrical background it carries must be sent to the pillory – 'the map is dead,

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long live to the map!' exults Wood (2003) – usually manifest scepticism towards any affirmative appreciation of cartographic practices.

The varied spectrum of feelings surrounding the map is the signal of a profound and unresolved tension, the result of a crisis that, as the philosopher Pelbart puts it, 'reveals to us the forces which have been at play, and redistributes them, by answering the question: are things [maps, in our case] going in the direction of life or of death?' (2015, 120). The majority of geographers has ostensibly remained quite indifferent to the new wave of excitement revolving around mapping; others have rediscovered the strength of the critical analysis construed on modern cartography (Farinelli, 1992; Harley, 2001; Olsson, 2007) and have decided to canalise the impetus against the new 'cartographicisation' of the digital world (Crampton, 2003; Wilson, 2017); yet, someone else (Rossetto, forthcoming) has come to touch with her hands – to sense and experiment with – this alleged abundance of mapping, going beyond its supposed direct link with power.

Essentially, the critical stance has been devoted to a suspicious scrutiny of any cartographic fabrication. It considered and still conceive it urgent to problematise and unpack the figure of the map for its frightening ambition to territorialise, by dissecting and ordering, the irreproducibility and complexity of the world. In such a reading, charting becomes an operational 'force' that dissipates the vibrating life of space and pursues 'the direction of death' (Pelbart, 2015, 120). On the other hand, the postcritical sensitivity advocated in the wake of the nonrepresentational and affect turns (Anderson and Harrison, 2010; Thrift, 2008) rediscovers 'joy in the act of making maps' (Dodge, 2014, 303), thus it explores maps more positively and, in a broader sense, as geovisualisations, images, virtual paths, subjective and collective stories, and as emotional, sensory, material, nontextual, human and more than human experiences with space and places. For my part, I deliberately recruit two caricatures, that of the 'exhausted geographer' and 'the geographer of the excess', in order to artificially demarcate the critical and the postcritical attitudes. After all, we might affirm that the ontology of maps has been excessively exhausted and exhaustively excessed.

Yet a significant point at issue is that the new regenerative stimulus may now be at risk of radically distancing itself from the antiobjectivist and deconstructionist attack on the map foregrounded in previous debates rather than promoting a sustained conversation to direct its energy – namely, a more constructive consideration of the mapping's 'excess' or proliferation, reaching towards new horizons of critical research and practical interventions. In the context of this divergence, certain issues and positions related to the ontology, epistemology and ideology of mapping – as usually debated in cultural and critical geography – need to be jointly reframed at the interface of critical and postcritical thinking and not to be sterilely isolated via their opposition.

To this end, the chapter discusses different forms of geographic critique that have often been couched in terms of 'exhaustion' or 'excess' to consequently envisage a different medium of theory – that is, an alternative mode of looking at the challenges that contemporary mapping presents to us, through an affirmative political lens.

In order to illustrate this point, the author speculatively engages with the cogency of the questions inherent to the intensification of the map trope by

contextualising such issues in the broader withering away and exhaustion of cartography as perceived in the field of geography. In so doing, the chapter first proceeds by contextualising the death of the map in postmodern geography; then it gives an overview of the consequent cartographic awakening visible in other disciplines and practices which, in turn, has reverberated in geography.

During the intervention, the feelings of exhaustion and excess experienced towards mapping are intentionally discussed in their liminality and co-causality to witness that whenever the critical theory of geography proceeds to exhaust a figure of thought and action, as that of the map, it nonetheless releases a creative dose of speculative excess in need of a constant reconceptualisation. Considering this unexpressed potential, I contend that the different theoretical postures today assumed by scholars on mapping – as a destructive and deadly force (the exhaustion) but also as a living, affirmative and germinal spatial practice (the excess) – cannot be deeply understood if they are unrelated to various ways of interpreting and sensing the problematic of representation, the modernist definition of which traditionally creates a divide between what is perceived as the external world, factual and real, and the internal practices of signification, subjective and partial.

Geographical maps have particularly become the site of aggressive inquiry within a period of a profound dialectical 'crisis of the representational' that has been strongly debated during postmodernism. Since there, deconstructing the logic of representation has been the unique means to understand mapping. For instance, the 'heretic' geographer Olsson embraced the crisis of representation in cartography by stating: '[n]o wonder that the art of mapping is a question of life and death, for the cartographer has no choice but to explore the limits of representation' (1994, 218).

As such, for a long time maps have been valorised under the banner of demystification as unreal territories and deceptive representations, rather than being explored as co-constructive of territories (Corner, 1999). When diagnosing the power of the map, postmodern geographers may show a paradoxical attitude because they condemn the limited and selective nature of the cartographic image but at the same time the map is alarmingly narrativised in terms of a destructive excess, that is, an instrument considered ideologically and persuasively vital in inventing, activating and controlling spatial materialities.

Drawing upon and extending this topic, the obsolete word 'representation' urges today to be rehabilitated as a boundary notion, itself ambiguous in the meanings and uses that are made of it. In this respect, it is important to explore (and overcome) the (mis)representation of the map in the 'exhausted' geographical discipline and to measure the consequences of several understandings of the map when the argument of representation is experienced and sensed differently – namely, through a new consideration of the excess.

To conclude, the aim of this chapter is twofold. First, it aims to highlight the ambivalent gestures that either the exhausted or excessive geographers maintain in relation to representation that was brought to bear on maps specifically. Second, I will evidence the importance that a pragmatic episteme of mapping reserves

nowadays for critical theory, trying to distinguish and contextualise, rather than absolutise, its functions of death and life.

Mapping deadly: cartographic exhaustions and the destructive excess

In this first paragraph, the postmodern and critical geographer coincides with the figure of the exhausted. Resuming, in some respects, the portrait of the 'exhausted' sketched by Deleuze (1995), the exhausted geographer is the one who, dissatisfied with cartography, has helped deprive the discipline of its active and life-giving component, overemphasising its death instinct, namely the power to control space but also to drain and dematerialise the life which emerges through it. However, the posture of exhaustion also presumes an intention of excess that unexpectedly amplifies, rather than rescales, the detrimental power of the map.

The map has long been a contested icon of desire and apprehension for geographers. Although it is widely accepted that 'maps and cartography comprise a primary part of the geographer's technology, methodology and language' (Bradshaw and Williams, 1999, 250), with the dismantling of the neopositivist paradigm and in the aftermath of the cultural turn, cartography has been actually decreed by cultural and critical geographers a dead science and has been increasingly removed from their primary research activities.

Under the circumstances, the proliferation of mapping discussed in the introduction cannot be understood in its scope if we do not explore the atmosphere of death that lies at the very heart of its resurgence. Specifically, cartography has been treated as an obsolete discipline, model and language mostly informed by ideological discourses and substantial representational limitations. Critical readings have substantially activated the problematic and agonistic dimension of the map in any age, society and space, but considering especially the Western culture.

In the midst of the postmodern 'hangover', cartography has been variously deconstructed as the master narrative of the national, colonialist and imperialist modernity (Blunt and Rose, 1994; Boria, 2007; Edney, 1997; Farinelli, 1992; Harley, 2001; Massey, 2005; Olsson, 1994; 2007). Later, moving through its digital transposition, the automated and virtual mapping has been critically perceived as a new ubiquitous and pervasive medium that sustains an augmented vision, not just from above, but from nowhere (Cosgrove, 2001; Crampton, 2003; Dodge and Kitchin, 2005; 2007; Graham, 2005; Neve, 2016) and may drive the deskilling of critical thinking (Dodge and Kitchin, 2005).

Each of those turbulent stages has seen geographers, instead of crafting their own maps, metaphorically and furiously cutting and disfiguring them to unmask the tremendous conundrums of their tacit and abstract powerfulness. Under this light, a sort of 'cartographic anxiety' (Gregory, 1994) has hit the minds of geographers for more than three decades, preventing them from reflecting on the paradoxical attitude through which they seemingly proceed to the anamnesis of cartographic

representations (Bargués-Pedreny's chapter, this volume, for an analysis of this anxiety in international relations debates).

In critical geography, the cartophobic obsession predominantly consists of two contrasting arguments. On the one hand, the map is addressed as an irrelevant and limited form of spatial knowledge; on the other hand, critical scholars look more and more fascinated and terrified by its power to persuade, control and dominate spaces and social actors. However, although the map can be mistreated for its representational inadequacy, it is nonetheless criticised for unleashing an endless source of power, which Olsson (1991) calls a 'geometry of silence' – an ontological void – that is apparently capable of persuasive and coercive functions.

Wearing a psychoanalytic lens, we might argue that the disfiguration of the map as the evil side of geography has shown simultaneously a libidinal attachment on the part of geographers to that icon. Such figural approach is suspended between what Mitchell (2005) and Latour (2010) usually attribute to the iconoclastic posture (a type of exorcism in the wish to destroy images), which in turn masks an implicit idolatry (the belief in the magical or divine presence of images).

In other words, for a great part of critical geographers, the silent emptiness of the map comes to be easily fetishised through a prosopopoeic figure: the map thus becomes an animated object able to speak for itself, by virtue of the suspicious geometrical grammar, the language of hegemonic forces and groups. However, the incomplete and nonverbal nature of the cartographic language reveals the secret of its power. The map overcomes the profound inadequacy to describe the depth of the world by means of its performativity, both ideological and iconological, which can produce, rather than merely include, any phenomenon in its spatial architecture.

The Excess: the map as the silent arbiter of power

In this regard, Deleuze argues that a power machinery always needs an image of thought – a figure – from which it procures in return the strength to function (Deleuze and Parnet, 2007). Seen from this angle, the map has similarly anticipated, created, moulded the face of the governmental state. In short, cartography usually provides the grammar of power, the abstract machine needed by institutions to organise their own form of control. This has been a refrain repeated in chorus by critical geographers, a tremendous syllogism returned in its caustic clarity through the words of Brian Harley: '[i]n modern times, the greater the administrative complexity of the state – and the more pervasive its territorial and social ambitions – then the greater its appetite for maps' (2001: 55).

Further, tools like the census and the cadastral survey have been instrumental for the modern state to establish power both in its territory and overseas, in the colony (Appadurai, 1996; Foucault, 1977). Especially in the colony, mapping devices worked as ideological means aimed to instil into colonisers the Western attitude of ordering, classification and measurement. Through this perspective, the history of the map can be easily translated as the history of several ideological applications. The map can be the result of an authoritative decision, it is an act of control, it can

be used for legitimising conquests and expansions, and it acts as a strategic tool and a weapon during wars and invasions.

Yet, despite some scholars' claim that maps could be *also* used for political ends (Pickles, 2004; Wood, 2010), the body of work on critical cartography implicitly presumes that all maps are always a matter of power, serving the interests of specific classes and political groups (Harley, 2001). Because of 'the violence associated with the drawing and policy of mapping' (Painter, 2008: 89), critical scholars inevitably underline the sort of negative and dangerous 'excess' that maps possess.

The Exhaustion: the map as the limit of representation

However, as I argued at the beginning of the paragraph, the fierce geographical 'appraisal' judges not only the ideological application of cartography but also its spatial representational limits. In this other nuance, the map acts in the regiment of what has been variously named the 'cartographic reason' (Farinelli, 2009; Olsson, 2007; Pickles, 2004) – that is, the reduction of the world's ineffability, complexity and livingness in the deathful and taxonomical grid of a piece of flat paper or screen. Whether considering nondigital or digital mapping, the ontological critique of the map follows several ways of exhaustion. Paraphrasing Pelbart (2015, 12) and transposing his argument into map theory, we could admit that, for critical geographers, a cartographic exhaustion involves the matter, forming exhaustive series of things; it devours the listening, drying up the flow of voices; it assaults space, trying to deplete its potentialities; finally, it appeals to the visual, but forms a desire to silence the power of the image. In this regard, mapping is commonly considered a limited form of spatial knowledge that does not grasp the sense of a human, lived, multisensorial, struggled – and thus more 'real' – space.

This modern understanding of the map avowedly nulls any performative livingness and opens itself to a dual rhetorical critique. From the point of view of cartographers, the distance between reality and representation becomes the object of inquiry of a progressive tale that asks if cartography's ontology and technology are perfectible, wrongly understood in the sense that maps can, through their technological advancement, increasingly stand in for reality. For critical geographers, the discourse on the ontology of the map results in a disenchanted and pessimist vision that turns maps back into always political and ideological means that sustain, especially, hegemonic forces. The last posture, fortunately, exists as the counternarrative to the first. And the more the map appears scientific, neutral and technocrat, the more is required from intellectuals to show its opacity as a sort of compensation.

The point at issue is that theoretical approaches of critical geographers, even if claimed to be anti-metaphysical and overtly deconstructivist, may appear to accrue the divide between a 'fraudulent' representation (the inner image of the map) and the 'authentic' reality (which is always outside the map). In the recital of this mutual exclusion, the outside preserves a sort of ontological precedence over the inner and false image wielded by the subjective cartographic tool. This is, for

instance, presumed by Olsson when he refuses to accept that the map goes 'in search of geographical essences' (Abrahamsson and Gren, 2012, 8).

Those kinds of statements embrace a nature – a being of things – truer than the hegemonic one encoded by the map and subsumed by Western modern reason. Such residual metaphysics of presence underlines the presumption that works of postmodern and critical geographers have been mostly informed by a strong semiotic and iconological rather than poststructuralist and discursive analysis. The semiotic vision of representation leads indeed to a distinction between the sphere of reality and that of discourse, while the iconological approach is compelled to interpret the meaning of the map as a symptom of 'something else' (Belyea, 1992). However, what remains largely unnoticed is that if reality is anyway produced and mediated by discourses, the argument of the divide between the world and its construction, mobilised by the symbolic reading, becomes delusive. The discursive analysis should be more helpful for considering cartographic representations as political and social dimensions of the same reality, so that maps are reasonably 'discursive formations' (Foucault, 1972), namely functions that are implicated materially in the construction of social life. As Hind and Lammes affirm: '[t]he map does not lie outside of the territory, and neither can the territory ignore the power of the map. The map animates the mediated relationship between technologies and worlds' (2015, 2).

Geographic representations on the verge of life and death

In this second paragraph, the exhausted geographer, who evaluates any map from its representational features, confronts the geographer of the excess, who explores the map beyond the Map and desacralises the weight of interpretation and the internal meanings of any representation. However, they both need to reconsider what does change in their understanding of mapping whenever the map is theorised through representational or nonrepresentational frames.

Maps, when looked at through a representational lens, are considered a language of death and a force of death. Geographers have highlighted both their limits of representation and their ideological applications. They very often refer to this phase in terms of a highly deconstructive moment (Harley, 2001). If so, the aim of deconstruction looks to be largely misunderstood because deconstruction does not entail a dematerialisation of factual reality and is neither a linguistic model nor a semantic model and least of all a mechanical model. It rather assumes that foundational elements, prediscursive notions and categorical truths are rhetorically constructed, thus there is no origin of reality but a process. In Derrida's words, reinterpreted by Spivak (1999), deconstruction is never reduced to mere destruction, but to a multiplication of points of view. It means to represent complexity that can hold together more things, even if they are contradictory.

Relying on this multifarious scenario, it is crucial to reconsider maps' limits and potentialities, investigating and refiguring under other perspectives the presumed gap between reality and representation. To examine this, as a first step it is essential

to understand where previous and more recent analyses come from: which regime of representation influences mapping approaches? Which theoretical coordinates do we need to read the 'mapping' question, today? Such questions should be addressed if we want to deeply understand the critique, the crisis and the recent renewal that the culture of mapping is unwittingly experiencing in a wide but specific range of debates and discussions.

If we have already clarified the consequences of the semiotic reading on the cartographic representation, we should now admit that a poststructuralist approach could more fairly recognise the performative power of the map because, as Foucault (1970) considers it, language is no longer seen as a representation of the world (a copy) but as a force and event in its own right. This suggests that representations come to form and to participate in the construction of events beyond what they may be said to only represent. Both approaches, semiotic and poststructuralist, see the representationalism of maps, respectively, as a *reflection* of the world out there and a *creation* of the world out there. However, they may not indicate why it is that maps are increasingly investigated, contested or joyfully experienced in current research. How to define the exhaustion or excess of mapping?

I would consider three modes of approaching the representation that affect the interest in mapping specifically. The first is what we might call 'the political representationalism', the second is the 'speculative nonrepresentationalism' and the third 'the social nonrepresentationalism'.

The first figuratively influences the geographer of the exhaustion, i.e. the critical scientist who constructs a theory of cartography based on what it is that maps visualise or hide. The politics of representation is an interpretative dissection that usually provides, through hermeneutic, deconstructive and discursive analyses, the proofs of the hidden power relations lying beneath an image. The critic asks, for example, what the image ideologically and persuasively shows or omits, who is represented and for what purpose. Through this analytics of images, objects are enquired as reflexive representations of reality 'with the aim of construing their implicit meanings and analysing how those meanings affirm or challenge power relations' (Rose, 2016, 337).

Essentially, by looking at the interior of the representation, the critical geographer retraces the symbolic ordering and larger power regimes in which those mapping practices are made meaningful and contested. Yet, as we might easily deduce, this kind of behaviour puts representation, even when biased and suspiciously addressed, in a state of ubiquity, by enforcing 'the postmodern idea that all we have are representations of the world with no possibility of an ultimate presence' (Colebrook, 2000, 48).

In such readings, the critical geographer starts with everyday experience but ends up transcending it for the purpose of decoding reality. The gesture of exposing the politics of representation tends to be conducted through a definitive approach made of criticism and interpretations that operate as peremptory. In other words, it leaves us with a last – let's say an ultimate – word by always exposing the hidden meaning and agenda of cartography and its mapmakers (Harley, 2001). If critical

analysis always rediscovers a connection between representation and power, every possibility for alternative cartographies would seem to be already exhausted. The critical geographer presumes that everything has been said about 'the Map' and that such a view should be applied to all the other mapping practices encountered on this journey.

Not everything, though, happens within the powerful frame of political representation. In the last decade, the geographical turn that has been defined 'non-representational' (Anderson and Harrison, 2010; Thrift, 2008) has somehow reinvigorated the terms of debate within the discipline of geography. Endemic to an era of post-signification, it deals closely with issues of performance, embodiment, emotionality, affectivity and materiality, opposing to analytical interpretation – the rational critique – the vertigo of the unexpected, the open ending of human and nonhuman activities, and the possibility of privileging dynamism, flow and movement over meaning.

This second position on representation suggests that not all that we call reality can be the object of an endless interpretative and (de)constructivist reading. Different phenomena can be connected but not everything can be fully captured and deeply explained – thus exhausted – by human subjectivity. As Anderson further states, 'nonrepresentational approaches locate the meaning and signification in the manifold of actions and interactions rather than in a supplementary dimension such as that of discourse, ideology or symbolic order' (Anderson and Harrison, 2010, 3).

The new poetics of performance engages with the immanence, with the flux of the contingency, with an unstable time-space, always in the making. The romance of vital flux helps Thrift articulate a new politics of life:

> a poetics of mundane space and time which can teach us to ourselves in better ways, that is ways which will allow peoples to survive their own environing (Wagner, 2001) by creating more rather than fewer worlds, […] to produce a politics of opening the event to more, more; more action, more imagination, more light, more fun, even.
>
> *(Thrift, 2008, 20)*

The emphasis on performance, movement, affect, corporeality, production, thingness, mundanity is not often set as a revaluation of certain relations but as a detox from the saturated work on textuality and the interpretation of cultural meanings. The latter may give the impression of a philosophical exercise, somehow disembodied from the contingencies of everyday life. The problem, now, is not that representations are inadequate or partial, as critical geographers acknowledge, but that mapping performances themselves are not thoroughly representational, even though we often treat them as such.

The pretension of interpretation is perceived by nonrepresentational theorists as a devaluation of other aspects that equally need to be accounted for in spatial research –for instance, bodily and emotional experiences, nonhuman agency and even more grounded and technical accounts. Put differently, what comes to the

fore is the awareness that '[t]o interpret is to impoverish, to deplete the world – to set up a shadow world of "meanings". It is to turn the world into this world', as argued elsewhere by Susan Sontag (1966, 4).

In this view, the nonrepresentational geographer presents himself as the promoter of excess rather than exhaustion, so that if the exhausted geographer, namely the critic, is disputed to be the theorist who ends up destroying possibilities through a negative critique of cartographic practices, the excessive geographer aims rather to create and invent anew from destruction.

Further, we can consider a third way of overcoming representation that is less philosophical in its intent and deeply influenced by media studies and sociology. It focuses more on the material and technical flow rather than the symbolic circulation of images (Lee and LiPuma, 2002; Rose, 2016). This other body of work suggests that a new emphasis might also be put on the 'visual economy' (Poole, 1997) of mapping, by tracing the dynamics, movements and hidden networks where any object is produced; it considers also the conditions through which the object is allowed to circulate within as well as disappear from the system. The last approach may give the feeling that charting the unseen trajectories of objects and fluxes and explaining how mapping *really* works is more important than understanding the broad regime of meaning where they come into existence.

At this point it might be more fruitful to act on the fragile line between representational and nonrepresentational currents, between the death and life of geographic representations. In other words, it is important to move across different postures and gaits in order to grasp what happens and ferments not only inside a map but also outside it. In this light, it is urgent to situate the nonrepresentational ferment within the strong political criticism. The questions that should drive interest in the 'critical politics of mapping' (Crampton, 2003) as well as in mapping contemporary politics is how to understand how maps act relationally with either humans or nonhuman agents and how the politics of their very reality is immersed in the world rather than barely 'at a distance' from it (Crampton, 2003, 171).

Even in such a more materialistic and object-oriented vision, subjectivity cannot be somehow eradicated or left in the background. However, what is now assumed is that the reality of things is not directly accessible to human beings, but only through mediation (Latour, 2013). Moreover, a strong political and affirmative project can even be traced in the philosophical strand of nonrepresentational theory. Postcritical geographers who are inspired by the work of Taussig (1993) provocatively ask themselves: what is the next step? What happens when it is demonstrated that everything is a political construction, when all hegemonic representations are deconstructed?

In sum, the intolerability of the endless number of power structures that define and entrap our way of life should compel the critic to find speculative and material holes in which to breathe and where new living spaces may be created that even accommodate new theorisations of maps. Seen from this perspective, nonrepresentational geographers of the excess invoke radical thinking, even if

momentary, regarding new practicable configurations, new images and spaces arising from the endless deconstruction of theory.

Those configurations might emerge in the bubbling of bodies, movements and rhythms of everyday life. In my speculation, this means never pausing or accepting a definitive approach in our research but going in search of the 'penultimate image' (Agamben, 2015), one that always presupposes a new movement, not yet theorisable.

In this way, the nonrepresentational becomes a current of thought which embraces a positive sense of the excess that can overcome the negative sense of exhaustion vis-à-vis toward the power of the map as defined in previous sections.

Interlude: but what if the exhausted were an optimist?

The philosopher Pelbart underlines the creative potential of the exhaust, addressing the Deleuzian project more optimistically. He argues that '[e]xhaustion may be the term that acutely defines, albeit enigmatically, the hesitant and unnecessary passage from catastrophe to creation. And in this context, it could also bring to mind the interchangeability of the "nothing is possible" and the "everything is possible"' (Pelbart, 2015, 122).

Through this revision, I believe that cartographic exhaustion might also become an insightful theoretical tool to revaluate and recalibrate certain figures of thought and theories and open new areas for a critique of contemporary mapping. In other words, the exhausted geographer – who diagnoses the criticality of the world – can overcome his discomfort toward the map and intercept the vibrant energy of the geographer of the excess. The latter indirectly asks if a critical theory does really need a phase of rejection when this results in the desertification of affirmative projects.

Put differently, in being tired of the cartographic status quo but seeking new lifeblood of cartographic discourses in other figures of thought and other practices; in venturing strenuously to debunk our own geographical concepts while connecting with those mobilised by other authors in other spaces, in other times, through other modalities … an invention, serendipitously, comes.

The unease is thereby translated into a call to see cartographic representations in practice, emerging through the contingent use that is made of them. In this spirit, the critique can be still exerted through various investigative lines to unfold the politics of mapping, now seen – through a vision of excess – as an open, effervescent, unstable practice of orienting and locating, sensing and inhabiting the hybrid space of the digital and nondigital worlds.

Mapping lively: from cartography to map studies

In the third paragraph, the excess is discussed as the proliferation of mapping theories, practices and users which are flourishing beyond geography and cartography. The social practice of mapping may suggest new interdisciplinary lines of inquiry and interests for critical theorists.

Although, for ideological and materialistic reasons, cultural and critical geographers do not always possess the technical skills to produce maps professionally, they are assisting a renaissance of mapping interest and consumption in other academic circles, from visual and media studies to international relations, and non-academic worlds such as activist movements, accompanied by the massive growth in spatial data and new spatial media technologies (Elwood and Leszczynski, 2013; Graham et al., 2013; Kitchin et al., 2017).

Maps are increasingly used in creative ways to document and act on various issues – not least, for example, to create political and moral voices. We might refer such excess to the 'cartographic turn' (Lèvy, 2015; Pickles and Cobarrubias, 2009) or the 'new mapping paradigm' (Crampton and Krygier, 2006). This new impetus of mapping drives different actors to explore mapping ontologies, practices and performances as relevant means, models, metaphors, incubators of spatial potentialities in a (counter)political, deep and emotional, archival and forensic or purely informational way.

The multifaceted social reality of mapping makes it reductive to strictly follow a unique perspective or paradigm to define maps through generalised features and normative terms. Maps, in short, look to have become objects without a discipline, the spurious referents of different practices of research and action. Instead of considering mapping as a specific interest of geography, we should more fairly refer to the hybrid arena of map studies, which gathers not only geographers, critical cartographers and GIS scientists but also anthropologists, sociologists, literary scholars, visual theorists, artists, urban planners, graphic designers and DIY mappers, among others.

Map studies is thus overwhelmed by a multisite and kaleidoscopic interest in addressing mapping that inevitably elicits different, even contradictory, theoretical and methodological approaches. The weaving of those several theoretical and practical interventions may sometimes accentuate and sometimes blur the traditional positions taken by geographers in respect to other scholars on issues concerning the ontology of mapping (what constitutes maps), ideology (what is their purpose), epistemology (how we come to know them), mediology (through which devices and supports do they materialise), phenomenology (how they are sensory perceived).

Such richness of theories and practices opens a congenial place in which to engage anew with mapping. It suggests embracing, on the one hand, issues of creativity, performativity and affect in the political research of cartography; on the other hand, new ecologies of mapping also offer new contexts of analysis for the exposure of more nuanced power relations.

A map caught in the net of the living

The abundance of mapping is compelling to the extent it leads map scholars to consider how to engage with a twisted cartographic theory that can incorporate multiple dimensions and directions, senses and interpretations, and, especially,

criticalities and affirmations. One possible direction to take would be to approach maps not as mere technologies of power but as performances of seeing and doing, desultory events always activated and resensed by their users andoperating in divergent contexts. In sum, maps are multiple, assembled and partial – and effective only when mobilised by specific social practices.

The postrepresentational turn on mapping (see Dodge et al., 2009) has overcome some assumptions of traditional cartographic theory through the reconceptualization of cartographic power not just as a 'power over' (i.e. a means of subjection and control) but also as a 'power to' (that is, as a potential).

In this regard, the strength of the prefix 'post' lies in the dual attitude of moving beyond and behind a mainstream tendency that has affected the discourse and the rhetoric on mapmaking to relocate and differently refigure the examination of contemporary mapping practices and theories. For instance, geographer Pickles (2004) suggests searching for not only new forms and representations of mapping but also a new sensitive disposition in looking at the existing cartographies. In other words, the creativity of map theory does not only entail creation from scratch but also the capacity to rearrange and theorise differently what is already at our disposal.

To put it bluntly, a critical researcher should be able to discern – paraphrasing Nietzsche (2002 [1889]) – when it is time to break the eternal idols and when it is more appropriate to stop and listen, touching and brushing them with a hammer used as a diapason. That is, with the intention not to destroy but rather to listen and understand what it is that the eternal geographical idols – maps – have to say, conceal or show. This endeavour suggests being carefully attuned not just to the ontological power of mapping but to its praxis. Essentially, it is crucial to understand how various mapping practices work as cultural, political, creative, performative, social or economic devices in our life.

Therefore, the new challenge of contemporary map scholars, both exhausted and excessive, critical and affirmative, is to develop a composite mode of analysis able to grasp what a map effectively does in multicontextual practices; how it emerges and comes to be recognised as a map and the multiplicity of modalities through which it can be transformed, twisted and recombined by its producers and users (Dodge et al., 2009).

In this respect, remembering the 25th anniversary of cartographic historian Brian Harley's famous essay, 'Deconstructing the map' (published in 1989), the historical geographer Matthew Edney suggests:

> Instead of a supposed universal endeavour that determines spatial thought and that ineluctably expresses state-focused, juridical power, we can study the several modes of mapping practices, each part of spatial discourses differentiated by their various spatial conceptions. We need to deprivilege 'the map' and instead explore the constitution of each mode as a melange of incorporative (performative) and inscriptive (graphic and verbal) practices.
>
> *(2015, 12)*

Through the incorporative and the inscriptive modes, mapping emerges both as a social and graphic practice. It is explored within the sphere of the contingent, relational and contextual analysis without in any way devaluating critical, iconological and semiotic thinking.

In political theory, this kind of behaviour may avoid absolutising positions, which are a feature of critical theorists. In effect, as soon as the mapping is separated from the materiality of its contingency, its theoretical reading becomes ineluctable and incontestable. If we distinguish the modes of mapping, rather than lingering over the general ubiquity and negative pervasiveness of the mapping tool, we can avoid being overwhelmed by the explosion of mapping practices. On the other hand, even the positive tale of the rapidly moving, affective charged and untheorisable magmatic reality narrativised by the nonrepresentational theory might be dangerous for political theory. It produces informal images that are certainly richer for their imaginative potential but perhaps are less useful in terms of political activism and revindication, while, in critical terms, we need an antidote to the risk of nonhistoricity and depoliticisation of mapping events.

The new critical posture emerging after the collision with the excess should no longer radicalise cartographic reason by dragging the figure of the map to the limit of its potential; it should not brood and crumble research possibilities one after the other just like the 'exhaust' imagined in Deleuzian terms. On the contrary, critique of the excess needs to prefigure a multispectral gaze that zooms in and out, overturns, dives, crosses and moves through cartographic frames, producers and users. In this vision, it may be misguided to see the map as something that is either fixed or exhausted and as such must be overcome. It would be more helpful to look at it as a changing material, social, cultural, and political construction that has both merits and problems that must be conceptually and contextually reweighted.

Maps, after all, are of the moment (Crampton, 2003), and, as such, political theory should attempt to catch the flow of mapping practices in 'the net of the living' (Wood, 1992, 18). The ferment and excitement of such liveliness are to evidence in an epoch in which cartography, more than geography, seems to have exhausted all its potentiality for geographers, while maps and mapping projects are a restless and ubiquitous presence in our society.

However, in the wake of the nonrepresentational solicitations, 'liveliness' does not necessarily mean that the map should be twisted and deformed in order to make it absorb life and subjectivities, emotions and sensations within its frame. It is not about finding new modes of 'stretching' the representation (Rossetto, forthcoming).

The new sense of critique emerging after the excess suggests rather approaching every map as if it is embedded in our practices of life, as if it has more to do with our life and death even while pretending to say, in its alleged abstraction, less about them. Critical theory of mapping, I return to argue, often runs the risk of abstracting from reality rather than plunging into it, with the consequent peril of dematerialising instead of concretising its figures of thought. The time is now ripe to draw an alternative history of mapping in a much more incarnated way. This is

to reinforce the feeling that just the dissection and inspection of the cartographic epidermis of contemporary global societies can avowedly witness the modes through which maps, mapping, geographic visualisations and the like are surprisingly embodied in the world.

Resituating post(mortem) cartographies

This chapter should be considered more as a tentative statement for further research than as a definitive project. I tried to argue that the current vitality of mapping should seriously affect the traditional position of critical scholars and push them to reflect whether the political goal of their research must be the killing of the map trope as such, after perforating and dismantling the cartographic implantation of the world from within, or whether they might search and activate the potentialities of map entities for good ends, by carefully distinguishing – instead of radicalising – their contingent and circumstantial uses. The suggestion is to resist reading maps through a generalised and ultimate theory by confronting and debating the massive mapping practices surrounding, interfacing and participating in the social life of the Global North.

The critic might not only himself become exhausted when he tries to diagnose and understand the phenomena in their logical and representational entirety, he also annihilates new and worldly possibilities for intervention. In this sense, the exhausted geographer seems tired of exploring the ontological conditions and transformations of cartography because they are only interested in capturing its deadly and pathologic nature, in terms of both representational inadequacy and danger. Postcritical thinkers, however, risk the other drift – that is, the utter depoliticisation of mapping – when they uniquely indulge into a joyful and uncritical appreciation of mapping practices. The effort required to map scholars is therefore to bring a bit of affirmation to the political critique of cartography and a bit of criticism to the smooth glorification of mapping.

With this disposition we may start to distinguish, in the cauldron of contemporary mapping operations, a legitimising function, to be considered when maps and mapping are produced by specific institutions to streamline forms of domination and control. However, in the recital of the omnipotent visual dominance of the map, the geographer should not take for granted the panoptical view of the map, considering the 'mapped' as a static and passive subject – that is, the object of seeing rather than a dialogical agent. This is to avoid the uneasy situation in which practices of vision that seem to geographers active and operative – because they produce knowledge – are distanced from other ways of seeing that are supposed to depend on or replicate passively in a subjugating way that knowledge.

We can further outline a resistant and resilient function that several political mappings present today by looking at those processes generated by social actors who speak from or for devalued and marginalised communities to promote social justice. Even if broadly defined as countermapping, there should be more effort to

sense them as living cartographies. Instead of being praised for their opposition to dominant forces, countermapping should be explored for the singularity of the events they enhance. In sum, acts of resistance that use mapping have to be seen as acts of creation rather than negation. Just as important, what still needs to be practised is a projectual and emergent vision of mapping that escapes prediction and structure and where new subjectivities, places and objects might be created within the process, besides the intention of transforming social and cultural forms.

Such distinction proves also that we might encounter events in which cartographic tools become dangerous and others in which mapping, in a wide range of declinations, such as those discussed in the present book, are increasingly helpful to promote critical and political debates. Without forgetting that there are many other contexts in which we could do without our maps. Because maps are not everywhere, and they need to be experienced and theorised only *where* they appear and disappear. This is to say that, as never before, map scholars need a descent to the mundane, otherwise pictured by Stuart Hall as a returning 'the project of cultural studies from the clean air of meaning and textuality and theory to the something nasty down below' (1992, 278).

To conclude, mundanity means also recognising 'mapping' and 'politics' as relative to their context of production, circulation and reception, not as the political invariant universals of spatial thought. The pragmatic of mapping is certainly more appreciable when any map is approached as both a figure of thought and an agentive practice, two concepts that better underline the potential and abundance but also the impotence and exhaustion that maps may possess when they drive political actors in the choice, assumption, decision, claim, vision, action, understanding of any reality.

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10

MAPPING BEYOND THE HUMAN

Correlation and the governance of effects

David Chandler

Introduction

Mapping as a form of posthuman governance is highly dependent on the application of new technologies for data analysis. These have been developed across contemporary society from the technologies of the quantified self to the application of data analysis in schools and businesses to the development of new mapping capacities through international collaborative initiatives. The latter include the United Nations' Global Pulse, established by the UN Secretary-General to research and coordinate the use of 'big data' for development,[1] the World Bank's Open Data for Resilience initiative (OpenDRI), seeking to see the emergence of natural hazards and the impacts of climate change in real time,[2] and the PopTech and Rockefeller Foundation initiatives on big data and community resilience.[3] These mapping approaches can be usefully understood on the basis of governance through correlation rather than causation. Posthuman governance is increasingly developing through non-modern ontologies which construct the world through processes of emergence and highlight the development of new post-epistemological approaches, which view correlation as a more reliable and more objective 'empirical' method than the extrapolations and predictions of causal analysis.

This chapter argues that posthuman governance works on the surface, on the 'actualist' notion that 'only the actual is real' (Harman, 2010, 180; Harman, 2009, 127). As Roy Bhaskar, the originator of the philosophy of critical realism, has

1 United Nations Global Pulse initiative website can be accessed at:www.unglobalpulse.org/.
2 The World Bank's OpenDRI webpages can be accessed at: www.gfdrr.org/opendri.
3 For information on the Data-Pop Alliance see: www.datapopalliance.org/; and for the Rockefeller Foundation: www.rockefellerfoundation.org/our-work/current-work/resilience.

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argued, 'actualism' can be seen to be problematic in that hierarchies of structures and assemblages disappear and the scientific search for 'essences' under the appearance of things loses its value (Bhaskar, 1998, 7–8). It is for pragmatic reasons that a new mode of mapping as posthuman governance appears to be emerging. Posthuman governance accepts that little can be done to prevent problems (understood as emergent or interactive effects) or to learn from problems and that aspirations of transformation are much more likely to exacerbate these problems rather than solve them. Rather than attempt to 'solve' a problem or adapt societies, entities or ecosystems, in the hope that they will be better able to cope with problems and shocks, posthuman governance seeks to work on how relational understandings can help in the present: in mapping and becoming responsive to emergent processes.

This chapter is organised in three sections. The following section introduces posthuman governance as the governance of effects rather than causation, focusing on the work of Ulrich Beck and Bruno Latour in establishing the problematic of contingent interaction, rather than causal depth, as key to emergent effects, which can be unexpected and catastrophic. The second section considers in more depth how mapping puts greater emphasis on relations of interaction rather than on ontologies of being, and links this methodological approach closely to actor network assumptions that disavow structures of causation. The final section analyses how correlation works to reveal new agencies and processes of emergence and how new technologies have been deployed in this area, providing some examples of how the shift from causal relations to mapping effects has begun to alter governmental approaches.

Mapping and the governance of effects

Posthuman governance understands problems in terms of their effects rather than their causation. Today, analysts are much more likely to highlight that the complexity of global interactions and processes mitigate against ambitious schemas for intervention aimed at finding the root causes of problems or developing solutions through ambitious projects of social and political engineering from the ground up (Ramalingam et al., 2008; Ramalingam, 2013). In a more complex world, linear or causal ontologies can appear to be reductionist and are easily discredited by the growing awareness that any forms of governance intervention will have unintended side effects. It is in the attempt to minimise these unintended consequences that the focus of policy-makers has shifted to new forms of mapping, focusing on the responsive governance of effects rather than seeking to address ostensible root causes. For example, rather than seeking to solve conflict or to end it (resulting in possibly problematic unintended consequences) international policy intervention is increasingly articulated as 'managing' conflict, developing societal strategies to cope better and thereby limit its effects (Department for International Development et al., 2011). Focusing on managing effects rather than engaging with causative chains makes the forms and practices of policy intervention quite different.

The link between conceptual discussions of governance and epistemic questions of knowledge is usefully highlighted by developing Giorgio Agamben's framing of a shift from a concern with causation to that of effects, which he understands as a depoliticising move (Agamben, 2014). Debates about addressing causation involve socio-political analysis and policy choices, putting decision-making and the question of sovereign power and political accountability at the forefront. Causal relations assume power operates in a hierarchy, with policy outcomes understood to be products of conscious choices, powers and capacities. Agamben argues that, while the governing of causes is the essence of politics, the governance of effects reverses the political process:

> We should not neglect the philosophical implications of this reversal. It means an epoch-making transformation in the very idea of government, which overturns the traditional hierarchical relation between causes and effects. Since governing the causes is difficult and expensive, it is more safe and useful to try to govern the effects.
>
> *(Agamben, 2014)*

The governance of effects can therefore be seen as a retreat from modernist or causal assumptions of governance. However, the shift from causation to effects involves a shifting conceptualisation of governance itself. Posthuman governance – governing through attempting to enhance system and community responsivity to effects – shifts the focus away from the formal public, legal and political sphere to the capacities and abilities of systems or societies for responsiveness to changes in their environmental context. The management of effects involves redistributing agency, understood as responsive capacity, and thereby evades the question of the responsibility or accountability for problems or the need to intervene on the basis of government as a form of political decision-making (Chandler, 2014b; 2014c).

Policy interventions have shifted to posthuman modes of governance as governing agencies have sought to respond to the effects of indeterminacy and risk as inherent in the complex and interdependent world rather than understanding problems in a modernist telos of solutionism and progress. Problems in their emergence are the ontological product of complex feedback loops and systemic interactions that often cannot be predicted or foreseen in advance. Surprising and catastrophic effects thereby call for new ways of thinking and governing: ways that go beyond modernist linear cause-and-effect assumptions and that can potentially cope with unexpected shocks and unseen threats.

As 'effects' become more central than causes, 'solutions-thinking' becomes less useful and potentially a barrier to responsiveness. This is because 'problem-solving' tends to affirm current practices and approaches rather than emphasising the need to be alert to emergent effects.[4] The promise of 'solutions' seems to deny our

4 Robert Cox prepared the ground, famously differentiating approaches that saw problems from a narrow status-quo perspective from those that sought to critically rethink the bigger picture (1981).

entangled responsibilities and commitments while greater sensitivity to effects enables us to become increasingly aware of them. Initially, the leading theorist to problematise 'problem-solving' approaches was perhaps Ulrich Beck, who argued that the risk of unintended effects could no longer be bracketed off, compartmentalised or excluded in what he called the Second Modernity (Beck, 1992). Beck argued that unexpected feedback effects from policy-making were an inevitable result of globalisation and interconnectivity, suggesting that the boundaries of liberal modernity – between the state and society and between culture and nature – were increasingly blurring. Surprises and shock events could no longer be treated as exceptions to the norm, to be quantified and insured against.[5]

The radical awareness of interconnectivity and feedback effects, articulated by Beck, was initially presented as purely negative: as a factor to be addressed, and potentially minimised, through governing under the 'precautionary principle'.[6] The awareness of entanglements leading to unintentional effects thus began to integrate concerns of contingency into the practices of governance. Beck's precautionary principle still had a modernist legacy, in the positing of a potentially knowing and controlling subject able to manage unintended effects. But, as the assumptions of modernity began to ebb away and discourses of globalisation morphed into those of the Anthropocene, this subject increasingly had to act more humbly and cautiously, testing and experimenting rather than assuming cause and effect modalities.[7] Unfortunately, Beck focused on the regulation of effects through ways of predicting or imagining the consequences of human actions, which seemed logically impossible to foresee. For example, even if scientists reached a consensus on the safety of a new procedure or initiative before its application, scientific experimentation in the laboratory cannot reproduce the same conditions as those of real, differentiated and complex life. This then led critics, like Bruno Latour, to convincingly argue that, once included, effects could not be prevented or minimised through precautions but instead had to be followed through 'all the way' (Latour, 2011, 27; Latour's thesis will be considered in greater detail below).

Towards the end of his life, Beck (in line with the times) shifted the presentation of his approach, articulating the appreciation of effects as enabling governance rather than as merely constraining it (Beck, 2015, 79). There were also positive feedback effects of the entanglements of culture and nature, indicating the need to adequately understand the new anthropogenic manufacture of risks – such as global

5 On the importance of the normalizing effects of insurance see, for example, Ewald, 1991; Defert, 1991; Dillon, 2008.

6 He argued: 'If we anticipate catastrophes whose destructive potential threatens everybody, then the risk calculation based on experience and rationality breaks down. Now all possible, to a greater or lesser degree improbable, scenarios must be taken into consideration; to knowledge drawn from experience and science we must add imagination, suspicion, fiction and fear' (Beck, 2009, 53).

7 For the critics of the principle, which has been taken up in a number of ways in international policy documents, the problem was the paralysing aspects of 'possibilistic' thinking (see, for example, Sunstein, 2002).

climate change. Thus, the awareness of the catastrophic effects of climate change and other risks could be seen to be potentially positive (Beck, 2015, 76). For Beck:

> Anthropological shocks provide a new way of being in the world, seeing the world and doing politics. The anthropological shock of Hurricane Katrina is a useful example … . Until Hurricane Katrina, flooding had not been positioned as an issue of environmental justice – despite the existence of a substantial body of research documenting inequalities and vulnerability to flooding. It took the reflection both in the publics and in academia on the devastating but highly uneven 'racial floods' of Hurricane Katrina to bring back the strong 'Anthropocene' of slavery, institutionalized racism, and connect it to vulnerability and floods. This kind of connecting the disconnected is the way the cosmopolitan side effects of bads are real, e.g. the invisibility of side effects is made visible.
>
> *(Ibid., 80)*

The flooding of New Orleans illustrated how devastating emergent effects could be, but had the consequence of enabling governing authorities to know the connection between risks that were thought to be natural or external with racial, social and economic inequalities that were thought to be purely social. This necessitated the bringing together of governance expertise on the basis that the natural and the social were intermingled and that the politics of race was not disconnected from the politics of ecology.[8] In the same way, the natural and the social sciences needed to be brought together in rethinking how to engage with the world beyond this posited culture/nature divide (Beck, 2016). For Beck, this 'Metamorphosis is not social change [it] … is a mode of changing the mode of change. It signifies the age of side effects. It challenges the way of being in the world, thinking about the world and imagining and doing politics' (Beck, 2015, 78).

A new form of governance thus emerges from the inclusion of effects: the understanding of crises and disasters as no longer purely natural or purely social but as contingent and emergent processes beyond governing control:

> Metamorphosis is deeply connected with the idea of unawareness, which embeds a deep and enduring paradox. On the one hand, it emphasizes the inherent limitations in knowledge … . [N]ano-technology, bio-engineering, and other types of emergent technology contain not only knowable risks but also risks we cannot yet know, providing a window of fundamental limitations to society's ability to perceive and govern risks.
>
> *(Beck, 2016, 104)*

Beck's understanding of the Anthropocene as 'the age of side effects' (Beck, 2015, 78) nicely encapsulates how the contingent and unforeseeable emergence of effects has been

8 See also the analysis of Hurricane Katrina in Protevi, 2009, 163–83.

captured and incorporated into governance under discourses of the posthuman. Beck had not much more to offer than that the 'imagination of a threatening future' would focus attention on the ways in which contingent processes interacted.

Bruno Latour has sought to go beyond the limits of Beck's work in this area, seeking to trace the effects of human actions in real-time feedback loops; requiring less of the imagination and more of mapping with the support of digital science and technology. Latour has deployed the radical discourse of understanding problems in their emergence to great effect, having long waged war on modernist binary understandings, particularly that of the separation of culture and nature. For Latour, just as humanity has become more entangled with nature than ever before, ecologists have sought to emphasise the need for separation to protect 'nature' and modernist science aspires to know the world/'nature' as somehow a separate and fixed reality (Latour, 1993a; 2004). Therefore, along similar lines to Beck's later work, global warming is not so much a sign of the failure of modernity but an enabler of new forms of posthuman governance after modernity. The awareness of emergent effects such as climate change reveals the entanglements of humanity and the environment and is a critical wake-up call to radically reorganise the governance of the planet on the basis of a more inclusive understanding that 'nature' cannot just be left alone, but must be 'even more managed, taken up, cared for, stewarded, in brief, integrated and internalized into the very fabric of policy' (Latour, 2011, 25).

Mapping as a tool of posthuman governance is crucial for Latour's project of enfolding the unintended effects of planetary interaction into the everyday governance of the Anthropocene. The effects of interaction are understood to be concrete and contingent and thus depend on the ability to map the surface of interactive relations through seeing effects, to follow the unintended and unforeseen consequences of human actions 'all the way'. Latour thus enthuses:

> the principle of precaution, properly understood, is exactly the change of *zeitgeist* needed: not a principle of abstention – as many have come to see it – but a change in the way *any action* is considered, a deep tidal change in the linkage modernism established between science and politics. From now on, thanks to this principle, unexpected consequences are *attached* to their initiators and have to be followed through all the way.
>
> *(Latour, 2011, 27)*

Latour's subject is the initiator of actions and thereby responsible for the interactive consequences of this initiation.[9] For Latour, the consequences of human actions can be mapped through seeing or being sensitive to the network formed through their effects.[10] Thus posthuman governance seeks to map these links on

9 Exemplified in the example of Frankenstein's failure to care for his creation, which then turned into a tragic monster (Latour, 2011).

10 See, for example, Clark, 2010 or Klein, 2014, 1–3, which opens with the ironies of anthropogenic feedback loops, for example, when extreme hot weather, caused by the

the surface. The need to be responsive to effects also drives debates establishing the networks of entanglement of the Anthropocene, calling for greater sensitivity to the everyday feedbacks that bring these relations and interactions to light.[11] For some authors, extreme weather events or outbreaks of new viruses, for example, indicate networked interactions spanning the globe, revealing contingent linkages, interconnections and feedback loops (Haraway, 2015; Tsing, 2015, 37–43; Gillings, 2015).

The ability to see or sense the actual effects of relational interactions becomes more enabling as more connections are established and mapped across greater distances and across more varied forms of interactive life. These complex and intricate feedback loops also call for greater technological capacities. Thus, these tasks can be accomplished, according to Latour:

> by crisscrossing their [the loops'] potential paths with as many instruments as possible to have a chance of detecting in what ways they are connected … laying down the networks of equipment that render the consequences of action visible to all the various agencies that do the acting … . '[S]ensitivity' is a term that applies to all the agencies able to spread their loops further and to feel the consequences of what they do come back to haunt them… but only as long and as far that it [humanity] is fully equipped with enough sensors to feel the feedbacks.
>
> *(Latour, 2013, 96)*

Latour's framework sees the ability to map effects as crucial to revealing the unseen and unknown interconnections of the Anthropocene, involving the technology and regulatory mechanisms necessary to 'trace and ceaselessly retrace again the lines made by all those loops' with a 'strong injunction: keep the loop traceable and publically visible' so that 'whatever is reacting to your actions, loop after loop … weighs on you as a force to be taken into account' (Latour, 2013, 135).

New sensorial forms of posthuman governance are given a material political form as a new set of political competencies and responsibilities are established: 'Such an accumulation of *responses* requires a responsible agency to which you, yourself, have to become in turn *responsible*' (Latour, 2013, 96). Unlike earlier modes of governance, posthuman governance does not seek to make causal claims,[12] the emergence of effects can be mapped to reveal new relations of

profligate burning of fossil fuels, melted the tarmac and grounded aircraft at Washington, DC, in the summer of 2012.

11 Latour, 2013, 94–5; see also Connolly, 2013; Bennett, 2010. Latour (2013, 112) echoes Connolly and Bennett on the cultivation of sensitivity: 'To become sensitive, that is to feel responsible, and thus to make the loops feedback on our own action, we need, by a set of totally artificial operations, to place ourselves *as if we were* at the End of Time' (emphasis in original).

12 As Gilles Deleuze and Felix Guattari (2014, 11–22) note, tracing causal chains could only be a 'selective', 'artificial' and 'restrictive' procedure, 'overcoding' and reproducing its starting assumptions in a transcendent manner.

interaction and new agencies or actants to be taken into account but there is no assumption that effects can be understood and manipulated or governed through transcendental policy goals[13] – real-time responsive forms of management through posthuman mapping increasingly focus on the 'what is' (Latour, 2013, 126) of the world in its complex and plural emergence.

The fact that the 'what is-ness' of the world is not a concern with a modernist ontology of being and causation is often neglected in considerations of new modes of mapping. This is why it will be considered here and in more detail in the following section. Latour, in the 'Facing Gaia' lectures, argues that nature has to be understood in 'post-epistemological' terms (Latour, 2013, 26). By this he means that modernist forms of representation, reduction, abstraction and exclusion cannot know a world that is plural, lively and interactive. This is post-epistemological because knowledge can no longer be extracted from its concrete context of interaction in time and space. In this framing, knowledge, to be 'objective' – to be real – has to be plural, fluid and concrete (Latour, 2013, 49). This is very similar to Donna Haraway's understanding of 'situated epistemology', which rejects modernist drives to extract knowledge, i.e. to turn knowing into abstractions from real emergent processes through methods of scaling up, generalising and universalising; fixing knowledge apart from its plural, changing and overlapping context of meaning (Haraway, 1988). In this way of rethinking knowledge, the modernist divisions between subjective and objective and qualitative and quantitative are dissolved (Venturini and Latour, 2010).

Latour's is a flat ontology, where speed, size and scale are momentary and contingent products of interaction rather than constructing and shaping path dependencies. As Latour repeats, in a world of unknowable contingencies 'it is the *what is* that obstinately requests *its due*' (Latour, 2013, 126). This 'empirical' displacement of causal understandings can also be intimated from Beck's later work. Beck imagined the development of real-time mapping empirics as able to evade both the dangers of critical immanent approaches, which tended to reproduce the knowledge scepticism of postmodernism, and the hubristic knowledge claims of transcendental frameworks of cause and effect. Thus, the world could be governed in its complex emergence, through focusing on mapping effects as the starting point for governance:

> Seen this way, climate change risk is far more than a problem of measures of carbon dioxide and the production of pollution. It does not even only signal a

13 Deleuze (1988, 128) nicely captures the difference between transcendent and immanent approaches in his suggestion that transcendent approaches introduce a 'dimension supplementary to the dimensions of the given'; i.e. ideas of goals, direction and causal connections, which separate the human subject from the object of governance. Whereas, on the plane of immanence: 'There is no longer a subject, but only individuating affective states of an anonymous force. Here [governance] is concerned only with motions and rests, with dynamic affective charges. It will be perceived with that which it makes perceptible to us, as we proceed.'

> crisis of human self-understanding. More than that, global climate risk creates new ways of being, looking, hearing and acting in the world – highly conflictual and ambivalent, open-ended, without any foreseeable outcome. As a result, a compass for the 21st century arises. This compass is different from the postmodern 'everything goes' and different from false universalism. This is a new variant of critical theory, which does not set the normative horizon itself but takes it from empirical analyses. Hence, it is an empirical analysis of the normative horizon of the self-critical world risk society.
>
> *(Beck, 2015, 83)*

In mapping as a technique of posthuman governance, the focus on empirical analysis to facilitate real time responsiveness enables emergent effects to discursively frame governance without an external subject 'setting the normative horizon'. This new 'normative horizon' is one imagined as set by the world itself – and accessed through the development of new mechanisms and techniques sensitised and responsive to the world in its emergence. The post-epistemological implications of frameworks of posthuman governance seem to underlie the fascination with big data approaches as a way of generating increasingly sensitive real-time responses to emergent effects (Mayer-Schönberger and Cukier, 2013; Kitchin, 2014).

Big data, objects and relations

As already intimated in the consideration of Latour's work in the previous section, posthuman governance can be usefully engaged with as a mode of governance that necessarily shares the ontopolitical assumptions of actor network theory (ANT) and can be informed by a consideration of the long-running engagement between Bruno Latour (the leading proponent of ANT) and Graham Harman (a leading speculative realist) over the conceptualisation of this approach (Latour et al., 2011). Harman takes Latour to task precisely for the 'actualism' at the heart of the ANT approach, stating that, for Latour, momentary relations are more important than the substance of entities (or 'actants'):

> For Latour an actant is always an event, and events are always completely specific: 'everything happens only once, and at one place.' An actant … is always completely deployed in the world, fully implicated in the sum of its dealings at any given moment. Unlike a substance, an actant is not distinct from its qualities, since for Latour this would imply an indefensible featureless lump lying beneath its tangible properties … . And unlike a substance, actants are not different from their relations. Indeed, Latour's central thesis is that an actor is its relations. All features of an object belong to it; everything happens only once, at one time, in one place.
>
> *(Harman, 2009, 17)*

This focus on relations in the actual, in the present rather than on the potential, or possibilities – which may lie latent or virtual in entities, ecosystems or assemblages – is crucial to the distinction with a causal ontology:

> Since Latour is committed to a model of actants fully deployed in alliances with nothing held in reserve, he cannot concede any slumbering potency lying in the things that is currently unexpressed. To view a thing in terms of potential is to grant it something beyond its current status as a fully specific event.
>
> *(Harman, 2009, 28)*

As Harman argues, 'Latour is the ultimate philosopher of relations' and in this way inverts the assemblage theory of DeLanda (Harman, 2010, 176), which understands assemblages as never fully actualised, enabling the possibility for causal interactions to bring forward alternative paths of emergence. For Harman, and object-oriented ontologists, ANT falls down for its lack of distinction between objects and their relations, which he argues acts by 'flattening everything out too much, so that everything is just on the level of its manifestation', and therefore, the approach 'can't explain the change of the things' or the hidden potential of alternative outcomes (Latour et al., 2011, 95). For actor network theory, however, the emergence of new aspects of reality is not a matter of causal depth but of mapping as a technique for seeing what actually exists, but has, so far, been consigned to the background. As Latour argues:

> I call this background *plasma*, namely that which is not yet formatted, not yet measured, not yet socialized, not yet engaged in metrological chains, and not yet covered, surveyed, mobilized, or subjectified. How big is it? Take a map of London and imagine that the social world visited so far occupies no more room than the subway. The plasma would be the rest of London, all its buildings, inhabitants, climates, plants, cats, palaces, horse guards … . [Sociologists] were right to look for 'something hidden behind', but it's neither behind nor especially hidden. It's *in between* and not made of social stuff. It is not hidden, simply *unknown*. It resembles a vast hinterland providing the resources for every single course of action to be fulfilled, much like the countryside for the urban dweller, much like the missing masses for a cosmologist trying to balance out the weight of the universe.
>
> *(Latour, 2005, 244, emphasis in original)*

In ANT, as an alternative approach to relationality, what is missing in terms of governmental understanding is not relational depth but the mapping of relationality on the surface: the presence of actual relations which give entities and systems their coherence or weight in the present moment. Thus, for ANT, modernist understandings of the world, whether those of natural or of social science, give too much credence to entities as if they have fixed essences (allowing causal relations) rather than shifting relations to other actants:

> The world is not a solid continent of facts sprinkled by a few lakes of uncertainties, but a vast ocean of uncertainties speckled by a few islands of calibrated and stabilized forms … . Do we really know that little? We know even less. Paradoxically, this 'astronomical' ignorance explains a lot of things. Why do fierce armies disappear in a week? Why do whole empires like the Soviet one vanish in a few months? Why do companies who cover the world go bankrupt after their quarterly report?
>
> *(Latour, 2005, 245)*

In February 2008, Latour and Harman participated in a public seminar at the LSE, in which the distinctive nature of what is heuristically described here as mapping – as a form of posthuman governance – was brought to the surface. Noortje Marres made some useful interventions regarding the importance of ANT for the discovery of new ways of seeing agency in the world on the pragmatic basis of 'effect' rather than a concern for emergent causation:

> because pragmatists are not contemplative metaphysicians, because they say 'we will not decide in advance what the world is made up of', this is why they go with this weak signal of the effect. Because that is the only way to get to a new object, an object that is not yet met nor defined.
>
> *(Latour et al., 2011, 62)*

Marres argued that taking 'as our starting point stuff that is happening' was a way of 'suspending' or of 'undoing' ontology, in order to study change (ibid., 89). This aspect is vital to posthuman mapping as a mode of governance, as this enables a focus upon the surface appearance of change, which is not considered so important in an ontology of causality:

> It's about saying that we have a world where continuously new entities are added to the range of existing entities, everything continually changes and yet in this modern technological world everything stays the same. We have stabilized regimes … . But if we engage in studying specific objects, we do not find this singularized thing that is well put-together, as an object. We do not find it at the foundation but we find it as an emergent effect.
>
> *(Ibid., 90–1)*

Surface appearances of things are continually changing as their relationships do, not through an ontology of depth but through networks and interactions on the surface: in plain sight. As Latour states, regarding the mapping of the 'plasma' or the 'missing masses' of ANT: 'it's not the unformatted that's the difficulty here. It's what is in between the formatting. Maybe this is not a very good metaphor. But it's a very, very different landscape, once the background and foreground have been reversed' (ibid., 84).

Thus, my argument here is that the ontopolitical assumptions of mapping as a technology of posthuman governance can be usefully grasped in terms of actor network theory, in that the concern is not the nature of systems or substances but ways in which change can be detected through seeing processes of emergence as relational. Relational processes without a conception of depth are co-relational rather than causal as the processes of relation may be contingent and separate conjunctions. The fact that all forms of being are co-relational means that new opportunities arise for mapping as a process of seeing with and through these relations and co-dependencies: whether it is the co-relation of pines and matsutake mushrooms (mobilised by Anna Tsing, 2015, 176) or the co-relation between sunny weather and purchases of barbecue equipment or the co-relation between Google search terms and flu outbreaks (Madrigal, 2014). These are relations of 'effects' rather than causation, when some entities or processes have an effect on others they can be mapped as 'networked' or 'assembled', but they have no relation of immanent or linear causation, which can be governed through policy intervention.

The co-relational rather than causal aspect of actor network theory distinguishes it from assemblage theory or the neo-institutional or ecosystem approaches with their ontology of causal depth. Actor network approaches therefore lack the temporal and spatial boundedness of assemblages or of nested adaptive systems and have no assumptions of iterative interactions producing state changes to higher levels of complex ordering.[14] They say nothing of 'ontology' or of the essences of things, merely focusing on the transmission of effects at particular moments; thus they can produce maps drawing together 'litanies' of actors and actants – the plasma, or 'missing masses' – crucial for describing or understanding how change occurs in systems or states. Suspending or 'undoing' ontology opens ANT approaches to the world of interaction in the actual, or brings the open-ended processual understanding of the virtual into the actual. New actors or agencies are those brought into being or into relation to explain 'effects' and to see processes of emergence through 'co-relation'. In this respect, new technological advances, driving algorithmic machine learning, big data capabilities and the 'internet of things', seem perfectly timed to enable mapping as a posthuman technique of governance.

The rise of the correlational machine

Human–non-human assemblages of sensors enable new forms of mapping that have already begun to alter approaches to governance. These advancements are not

14 Harman calls this 'occasionalism' and argues that Latour provides the first-known example of 'secular occasionalism' (2009, 228) where there is no fixed way of explaining causation or the continuity of events. In ANT, nothing follows from anything else: 'Nothing is by itself either reducible or irreducible to anything else' (Latour, 1993b, 169). The work of composing relations begins again 'every morning' (Latour et al., 2011, 76). Regarding complexity theory, see Chandler, 2014a.

to do with causal knowledge but with the capacities to see through the breaking down of processes via the development of 'correlational machines'. I use the term 'correlational machines' to distinguish mapping as a posthuman practice as a very distinct paradigm in contra distinction to causal ontologies of depth and immanence. The development of correlational machines is not new to the Anthropocene, but is part and parcel of the extension of human agency through the use of artificial prostheses to enable the mapping of the environment. Perhaps the classic example, provided by Merleau-Ponty's work on the phenomenology of perception, would be the walking stick, which enables a blind person to map the obstacles around them through the resistance to touch and the sounds made (Merleau-Ponty, 1989). Another example would be the deployment of canaries for mapping carbon monoxide in mineshafts, where the canary becomes a prosthesis enabling greater human 'sense-ability' (Haraway, 2008).

Human, non-human and technological aids thus have long histories in enabling the extension of the mapping of effects, through the power of co-relation or correlation. It is important to illustrate why this is correlation and not causation as this is key to mapping as a posthuman approach to governance. Mapping deploys causal laws or regularities but the key aspect is that they are secondary to correlation rather than primary. As Latour would argue, the key concerns are not ontological but relational: the causal becomes background to the relational foreground. Take the example of the canary in the mineshaft. The precondition for the canary mapping the existence of carbon monoxide is the causal regularity of poisonous gas killing the canary before mine workers are aware of its existence and prone to its effects. However, the problem of carbon monoxide is not addressed at the level of causation (predicting it or preventing it from appearing or solving the problem afterwards) but through developing a method of signalling the existence of poisonous fumes and of increasing human sense-ability through the power of correlation. The canary is a non-human correlational (mapping) machine for signalling the existence of carbon monoxide. The canary enables the unseen to be seen: it brings the 'missing masses', which exist in the mineshaft, into perception. The addition of the canary into the situational context maps the existence of other actants, the poisonous gases, which were there but previously operated unseen.

Two everyday examples that draw out more clearly the 'machinic' nature of artificial prosthetics for mapping as a posthuman practice are the thermometer and the compass. Both the thermometer and the compass enable the extension of human sensitivity and agency. The prosthetic support they provide is correlational although based upon causal laws or regularities. The compass, based originally on the magnetic qualities of the naturally occurring mineral magnetite or lodestone, can enable a magnetised needle to point a course in relation to the geomagnetic North Pole. Thus, mariners could map their direction through the power of the compass as a 'correlational machine', enabling new 'actants' (magnetic fields of attraction) to be enrolled in navigation through their correlational effects (Dill, 2003).

The story of the thermometer is similar; it relies on causal relations, the thermal expansion of solids or liquids, such as water, alcohol and mercury, with the increase

in temperatures. These thermal properties of expansion were known to the ancient Greeks and applied or 'machinised' in the eighteenth century with the Fahrenheit scale (Radford, 2003). A thermometer is an artificially constructed correlational machine that enables the mapping of atmospheric changes that would otherwise be unseen. New 'correlational machines' are being developed all the time, enabled by a variety of new technologies, for example, more accurate quantum thermometers, measuring thermal changes at the quantum level. New actants, in this case intrinsic quantum motions, can be enrolled to create new machinic prostheses for mapping changes in temperature at ever more precise levels (NIST, 2016).

Mapping as a correlational process has proliferated under posthuman approaches to governance, enabling new high tech assemblages involving the extensive use of new mapping technologies. These are often termed 'the internet of things', where sensors can be connected to the internet and provide real time detection of changes in air and water quality, earth tremors or parking capacity. The potential use of mapping technologies is extensive. At the MIT Senseable City Lab, for example, researchers informed me of work being carried out using robotic sensors in sewers mapping minute quantities of bio-chemical material. Potentially, local authorities could receive real-time information on localised health profiles and illegal drug use.[15] If sewers can be turned into key information generators for bio-mapping and drug and health profiling, it is clear that mapping as a posthuman technology can provide a whole range of new avenues for monitoring and regulatory policing.[16] Thus, new assemblages are being artificially constructed that enable new actants to be enrolled in governance, including non-human and non-living actants, and in doing so, changes can be mapped and therefore responded to, often revealing new threats or dangers or expanding human sensitivity to existing ones.

While these 'more than human' machinic assemblages are constructed on the basis of causal laws and regularities their purpose is a correlational one: mapping what exists in the present, in the actual, but is unknown or unseen (the 'plasma' or the 'missing masses' of ANT). To take one contemporary example of new forms of posthuman governance, Elizabeth Johnson has done insightful work on more-than-human forms of governance in her analysis of the work of commercial biosensing and the use of organic life to map fresh and marine water sources for pollution (Johnson, 2017). Here an array of animal species, small fish, worms, molluscs, crustaceans and micro-organisms are monitored intensively to discover their norms of functionality and to develop ways of measuring changes in these indicators. They are then ready for use as mapping 'correlational machines':

> [The company] monitors a suite of 'behavioral fingerprints' as these organisms are exposed to different systems. Locomotor activity, reproductive rates, and embryonic developments are measured together to indicate the severity of

15 As Charlotte Heath-Kelly (2016) notes, big data ontologies of complexity lead to universal rather than targeted surveillance parameters.

16 Personal interview, researcher, Senseable City Lab, Massachusetts Institute of Technology, 30 March 2017.

> hazardous anthropogenic chemicals as well as biologically produced toxins, such as blue-green algae. In this way the company boasts, it can make 'pollution measurable.'
>
> *(Ibid., 284)*

As Johnson notes, the mode of mapping is less about causation than seeing the unseen: 'making imperceptible harms perceptible' (ibid.). This approach maps through correlation, which enables new problems and possibilities to be detected. For example, changes in the bodily indicators of the animal organs can alert human agents to identify potential problems even if the sources are unknown. Thus, the company concerned argues that problems can be detected 'in due time before pollution irreversibly spreads in the environment or even harms human health' (ibid.). In a technological extension of the non-human mapping capacity of the canary down a coalmine, 'biosensing enables a way of seeing with nonhuman life' (ibid., 286).

Just as for the thermometer to work as a correlational machine the properties of mercury needed to be understood for its enrolment. For biosensing technologies, green florescent protein (GFP) has been a widely used tool to enable organic life to be modified into correlational machines, potentially mapping a wide range of changes in acidity and alkalinity as well as the presence of pathogens, toxins and cancer-causing agents (ibid., 285). Mapping, on the basis of developing new forms of correlational sight, enables a fundamental shift from governance on the basis of 'problem-solving' and analysis of 'root causes' to the governance of effects. In this mode of governance, distinctions between scientific disciplines and individual entities tend to disappear as these historically depended upon organic conceptions of causation. In contrast, the ontopolitics informing mapping is not concerned with entities or with causation, enabling 'more-than-human' assemblages of mapping to become the new governmental norm.[17]

Conclusion

Mapping as a form of posthuman governance is less concerned with adaptive change (to prevent problems before they occur or with transformation afterwards) than with responsiveness to problems understood as emergent effects. The essence of entities, be they systems, societies or individuals, becomes much less important than the mapping of surface 'effects', which are to be modulated and responded to. Thus, with posthuman forms of mapping there is no longer a 'line' of causality but a 'plane' of relationality – this shift is fundamental in terms of governance, which, as analysed above, no longer needs to assume a normative horizon or normative goals external to the actuality of the world. As

17 This form of governance through the modulation of effects can be usefully grasped in terms of Deleuze and Guattari's concept of 'machinic enslavement', derived from cybernetics, where responses are automated to manage or govern on the basis of maintaining equilibrium. In this process there is no distinction between using a machine and being part of the informational input to the machinic process: the process itself is more important than distinctions between entities or individuals. See Deleuze and Guattari, 2014, 531–6; Lazzarato, 2014, 23–34.

Agamben has highlighted, governance through the mapping of effects can thereby be seen to be thoroughly depoliticising, as the tasks of governance are discursively derived 'empirically' from the world, rather than from human actors as subjects. Thus, mapping in a digital world becomes a very different project of governance once it is constructed in terms of a process-based, less subject-centred, or posthuman ontology of emergence. There seems to be little doubt that new digital technologies are increasingly deployed in ways that can be understood as reflecting this ontological shift in perspectives and thus need to be politically engaged with on these terms.

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11

MAP-I: MERCATOR REVISITED

From mapping modernity to postmodern creative cartographies

Inge Panneels

Introduction

The mapping of our world has long been a significant scientific undertaking, one that has influenced how we *see* the world and our place within it. A reconsideration of Mercator, whose work reflected upon an age of unprecedented mapping of both the global and celestial, provides a useful methodological starting point for reflecting upon mapping today when new digital technologies and approaches mean that our collective worldview is once again being radically altered. This chapter is a personal reflection on the legacy of the sixteenth-century cartographer Gerard Mercator, informed by the author's artist-in-residency at the Mercator Museum in Sint-Niklaas, Belgium. Mercator's legacy is contrasted with the *Powers of Ten* by Ray and Charles Eames, which is analysed as one of the first examples of ontological mapping; as a succinct merging of different fields of knowledge into a coherent visual narrative. Both of these projects eloquently encapsulate the notion of wonder and the sublime and will be placed in the broader context of visual culture in general and creative cartographies in particular.

Mapping Heaven and Earth: the visual turn

It has been argued that the *visual turn* defined the Modern Era, where vision played such a key role as a means of empirical observation – where the invention of good-quality polished glass lenses has been fundamental to the expansion of knowledge about the universe in particular – but where the visual has also been a key critical agent of power. The anthropologist Alan Macfarlane and historian Gerry Martin (2002) argued that access to glass technology played a critical role in the development of western civilisation, and the development of western science in particular,

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with inert, transparent glass the perfect material for clinical observation.[1] Imagine an archetypal image of the contemporary science lab: of microscopes, glass laboratory wares bubbling away and festering petri dishes … . Glass is a key technology that enables scientific experiment and observation. It was the invention of good-quality polished glass lenses, which led to the development of the telescope and latterly the microscope, prime tools for observation, which have been fundamental to the expansion of knowledge in general, and for mapping the universe in particular.

The optical qualities of glass that enable it to refract light and magnify images were not just used to aid reading, but more to help people see beyond what was too small or too far away. Simple magnification is achieved with convex lenses such as are needed for short-sightedness. The need for both concave and convex lenses to make more powerful telescopes was hampered by the technical limitations of the glass technology then available. It was an optician, the Dutch instrument maker Hans Lipperley, who is credited with constructing the first telescope, using the combination of a convex and concave lens, made from rock crystal, presenting his invention to the court. It is thought that it was via diplomatic courtiers from the court that the Italian mathematician Galileo Galilei heard of this invention in the Netherlands and understood its implications as a tool for discovery, particularly for the study of astronomy. He set out within days to make his own version.

Galileo's hands-on approach to grinding and polishing glass lenses increased the magnification power of the telescope through practical improvements from eight to twenty and eventually to thirty times, which led him to make his epoch-changing discoveries of the planets and stars.[2] The German mathematician and astronomer Johannes Kepler (1571–1630), whose devotion to the theoretical study of optics was matched by his understanding of glass lenses, improved the Galilean telescope and subsequently formulated the seismic theory of the motion of planets, one of the foundations for Isaac Newton's (1642–1727) theory of universal gravitation. Galileo, Kepler and Newton all used mathematical theory for their astronomical discoveries, but it needed practical observations, using glass lenses, to prove their theories. Even though glass quality had improved by the late 1800s, it was the refractive qualities of the glass that needed to be improved in order to develop optics further. The German mathematical physicist Ernst Abbe (1840–1905), together with gifted instrument maker Carl Zeiss and young chemistry graduate Otto Schott, founded the Schott Glassworks in Jena, Germany, in 1884. This revolutionised the manufacture of optical instruments and grew into a modern glass

1 They also argue that the availability of glass-shaped western culture and civilisation: it was critical to the development of observational science, it shaped architecture and transformed agriculture in the form of greenhouses.

2 Ironically, it is suggested that it was the availability of good-quality Venetian glass in Holland that resulted in the boom in optics in the Netherlands in 1608. Venice remains to this day a centre of glass-making excellence, centred on the island of Murano. It was Venetian glass blowers who are credited with breaking trade secrecy by bringing the ancient techniques of Venetian glass making to the US in the mid-twentieth century, which has led to emergence of a buoyant art glass scene, both in manufacturing and collecting.

conglomerate, still operational today. It was the development of the silver-on-glass reflectors, which were lighter, more accurate and cheaper to make than glass lenses,[3] which were next to revolutionise astronomy (Watson, 2004).

The perfection of the glass *prism* by Schott, in turn, enabled the field of photography to develop in the nineteenth century. Photography itself became a key part of a new type of telescopes, recording images from space onto photographic plates. This negated the need for human eyes – which are prone to being tired or simply missing things 'in the blink of an eye' – scanning the sky. In the early 2000s, the German filmmaker Harun Farocki's *Eye/Machine* series of work on 'operational images' drew attention to the limits of human biological vision but more profoundly to the fact that *images* are increasingly produced by machines, thus presciently critiquing Cosgrove's observation that 'the eye is always in a fleshy body' (2008, 5), an observation that will be returned to shortly.

Photography established itself as the defining art form of the twentieth century, and the predominance of the image in our visual culture (Mirzoeff, 2015). Two of the most iconic photographs of the last century are *Earthrise* taken by the Apollo 8 in December 1968, and Photo AS17–148–22727, an image captured by Apollo 11 on its final flight in December 1972. The latter image became known as the *Blue Marble* (1972) of Earth as seen from space at a distance of 45,000 kilometres. The photograph shows Earth as a blue glass marble with the outline of the African continent clearly marked out beneath wisps of clouds. *Blue Marble* became one of the defining images of the twentieth century (Cosgrove, 2001; Mirzoeff, 2015). In 2002, NASA produced a new set of images, also entitled *Blue Marble*, which are a digital montage of four months' worth of images. These, and other subsequent images from 2012, as architectural critic Laura Kurgan observed, were an artificially assembled composite of massive quantities of remotely sensed data collected by satellite-borne sensors (Kurgan, 2013, 11). These familiar yet simultaneously true and artificial images of the planet fundamentally changed our understanding of planet Earth – and our place on it. The 'Apollonian gaze' – not named after the spacecraft but after the mythical Greek god Apollo – was present in the imagination of humans long before space flight facilitated its extra-terrestrial view. For Cosgrove, it is a viewpoint of celestial and terrestrial harmony as well as divine authority, surely a view also shared by Gerard Mercator, as will be discussed in a moment. It also heralded a vision of global unity and a potent signifier for the environmental movement.

3 Glass being an elastic material has a tendency to sag under its own weight. In ordinary circumstances this would be imperceptible but in a lens, whose surface must be accurate to a tiny fraction of a millimetre, it becomes problematic with glass over a metre in diameter. The largest glass lens ever made was made by Corning Glass in 1934 for the American astronomer George Ellery Hale: it measured 200 inches in diameter and took ten months to anneal and over two years to grind and polish. The surface problem was solved by creating a honeycomb structure to the disc. The lens was finally placed in the Hale Telescope for the Palomar Observatory in California in 1947 and named posthumously after its creator; it was later used by Edwin Hubble to take photographs of space unseen before.

Light visible light in the electromagnetic spectrum has thus been the critical phenomenon that has enabled optical telescopes to capture the energy emitted as visible light by stars and also made it possible for extra-terrestrial cameras to photograph Earth. Latterly, the universe is being revealed through light beyond the visible spectrum, to explore and map the universe beyond the visual, using X-Rays, Gamma and sound waves. The Space Race in the Cold War was the catalyst for the space technology that enabled huge strides in the development of communication, knowledge exchange and scientific discovery. The invention of a military communication network spawned the internet, enabled by glass fibre optic cables and the installation of 24 satellites in orbit which formed the Global Positioning System (GPS) in the aftermath of the Space Race in the 1960s and was completed in 1994 (Mirzoeff, 2015, 206). Both internet and satellite communication were gradually extended from exclusive use by the military to civilian access. It is argued that the disruptive technology of the internet will continue to disrupt, in the same way that the Gutenberg press presaged profound social change in Mercator's time (Naughton, 2012). Thus, light itself is being used to decipher its origins and map the universe. The physicist Arthur Zajonc wrote that light needs objects in order to be 'seen'; 'we see only things, only objects, not light' (1993, 3). *How* we see and *what* we see is thus worthy of further critical examination.

Critical cartography in visual culture

Neuroscientists have proven that a technically functional eye cannot really see unless it has learnt to see from a young age, and that once it has learnt – even if impaired – the visual cortex 'deprived of visual input, is still good neural real estate, available and clamoring for a new function' (Sacks, 2010). Learning to see is both a neurologically learnt cognitive process and a socially and culturally defined ability (Zajonc, 1993). How then are we culturally primed to see? The social construct of *seeing* space in particular will be explored here.

The emergence of the academic field of visual culture in the late twentieth century reflected on the veritable explosion of visual media in the twentieth century: film, television and social media, has seen an exponential growth of visual media which has outgrown its natural habitat of art history, aesthetics and, latterly, media studies. A critical evaluation of what all this visual culture 'does' has been the subject of visual culture studies. Visual culture is not just part of daily life but *is* daily life when information, meaning or pleasure is derived through visual means, whether visual art or media (Mirzoeff, 1999, 3): visual culture is 'showing seeing' (Mitchell, 2002, 166). As visual studies expanded outside the field of art history – and as cultural studies examined cultural practices' relation to power, in both analysis and critique, reflecting the increasingly interdisciplinary nature of scholarly research – so too did geography expand outside the field of cartography.

The French philosopher Michel de Certeau distinguished between *place* (lieu) and *space* (espace) in his influential *Practice of the Everyday* (1980). Where place implies belonging and an indication of stability, space has none of the stability of

place, being a product of action and movement. De Certeau also distinguished between *producers* – the mapmakers – using *strategies* to plan space and *consumers* – the map users – who use *tactics* to navigate space. The implication of this for cartography was profound. De Certeau determined that the earliest kind of map was not a geographical map but 'a history book', recording journeys pictorially and thus implying movement, a line of enquiry that the anthropologist Tim Ingold (2007) investigated further with his historical analysis of *the line* in the story of the map; from a three-dimensional bodily gesture to a two-dimensional drawing. The subsequent use of the straight line removed the line of the map even further from the fluid gestural strokes. Maps became more autonomous and divorced from the space of which the map is the 'visible evidence of its own construction' (Reynolds and Fitzpatrick, 1999, 68). The map historian Allesandro Scaffi put it eloquently: 'With quantification, and by asserting the concept of an absolute space, mapping from 1500 certainly gained increasing precision over the whole span of time as well as the whole of earthly space. The price however, was the loss of the timeless vision offered by the medieval *mappa mundi*; mapping's horizon was reduced to three-dimensional Euclidean space and limited to our experience of the physical world' (quoted in Cosgrove, 1999, 67–8). However, the French philosopher Merleau Ponty (1908–1961) observed that it is only *because* we have explored forests, prairies and rivers that we can even make sense of a geographer's map, in which all these features are reduced to abstract symbols (quoted in Matthews, 2002, 63). The phenomenological philosophical framework that he developed considers perception then as a combination of sensation *and* cognition that is inclusive of both a passive encounter with environmental stimuli and an active exploration as the body moves through space and time (Rodaway, 1994). Phenomenology thus accounts for our individual experience of the world that colours and shapes how we experience it: how we see it in the broader neurological sense.

While the mapping instinct has been evidenced in archaeological maps since the rise of the agricultural settled lifestyle (Brotton, 2012), map *knowledge* does not come to us naturally but through complex cultural understanding. The understanding of how maps work, and the diverse ways in which space and place are currently conceptualised and analytically employed to make sense of the world, has been analysed more in the last three decades. David Woodward and Brian Harley's multi-volume *History of Cartography*, a longitudinal project started in the 1980s, provided a first theoretical and critical reflection on the broader cultural and historical contexts and implications of cartography. The diverse analyses of cartography, edited and collated by geographer Denis Cosgrove in *Mappings* (1999), evidenced the exponential expansion of the interest in 'mapping' beyond the disciplinary confines of geography. Cartographer and artist Denis Wood argued in his seminal book, *The Power of Maps* (1992), that understanding the historical provenance and the rationale of maps to claim territories, mark property and denote political boundaries, make maps potent tools of power. The democratisation of mapping – or the 'undisciplining of cartography' (Crampton and Krygier, 2005) – is what Foucault called 'an insurrection of knowledges' (1980, 84). In *Else/Where:*

Mapping New Cartographies and Territories, artist and critic Janet Abrams and writer Peter Hall (2005) outlined two distinct cartographic developments. First, mapping as 'a means of observation, analysis and synthesis of ideas that draws on different practices including design, architecture and engineering': the consolidation of disparate fields of knowledge through mapping. Second, the ubiquity of available mapping technologies and networks that has allowed for the democratisation of mapping, of anything, by anyone. This latest 'technological transition' of cartography has not been enabled so much by new software as by a mixture of open source collaborative tools, mobile mapping applications and geotagging (Crampton and Krygier, 2005).

The ability to convey complex data in a visual manner that is much easier to understand than the raw data itself is not a new idea. The cholera map of London made by physician John Snow in 1854 revealed the source of the cholera outbreak to be water rather than air as previously thought and prompted the London authorities to close the pump and halt the spread of this deadly disease.[4] It demonstrated the power of mapping by uncovering hitherto unseen connections, and more importantly, revealed it as a tool for change. This precursor to the modern map thus reveals the map to be a powerful tool for agency.

Cosgrove observed that 'all the resources of visualisation and graphic communication are combined in mapping; the map is perhaps the most sophisticated form yet devised for recording, generating and transmitting knowledge' (1999, 12). The map's ability to reveal connections and also networks between datasets, at a time when knowledge is increasingly produced in abstract datasets, make maps key and necessary tools in contemporary society. Mapping has thus become the modus operandi of contemporary life and fundamental to the process of lending order to a complex and multi-layered connected world. The emergence of mapping in many different disciplines such as architecture, planning, design, the arts and humanities, social sciences … is testament to the power of the map. The interpretation and visualisation of datasets has given rise to the emerging discipline of infographics in the last three decades, with statistician and artist Edward Tuffte as a pioneer in the field of data visualisation, also sometimes called 'the functional art' (Cairo, 2013). Tuffte noted that envisioning information is 'to work at the intersection of image, word, number, art' (1990, 9). Tuffte is an advocate for the importance of visual literacy when presenting data in a visual manner. All elements of the *design* of information – how it is presented, the layout, the typography, the use of colour, etc. – are key considerations. Maps, graphs and diagrams are tools in the toolbox of the information designer. Mapping has become the main tool in managing and interpreting the exponential growth of datasets, produced by the ever more powerful and networked computer. The neuroscientist and geneticist Anthony Monaco argued that 'big data is the measure of mankind' (2016) and that it is therefore

4 Brotton, Jerry, *Great Maps: The World's Masterpieces Explored and Explained* (London: Dorling Kindersley, 2014, 192–193).

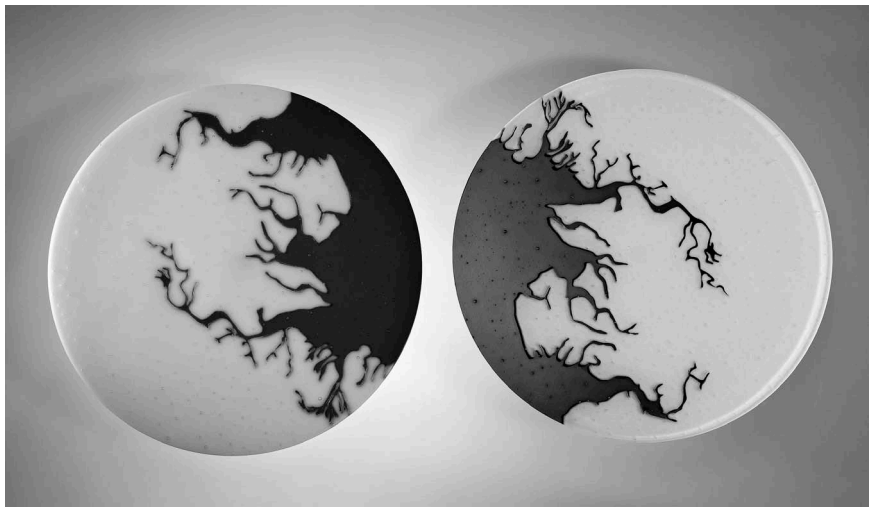

FIGURE 11.1 *Micro Macro*, Inge Panneels, 2010 (Fused glass, stainless steel fixings, 2 x 28 cm diameter. Collection of the artist)
© Photograph by Kevin Greenfield

imperative that current and future generations of students in both technical and liberal arts subjects are equipped with a quantitative mindset.

The correlation of the cognitive process of abstraction, as deployed in science and observed in modern art, had been noted by neuroscientists such as Shlain (1991) and Kandel (2016). Kandel argued that the process of reductionism in particular enabled scientists to explain complex phenomena (by examining one of its core elements at a more elemental level), and that this can also be observed in the abstraction deployed by artists. Kandel uses the term 'bottom-up information processing' to discuss an innate way of seeing that depends on a 'low-level and intermediate level of vision' central to the physical function of seeing (2016, 22). The brain must interpret the signals sent to the visual cortex via the optical nerve system. He differentiates 'top-down information' as the cognitive influences and mental functions such as attention, imagery, expectations and learned visual associations. Kandel makes the case that the brain must engage top-down processing in order to 'construct' perception, based on previous experience. It is this process which, he argues, is at play when we consider abstract works of art: 'In a sense, to see what is represented by the paint on a canvas, we have to know beforehand what sort of image we might expect to see in a painting' (2016, 23).

It is our familiarity with landscape that helps us discern almost immediately the scene in the dots of the pointillist paintings of Georges Seurat, for example. It is this prior knowledge, as Merleau-Ponty had already observed, of our ability to decipher the abstract symbols on a map that enables the process of abstraction. For the French philosopher Giles Deleuze, the post-structuralist approach to geography is 'to become sensitive to the vivacity of space' (Doel and Clarke in Hubbard et al.,

2004, 106). De Certeau had argued that many creative everyday 'arts of practice' evade almost all forms of representation and are not comprehensible through strict models used in the social sciences (Weymans, 2004). While the subtle delineations of philosophical frameworks are not the subject of this chapter, the theoretical underpinning – that the world was no longer to be seen as a machine, made up of a multitude of separate parts, but as an indivisible whole: a network of dynamic relationships that even included the consciousness of the human observer in an essential way – have nonetheless informed the concept of postmodern approaches to 'seeing'. In his observations on how abstraction in modernist art has altered our way of 'seeing', Kandel predominantly discussed modern artworks. Next, we will consider how postmodern approaches to art are informing how we 'see the world'.

Mapping in art

Postmodernism in art was a reaction against modernism in art, which had dominated art theory and practice in the first half of the twentieth century. Anti-authoritarian by nature, postmodernism in art refused to yield to the authority of a singular style, the difference between high art and popular culture, between art and the everyday: as evident in the eclecticism of art practices such pop art, conceptual art and feminist art. This coincided with the emergence of the *expanded field*, a term defined by the art critic Rosalind Krauss in 1979, which describes ideas about both landscape and architecture as forms of sculpture that were being explored by moving art out of the gallery and into the landscape itself. Modern sculpture, she noted, 'had become a kind of ontological absence' (1979, 36), one in which abstraction had unmoored sculpture from its plinth, quite literally its groundedness. Thus, contrary to the abstracted way of seeing, evident in modern art, which Kandel had noted was a useful way to expand 'seeing', postmodern art, as described by Krauss in the expanded field is, I would argue, a reaction against the 'ontological absence' – or the *unmooring* Krauss noted of modern sculpture – and introduces once again new ways of how we 'see the world'.

If the established logic of the 'modern' was mostly concerned with *progress* and 'new worlds' – principles such as authority, unity and certainty required a 'historical deafness' (Jameson, 1991) – the postmodern can then be associated with difference, plurality and scepticism and a return to (historical) narrative, as demonstrated in the *Map of Nowhere* by British artist Grayson Perry.[5] Perry references the historical Ebstorf map[6] (circa 1300). The body of Christ forms the central structure of this mappa mundi and 'implies Christ's involvement with and understanding of humanity and the world' (Barber, 2010, 80), where the map fulfilled as

5 Grayson Perry's inspiration and making of the *Map of Nowhere* can be viewed online: www.youtube.com/watch?v=ZIFfzox06a0

6 The Ebstorf map (circa 1300) is over 3.5 m in diameter (357 cm) and is the largest known medieval mappa mundi, and although the original is no longer with us, the surviving photographic reconstruction allows us to see the scale, colour and detail of the map.

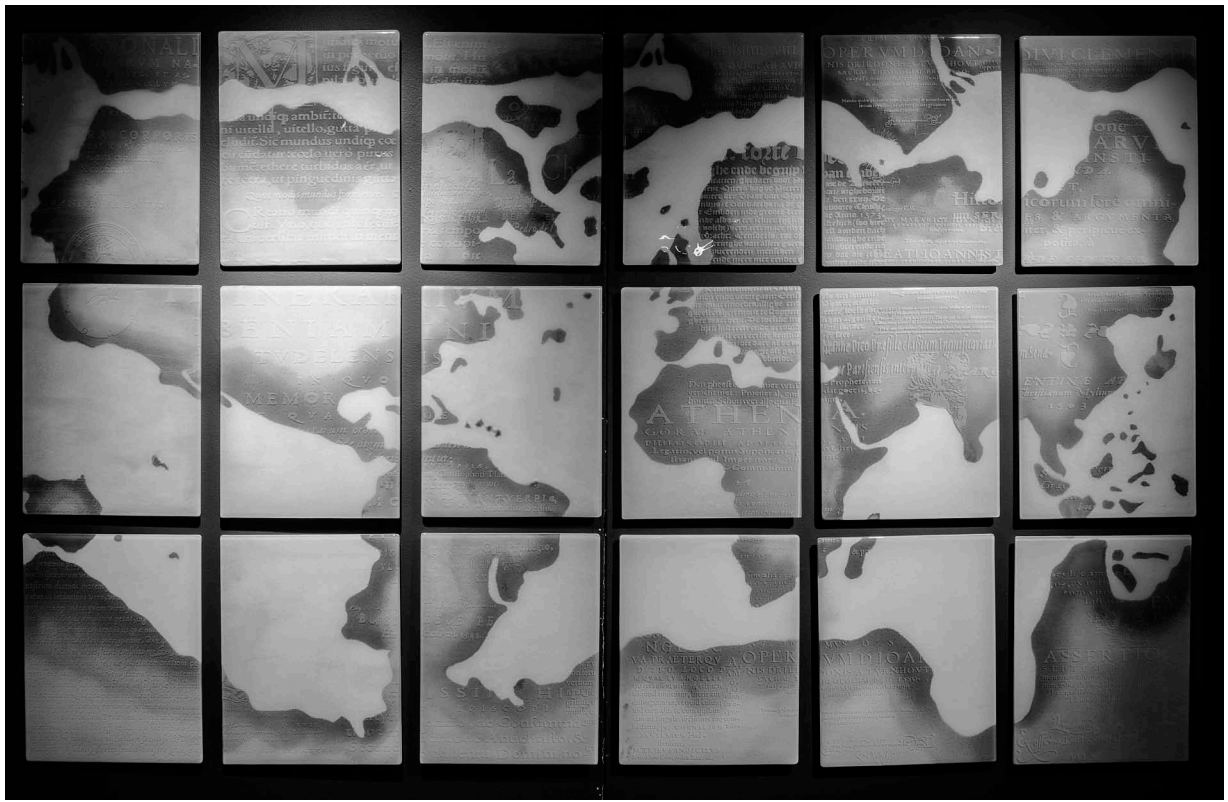

FIGURE 11.2 *Compendium*, Inge Panneels, 2013 (Fused glass, engraved, stainless steel fixings, 18 x 34 x 45 cm. In the collection of the Mercator Museum, Sint Niklaas, Belgium)

FIGURE 11.3 *Circulus* and *Quadratum*, Inge Panneels, 2013 (Fused glass, engraved, stainless steel fixings. Collection of the artist)
© Photograph by Jürgen Doom

much a spiritual function as a cartographic one. Perry adopted the map's iconography and borrowed the title, a pun on the Greek *ou tops*, meaning no place, from Thomas More's (1478–1535) *Utopia*. Perry, an iconoclast artist, placed himself irreverently at the centre of the map:

> I wanted to make a map of the beliefs, headlines, clichés, and monsters that populate my social landscape. At the top of the map, to the right handside of my head, is a swirling whirlpool labelled Baloney Generator (note; baloney; foolish or deceptive talk, nonsense). This was cognitive scientist Steven Pinker's phrase, describing our brain's desperation to make sense of the world and its often-spurious rationalisations of our intuitive behaviour. Perhaps this map is an attempt to chart a meandering journey through my own psyche and contemporary life. In the centre of the map sits a figure in a cage behind a wall being visited by a stream of pilgrims on a small island labelled 'doubt'. I am distrustful of those who are vehemently sure about their beliefs. Above the island of Doubt, in the sea of despair, is a ship labelled 'The Sadness of the excessively logical', below it on the shore is a phallic rock dwelling 'Know All' […] This piece reflects my concerns at the time, late 2007/08, about everything from class and turbo-consumerism to green politics and intellectual snobbery. The names of the sites are often current media buzzwords and phrases; kidults, neighbours from hell, shopaholic, thumb generation, faith-based intelligence, the Bilbao Effect … .
>
> *(Perry in Barber and Harper, 2010, 81)*

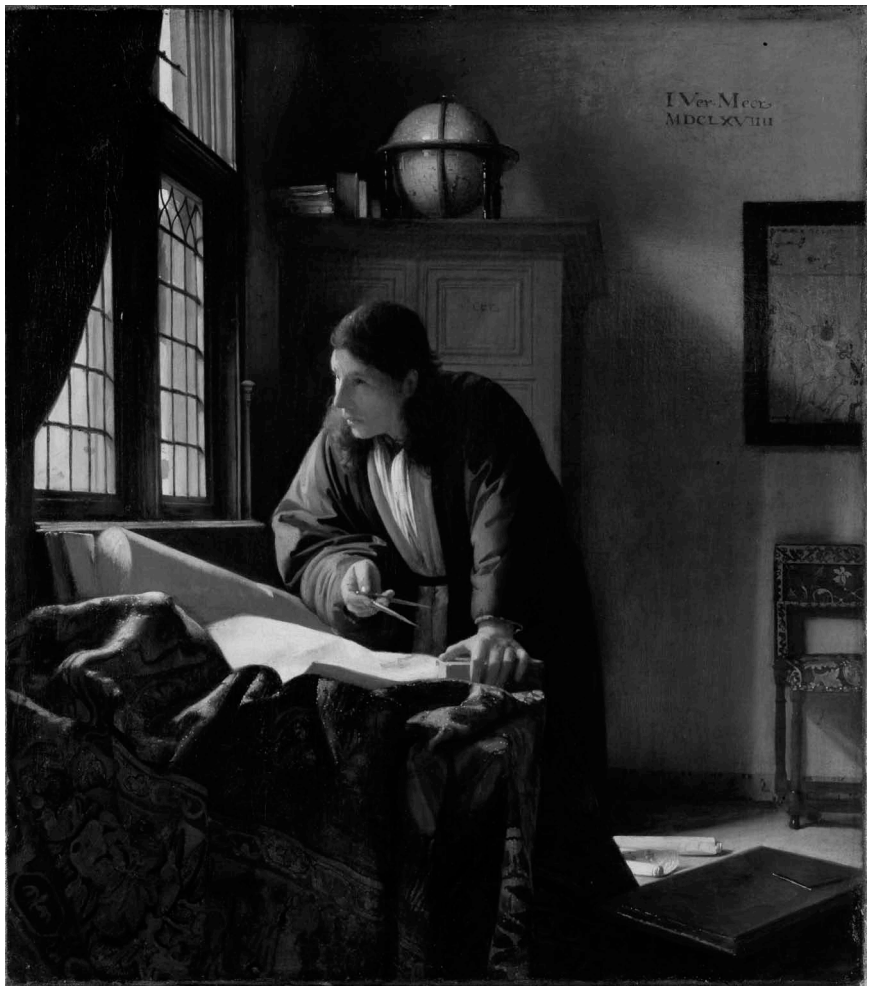

FIGURE 11.4 *The Geographer*, Johannes Vermeer van Delft, 1669 (Oil painting on wood, 51.6 x 45.4 cm)

Perry has thus reinterpreted a medieval map for the twenty-first century, where the mappa mundi is being used not as a moral guide of certitude but as a mocking moral questioning of contemporary life. I would argue that *Map of Nowhere* brings both a phenomenological approach to his work – evidenced in his choice of the word 'intuitive', for example – and an aspect of *cognitive mapping* as argued for by the Marxist political theorist Fredric Jameson (1995). Jameson contended that to map social space and class relations in late capitalism was imperative, and that a 'Marxist dialectic as a compass for cultural critique' was much needed because 'an inability to cognitively map the gears and contours of the world system is as

debilitating for political action as being unable to mentally map a city would prove for a city dweller' (Toscano and Kinkle, 2015, 7). Perry thus used his 'fleshy eye' and his embodied experience of the world to cognitively map. In critiquing the society in which he lives, using the known trope of the mappa mundi map, Perry's is a postmodern artwork.

The expanded field had started to define both arts practice and theory with ideas that are traditionally geographical terms: notions of *space, place* and *site*. The Situationists, headed by French writer and artist Guy Debord, had literally upended the map, through the challenge of the *dérive* (drift) in the mid-1950s. This technique of transient passage allowed the psycho-geographer to explore the terrain through an element of chance. Drift subverted dominant authoritarian readings of the urban landscape, and instead honed in on the ephemeral, fugitive and sensory spatial experience. Jameson described the importance of drift as a form of *cognitive mapping* in relation to urban space as 'the practical re-conquest of a sense of place and the construction or reconstruction of an articulated ensemble which can be retained in memory and which the individual subject can map and remap along moments of mobile, alternative trajectories' to reclaim territory in a dis-alienating urban landscape (Corner, 1999, 231–2). Artists thus upended the map through the *dérive*, or walked the map and mapped the walk, cut up the walk and rearranged it, erased and painted over the map. Thus: 'Map artists claim the power of the map to achieve ends other than social reproduction of the status quo' (Wood, 1992). Artists used mapping techniques to create images, and understood that scientific measurement is not the be all and end all but that collating information about places – its people, its history, its memories, its culture – the intangible assets that interweave with the physical realities of a geographical location – all add up to giving it a *sense of place*. Mapping in art moved beyond the map as a trope towards mapping as a methodology, where the social has to some extent become the new plastic. The importance of artists creating work informed by the locale, whether urban or rural, has turned artists into producers of new knowledge, makers of alternative forms of data, and has been a key factor in the changing field of geography itself (Hawkins, 2014).

'I map, therefore I am', wrote Katharine Harmon (2003, 11) as a means of defining the modus operandi of the artists who use maps and mapping methodologies to make sense of the world, a pun on the proposition *cogito ergo sum* [7] by René Descartes (1637). Mapping in art has emerged as a distinctive critical tool for artists, as is demonstrated in the burgeoning cartographic work produced by visual artists in the last five decades. The exponential expansion of creative geographies in the last 15 years (Harmon, 2003/2009), and the emergence of creative mapping within other disciplines, suggests that 'this is the moment of the map' (Mogel in Thompson, 2008, 107). Artists have been singularly astute in exploring the agency of the map, with its potential to be subversive. A map is, of course, never truly an

7 Attributed to Descartes' treatise *Discourse on the Method* and originally published in French as *Je pense, donc je suis,* which translates into English as 'I think, therefore I am.'

FIGURE 11.5 *Micro Macro (Mercator)*, Inge Panneels, 2013 (Fused glass, engraved, stainless steel fixings, 78 x 78 x 3 cm–3 x 3 x 0.6 cm. Private collection)
© Photograph by Jürgen Doom

objective instrument but rather one shaped by its time and place (Wood, 1992). Artists have been able to play with the perceived neutrality of maps as instruments of science, perhaps not surprising 'in post-modern times with all truths suspect' (Harmon, 2009, 8), as we have already seen with Perry's *Map of Nowhere*. Visual culture theorist Irit Rogoff noted a crisis of the ability to represent

> any form of stable geographic knowledge as a set of guidelines regarding identity, belonging and rights – has made manifest the degree to which we have collectively lost the navigational principles by which such questions were determined in the recent past such as mid-century.
>
> *(2000, 3)*

Mapping-i: Mercator Revisited

It is thus within this context that the Map-i: Mercator Revisited art project emerged. The 'Map-I' project engaged with mapping in art and the map as metaphor specifically by looking at the notion of space from a human – and phenomenological – perspective: from the infinitesimally small to the sublime of space. The ethos of Map-i was based on this premise of interconnectedness: how the observable universe can be broken down into infinitesimally small particles, applicable at both the micro and the macro level, always of course observed from a human point of view and referenced by the 'i' in Map-i. The artwork made for Map-i: Mercator

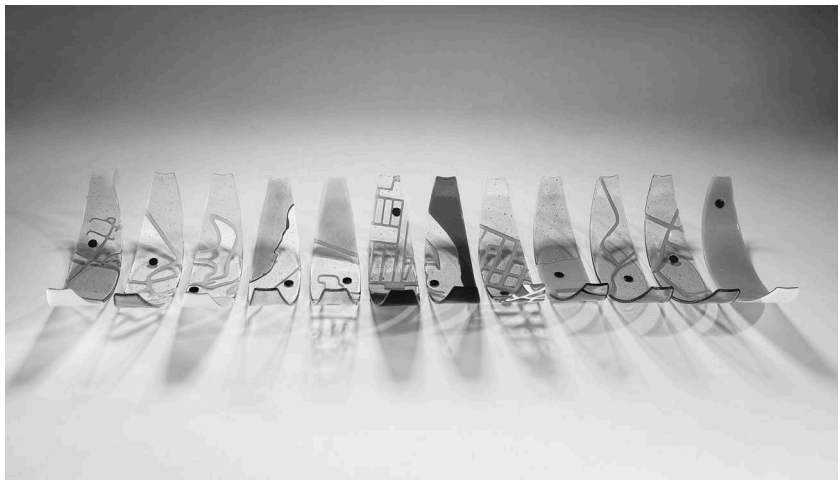

FIGURE 11.6 *Terra Mundi*, Inge Panneels, 2013 (Fused glass, engraved, stainless steel fixings, 12 x 48 x10 cm. Collection of the artist)
© Photograph by Kevin Greenfield

Revisited was a twenty-first-century response to the work and life of the sixteenth-century cartographer and was exhibited at the Mercator Museum in Sint-Niklaas, Belgium (April–December 2013) and accompanied by a publication (Panneels, 2013). It is apt that the material of choice for artworks was glass – a material that speaks of the modern, but applied in a post-modern setting. Four works from this exhibition will be briefly discussed.

The sixteenth-century 'cosmographer' Gerard Mercator (1512–1594) was a polymath whose scholarly skills and manual craftsmanship were embodied in his work as a cartographer and maker of globes. Mercator understood the political agency of maps but considered his life's work, the *Atlas sive Cosmographiae Meditationes de Fabrica Mundi et Fabricati Figura*, not as a political work, but as a spiritual endeavour. The compilation of Mercator's life's work in a bound book of maps, coined the term 'atlas' as we know it today. However, Mercator's major and long-lasting achievement was the development of the eponymous projection, first seen in his celebrated *World Map* of 1569, which 'may be the most influential map in the history of geography' (Brotton, 2012, 247).[8]

Mercator was a scholar who combined ancient learning with the most current research (Crane, 2002; Taylor, 2004). His friend, the Flemish cartographer Abraham Ortelius (1527–1598), called him 'nostri saeculi Ptolomeus': the Ptolemy of our age. Mercator's seminal world map was thus based on emerging new contemporary empirical and embodied knowledge that profoundly changed our world view. It gave rise to the flat, cartographic gaze which has defined the Modern Era and the

8 A facsimile hangs in the Mercator Museum in Sint-Niklaas, while the original is in the collection of the Kultur and Stadthistorisches Museum, Duisburg, cf. Horst, Thomas, *De Wereld in Kaart: Gerard Mercator en de eerste wereldatlas* (Brussel: Mercatorfonds, 2011, 85).

cartographic 'view from nowhere' where all points are mapped simultaneously, non-perspectival and highly abstract: the objective viewpoint assumed by science. The monochrome *World Map* was made up of eighteen printed sheets of paper and showed for the first time a cylindrical world projection where all parallels and meridians are straight and perpendicular to each other. Mercator had successfully 'squared the circle'.[9]

Mercator's skill as an engraver made good use of the new printing technique afforded by the invention of the Gutenberg press in neighbouring Germany in the 1450s. Ortelius had introduced Mercator to the French printer and publisher Christoffel Plantyn[10] (*c.*1520–1589), who had established himself in Antwerp, a thriving international centre of trade and commerce and an epicenter for cartography and printing. Plantyn, like Ortelius, had become a member of the Sint Lukas guild of printers and painters, as science and art were intrinsically linked (Crane, 2002, 188). Despite the decline of the guilds in the Modern Era, the name of Sint Lukas remains synonymous with art education in Belgium to this day. Thus, the close link between geography and the arts finds its roots in the early days of cartography, when many artists were employed as colourists and embellishers of engraved maps.

The emergent discipline of cartography of the sixteenth century produced maps that were fundamentally different from the conceptual 'mappa mundi' that had defined the collective western worldview prior. The layout of Mercator's world map was constructed on contemporary knowledge (de Graeve, 2006). Yet this layout is unfamiliar to twenty-first-century eyes. The eighteen individual glass panes that make up *Compendium* (Figure 11.2) depict the geography of Mercator's world map, overlaid with text from the title pages of his book collection, as referenced in the 'Mercator and his books' exhibition at the Mercator Museum in 1994. *Compendium* [11] thus reflects on how knowledge shapes our world view. As such it is worth reconsidering Mercator's legacy and placing it in the context of a postmodernist perspective at a point where the way we see the world is changing profoundly once again (Mirzoeff, 2015).

By the end of the sixteenth century, the projection first used in Mercator's seminal world map, had become embedded in cartographic thinking and by the twentieth century had become synonymous with his name. The twenty-first century cartographer no longer has to delicately etch the rhumb lines out of the soft copper plate in reverse, using a mirror, but can layer information on digital maps and update them with the click of a button. The Geographical Information System

9 Quote from Walter Ghim, the first biographer of Mercator (Duisburg, 1595), as referenced by Gaspar, Jacquim Galves (2012) 'Squaring the circle: How Mercator did it in 1569', proceedings of Mercator Revisited International Conference, Sint-Niklaas, Belgium, 25–28 April 2012. www.academia.edu/1843310/Squaring_the_circle_how_Mercator_did_it_in_1569_ppt_ (accessed 3 February 2013).

10 Plantyn would print and publish Mercator's maps from 1557 and Mercator would purchase books from Plantyn for his private collection.

11 *Compendium* was purchased for the permanent collection of the Mercator Museum in 2014.

(GIS) allows cartographers to create maps directly related to statistics and database information; if the data changes, so do the maps. It is these automated functions that give us real-time maps of weather patterns, travel routes and other digital traffic. *Circulus: circling the square* (2013) and *Quadratum: squaring the circle* (2013) (Figure 11.3) reflect on these changes in map making and their impact on contemporary culture. The glass maps are based on contemporary maps (produced by GIS) of twenty-first-century air internet and traffic, overlaid on a Mercator and Langrange projection; a square and circular world map respectively. These maps produced by real time, live data, were frozen in glass as a momentary snapshot. The piece reflects on the significant increase in knowledge over the last five hundred years that has been much aided by the incremental speed of travel and communication and the closing of the space-time gap.

Mercator's scholarly skills and craftsmanship were embodied in his work as a cartographer and maker of globes. Globes and maps were highly valued collectables by the establishment that, like their counterparts in painting, reflected the aspirational values of their collectors. As the cartographer and geographer Denis Cosgrove observed, 'circumnavigation has remained an act of enormous imaginative significance since Magellan' (2001, 220). The cultural reference of globes is evident in paintings of this era. The early Dutch painter Hieronymus Bosch (1450–1516) painted a large glass globe on the closed shutters of the triptych *Garden of Earthly Delights* (*c.*1490?).[12] Brueghel de Oude (1569) was a contemporary of Mercator. His painting *De Nederlandse Spreekwoorden* (1559),[13] illustrating Dutch proverbs, depicts four globes.[14] And Johannes Vermeer's (1632–1675) paintings are studded with maps, charts and globes, the symbols of the sea voyages that were key to Holland's prosperity in the seventeenth century, as in his painting of *The Geographer* (1669) (Figure 11.4). The legacy of the Vereenigde Oost Indische Companie (Dutch East India Company, 1602–1799) is evident not only in the cultural artefacts of its time but also in pioneering globalisation (Shorto, 2013).

The patronage of royalty, clergy and the aristocracy helped Mercator become an established 'cosmographer', a title bestowed on him by Duke William V van Gulik-Kleef-Berg (Horst, 2011, 69). When Frisius was offered a formal imperial charter in 1535 by the reigning Spanish emperor Charles V (1500–1558) to make a globe that reflected the new geography and world view, Mercator was called in to assist. Mercator continued his collaboration with Frisius on a celestial partner (1537) to the terrestrial globe. The enmeshment of political power on maps would

12 Dated from between 1490 and 1510, this masterpiece was acquired by Philip II of Spain (1527–1589) and bequeathed from the Royal Collection to the Museo del Prado in Madrid, where it is still on public display.

13 This painting is in the collection of the Gemäldegalerie der Staatlichen Museen, Berlin, Germany.

14 The largest globe is a glass one, into which a crippled man tries to crawl: 'men moet zich krommen, wil men door de wereld kommen', which roughly translates as 'if you want to succeed in life, you have to be prepared to bend over backwards' (translation by the author).

not be theorised until the mid-twentieth century, but Mercator was aware of the political power of his maps. In the aftermath of the publication of a contentious map of Flanders by Pieter Van der Beke that defied the power of Emperor Charles V, Mercator was commissioned by Gent's mercantile class to make a map of Flanders (1540) dedicated to the emperor with the explicit aim of placating the ruler. Mercator was later commissioned by the emperor to make a pair of small globes – which sadly have not survived[15] – in which the terrestrial globe was made of wood and the outer celestial sphere was made of blown crystal glass, engraved with diamonds and inlaid with gold as a symbol of peace and reconciliation after the Fürstenaufstand of 1552 (Horst, 2011, 69). It is thus evident that Mercator understood the political agency of his work. Mercator's sponsors will have had an impact on what he chose to present, or not, on his maps.

The question of who decides which information gets put in and what is left out of a map is not only a question of authorship, but also a question of scale. *Micro Macro (Mercator)* (Figure 11.5) comprises a large-scale glass map of the world using the Mercator projection, juxtaposed with the same image on a much smaller scale. The juxtaposition of the large-scale map (78 x 78 cm) with a tiny map (3 x 3 cm) comments on decisions of scale by the mapmaker. The reduction in scale is a process that comes at the expense of entire countries disappearing; Britain, Iceland, Japan, Indonesia … . The same image exposes a different version of 'reality' and raises the issue of the power asserted by the mapmaker. The making process of these glass maps has incorporated the traditional Venetian glass-blowing technique of *murine*, [16] in which small glass tiles are cut from glass cane and put back together into a pattern.[17] A simplified image of the world map was cut out of thick tiles of different coloured glasses using a water-jet cutter. This composite image of the world map was put back together and miniaturising by pulling and stretching out the glass image of the map into a thin cane. A slice off the end of the cane reveals the miniature map. Digital technologies have thus augmented the *making* skills and technical vocabulary available to artists (Shillito, 2013), much like the printing press for Mercator.

Mercator considered his life's most significant work to be the publication of *Atlas sive Cosmographiae Meditationes de Fabrica Mundi et Fabricati Figura,* a synthesis of the history of Heaven and Earth. It is with this posthumously published work

15 Although the globe itself has not survived, descriptions of it appear in a letter from Mercator to his friend Philip Melanchton.

16 Murrini is an Italian term for coloured glass patterns made from glass cane and is commonly used to create repetitive patterns in decorative glass vessels, developed on the island of Murano, Venice. It is also known as the miniature letters in tiny glass beads, which are strung together to spell out words and names. It is also used by master glass blowers to create intricate coloured patterns in blown glass vessels. For murrine, letters and composite images can be formed by different coloured components part being fused into a homogenous image. This was adapted by a technique developed by Scott Chaseling, a Leverhulme Research Fellow at the Institute for International Research in Glass at the University of Sunderland in 2006.

17 The traditional *'rock'* confectionery is also made this way.

(1595) that Mercator choses the word *atlas*, to honour not the Titan god but the learned King of Mauritania on the East Coast of Africa, whose legendary 'erudition, humanity and wisdom' Mercator took as inspiration for the dedication of his momentous undertaking. Myth has it that the Mauritanian Atlas – incidentally related to the Greek god Atlas – was the son of Terranus (also called Caelus) and his sister Titea (also called Terra) and his grandfather the Fenician King Elius (Sol). It is therefore easy to see why Mercator would choose this mythical figure as the perfect embodiment of his life's work (Horst, 2011, 103).[18] Mercator's *Atlas* can thus retrospectively be considered the embodiment of the Modern Era undertaking of scientifically and empirically understanding the Cosmos.

Mercator produced different versions of his atlas, many printed by the Plantyn press with the prints tinted in a rich palette of colours. The colouring and detailing of his numerous atlases are referenced in *Terra Mundi* (2013) (Figure 11.6), each gore[19] an abstraction of Google digital maps, with locations pertinent to the artist thus creating a personal geography of the world map. Much in the spirit of Mercator, new technologies were deployed to make these map segments. Three-dimensional software was used to model the globe segments, from which a Rapid Prototyping model could be printed on a 3D printer. A five-axis milling machine, used in the automotive industry, precision-engineered a foam board master model from which to make the plaster moulds over which the glass segments for the globe were formed. The digital form in which the globe existed thus preceded the material execution of it in glass. In the same way, Google Maps has only recently come into existence with the expansion of space exploration, which has shaped our ability to navigate and 'know' the world, as we will discuss below.

The exponential expansion of terrestrial knowledge in the Age of Discovery, evidenced in the cartographic developments of Mercator's age, precipitated the exponential expansion of celestial knowledge of the twentieth century, which Mercator sought in his *Cosmographiae*. Mercator was a deeply religious man who had made it his life's work to investigate 'the mysteries of nature', a potentially dangerous pursuit, and although Mercator himself saw no clash in 'the contemplation of Nature', since to study Creation was a way to understand its nature, the contemporary authorities would have considered this heretical. Thus, in 1552, in a period of religious persecution, Mercator was prompted to move from Leuven in Flanders to Duisburg in Germany, where he lived until his death in 1594. It would not be until a century later that the French mathematician René Descartes' (1596–1650) concept of dualism – the separation of mind and body – would place an increasing reliance on the cognitive capacities of the (hu)man. This focus on the objective, at the exclusion of the

18 Horst, 2011, 103: translation from Dutch by the author.

19 A gore is the segment of a globe when laid out flat onto a sheet of paper, much like the segments of a peeled orange. Mercator had twelve lozenge-shaped segments that made up the paper covering of his globes.

subjective, has come to dominate science, which in turn has come to rely extensively on our ability to observe: to see.[20]

Cosgrove wrote that 'earthbound humans are unable to embrace more than a tiny part of the planetary surface. But in their imagination they can grasp the whole of the earth, as a surface or a solid body, to locate it within infinities of space and to communicate and share images of it' (2001, ix). This cartographic viewpoint 'above the earth' is what artist and academic Claire Reddleman (2018) considers an individualised position 'from' which it is possible to conceptualise and a useful framework with which to consider cartographic abstraction in artworks. I contend that this cartographic viewpoint is a useful one from which to consider the film *The Power of Ten* by Ray and Charles Eames.[21] I will further elaborate on this cartographic view as an 'anthropocentric' one. A first version of the film was originally made in 1968, nine years after the first moon landing by the Soviet Luna 2 and made into the final version in 1977, eight years after the first man walked on the moon on the Apollo 11 spaceflight in 1969. The film deployed the visual expression of micro and macro scale, to bring a succinct nine-minute synthesis of heaven and earth, as Mercator had envisioned with his *Atlas* project. The film depicts the relative scale of the universe according to an order of magnitude based on the factor of ten. The film starts with a couple having a picnic scene and zooms out every ten seconds to the powers of ten, taking the cartographic aerial perspective, and into the infinity of space and then plummets back to Earth. The camera zooms into the hand of a napping man and magnifies to the power of ten, from a white blood cell to the DNA molecule until a single carbon atom and its quarks are observed; the limit of human knowledge at the time. I would argue that the film is anthropocentric for two main reasons. First, it is centred around the human body – literally 'embodied' zooming out and then into the human body – and second it requires the human imagination Cosgrove referred to earlier. It is only by 'being human' that we can experience, observe, sense and imaginatively 'see' the world. The film itself, like the *Blue Marble* image (2002), is an elaborate and painstaking composite simulation of images (Toscano and Kinkle, 2015, 2). The images used by the Eames' were based on conversations with scientists but were compositions of both existing and imagined visualisations, well ahead of their time. It is only now that increasingly sophisticated technologies such as satellite imagining have allowed cartographers to map the world, astronomers to map the universe – substantiated by images provided through space exploration – or molecular biologists to map the genome through powerful microscopes.

The physicist Philip Morrison collaborated with Ray and Charles Eames when he provided the script and the narration for the film. Morrison described such work as 'cognitive art', but as Tuffte observed 'there is no Museum of Modern Cognitive Art' (1990, 9). Jameson argued that 'the aesthetic of cognitive mapping' would not be merely didactic or pedagogical, but would of necessity be both. The *Powers of Ten* film

20 I am using the word 'man' here to denote 'human', being aware that that may denote any sex.

21 The film was in turn inspired by the book *Cosmic View* published in 1957 by the Dutch educationist Kees Boeke, two years before the Russian Luna 2 landed on the moon.

has been considered an exemplar of teaching and understanding the importance of scale in classrooms in the last four decades and has been archived in the United States National Film Registry by the Library of Congress in 1998. I would argue that *The Powers of Ten* is not only cognitive mapping but also an example of what in this book is being explored as 'ontological mapping'. The 9.1 minutes of this short film manages to visually bring together diverse scientific knowledge bases into one coherent visual narrative, making clear the connections and relationships between them.

Conclusion

The importance of Mercator's making skills and his willingness to engage with contemporary cutting-edge technology and science and the relationship of the two-dimensional map and the three-dimensional globe were reflected on in the Map-i project. The re-consideration of the sixteenth-century Mercator globes and their expanded mechanistic worldview, critical in the Age of Discovery and informed by world exploration and early astronomical observations, were contrasted with a twenty-first-century digital worldview of the artwork. The work placed it in a postmodern context by wholeheartedly engaging with the historical narrative of Mercator. It has drawn analogies with the critical use of the new and disruptive technologies of the sixteenth-century printing techniques that Mercator employed and the twenty-first-century digital making and mapping techniques used in the Map-i: Mercator Revisited work. It has placed this work in the context of the emergent field of creative geographies. The importance of "seeing" and the "visual turn" in the Modern era, contributed to the exponential expansion of Science, aided by the technological development of the material of glass. Like Mercator, who reached the end of his life without having completed his life's work, the Map-i project has the capacity to develop more, and more in-depth, visual narratives that engage with a rapidly changing world through the metaphor of the map.

If the Anthropocene is now defined by the *spatial turn*, what does this say about us humans in the context of the Anthropocene? Mapping in the sense devised by Mercator as a 'synthesis of heaven and earth' is about mapping space-time. The exploration of the global is no longer earthbound and, with its 'sky-situated' knowledge, has significantly expanded with the Space Age, fundamentally changing our worldview. In *Cartographies of the Absolute* (2014), critical theorists Alberto Toscano and Jeff Kinkle zone in on the crises of representation that have accompanied the enduring crisis of capitalism, foregrounding the production of new visions and artefacts that wrestle with the vastness, invisibility and complexity of the abstractions that rule our lives.

Understanding and questioning these issues have been key motivations for artists in recent years, and continue to be so. Geographers Ash Amin and Nigel Thrift argue that only by broadening the domain of what is considered political and embracing the diverse and creative ways in which people are responding to the global financial crisis and environmental disasters that are affecting and changing communities worldwide can more effective change be implemented:

> We want to consider the implications of seeing politics as an art form, but one with rather more consequences than the average landscape painting. A more general art is at issue here – an art of moving forward without getting stuck in the old, and as corollary, making progress without having too strong a notion of what is coming next. That knowledge has to be created – carefully, never indiscriminately – as part of what this art form is
>
> *(Amin and Thrift, 2013, x)*

The creative cartographies foregrounded by *Powers of Ten* continue to shape and explore new ways of world making and exploring new ways of 'seeing'. "where seeing no longer relies on the visual but on the spatial relations between things". The full sentence reads: The creative cartographies foregrounded by Powers of Ten continue to shape and explore new ways of world making and exploring new ways of 'seeing', where seeing no longer relies on the visual but on the spatial relations between things.

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12

MAPPING'S INTELLIGENT AGENTS[1]

Shannon Mattern

Introduction

We now take it for granted that our machines can sense almost any space in the world, from deep-sea trenches to the chambers of the human heart. Building on thousands of years of research in physics, war, and natural history, doctors in the 1940s began using ultrasound to scan human and animal bodies. Taking cues from dolphins and bats and Leonardo da Vinci's early echolocation experiments, naval scientists in the early twentieth century learned how to detect mines and submarines with sonar. Early cathode ray studies by Wilhelm Röntgen, Nikola Tesla, and Thomas Edison led to the development of x-ray photography, which enabled radiologists to see broken bones, art historians to read the layers of an oil painting, and physicists to study crystalline structures.

Revolutions in machine sensing have transformed fields like medicine and engineering and creative production several times over. Now, finally, these technologies are reaching their apotheosis, converging in—*sound of balloon deflating*—the self-driving car!

Sorry if I sound disappointed. According to the hype, autonomous vehicles will ease congestion, shorten commutes, reduce fuel consumption, slow global warming, enhance accessibility, liberate parking spaces for better uses, and improve public health and social equity (Levinson, 2016, 14). All well and good. Analysts predict that by 2050 self-driving cars will save 59,000 lives and 250 million commuting hours annually and support a new "passenger economy" worth $7 trillion USD (Lanctot, 2017, 5, 6). Google's parent company Alphabet is positioning itself to lead that economy, with synergies among Waymo (self-driving cars), Waze

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(navigation), Sidewalk Labs (urban tech), and Google Maps, plus search and advertising (and maybe law enforcement and private security, too!). There are hundreds of players, large and small (Stewart, 2017). The industry has swept up cartographers, GIS specialists, roboticists, and engineers and technicians of all kinds, entangling them in what one observer calls "a billion-dollar war over maps" (Fiegerman, 2017).

That's probably an understatement, because the applications go well beyond self-driving cars. Everything from autonomous warfare to logistics to geo-targeted advertising depends on map superiority. On the friendlier end of the spectrum, maps drawn by AI have potential to transform myriad areas of research and design, and to influence policy and governance, starting with environmental protection and public health.

With the stakes so high, we need to keep asking critical questions about how machines conceptualize and operationalize space. How do they render our world measurable, navigable, usable, conservable? We must also ask how those artificial intelligences, with their digital sensors and deep learning models, intersect with cartographic intelligences and subjectivities beyond the computational "Other."[2] I'm using "intelligence" broadly here, to encompass the various ways that knowing has been conceived across disciplines and cultures. There are a lot of *other* Others—including marginalized and indigenous populations and non-human environmental actors—who belong on the map, too, and not merely as cartographic subjects. They are active mapping agents with distinct spatial intelligences, and they have stakes in the environments we all share.

Maps made for and by machines

Utopian machine or not, the self-driving car has captured the public imagination like few devices since the smartphone. I suspect that's because we marvel at, or even envy, its powers of perception, which are largely derived from nineteenth-century technologies that are familiar enough to be relatable. The most basic of these is an omnidirectional array of cameras. Teslas, for example, have redundant front cameras that cover different visual depths and angles, so that they can simultaneously detect nearby lane markers, construction signs on the side of the road, and streetlights in the distance. Radar sensors, unimpeded by weather, track the distance, size, speed, and trajectory of objects that may intersect the vehicle's path, and ultrasonic sensors offer close-range detection, which is particularly useful when parking.

Beyond those tools of looking and listening, most self-driving cars also generate a real-time map of the world. Light detection and ranging (Lidar) sensors bounce super-fast laser pulses off surrounding objects and measure reflection times to create a high-resolution 3D model of the immediate environment. Unfortunately, these contraptions are bulky and expensive and can be stymied by bad weather and reflective surfaces. Engineers are rushing to develop smaller, solid-state designs,

2 I'm capitalizing "the Other" to acknowledge the postcolonial concept formulated by Gayatri Spivak and Edward Said, among others.

which would simplify manufacturing and cut costs, even if it won't solve the problems with environmental sensitivity. Intellectual property related to Lidar was at the heart of the recent scandal that led to the firing of Anthony Levandowski, an Uber engineer who was formerly the technical lead at Waymo (Issac and Wakabayashi, 2017).

So, the car "sees" and "hears" the world as an organized three-dimensional code-space, with signs and lines directing its operation; and, simultaneously, as an assembly of reflective objects—pedestrians, bicycles, other cars, medians, children playing, fallen rocks and trees—that may interrupt the order of that code-space, and with which each car must negotiate its spatial relationship. Driving is often challenging for humans because we must code-switch, as the car does, between different ways of reading and understanding the world, while also distributing our vision among different widths and depths of field and lines of sight (not to mention dashboards, text messages, and unruly passengers). Human ears are multitasking, too.

All this sensory processing, ontological translation, and methodological triangulation can be quite taxing. Tesla (which, for now, insists that its cars can function without Lidar) has built a "deep" neural network to process visual, sonar, and radar data, which, together, "provide a view of the world that a driver alone cannot access, seeing in every direction simultaneously, and on wavelengths that go far beyond the human senses" (Tesla, n.d.). Waymo catalogs the mistakes its cars make on public roads, then recreates the trickiest situations at Castle, its secret "structured testing" facility in California's Central Valley. The company also has a virtual driving environment, Carcraft, in which engineers can run through thousands of scenarios to generate improvements in their driving software (Madrigal, 2017).

And machine pilots (again, like humans) do not operate on real-time sensory input alone. Just as we have Siri and Google and mental maps, driverless cars tap into external sources of geospatial data. Standard GPS is accurate within several feet, but that's not good enough for autonomous navigation. Industry players are developing dynamic HD maps, accurate within inches, that would afford the car's sensors some geographic foresight, allowing it to calculate its precise position relative to fixed landmarks. Layering redundant forms of place awareness could help overcome ambiguity or error in locally sensed data. Meanwhile, that sensor data would feed into and improve the master map, which could send real-time updates to all vehicles on the Cloud network (Seif and Hu, 2016, 161). In other words, autonomous vehicles will rely on an epistemological dialectic, balancing empiricism with carto-rationalism, and chorography with geography.

Lots of companies are building maps like this, including Alphabet's Waymo, German automakers' HERE, Intel's Mobileye, and the Ford-funded startup Civil Maps. They send their own Lidar-topped cars out into the streets, harvest "probe data" from partner trucking companies, and solicit crowdsourced information from specially-equipped private vehicles; and they use artificial intelligence, human engineers, and consumer "ground-truthing" services to annotate and refine meaningful information within the captured images. Even Sanborn, the company whose

incredibly detailed fire insurance maps anchor many cities' historic map collections, now offers geospatial datasets that promise "true-ground-absolute accuracy" (Sanborn, n.d.). Uber's corporate-facing master map, which tracks drivers and customers, is called "Heaven" or "God View"; the parallel software which reportedly tracked Lyft competitors was called "Hell" (Shu, 2017). That's quite some epistemological (and ecclesiastical) chutzpah.

Yet achieving *real-time* "truth" throughout the network requires overcoming limitations in data infrastructure. The rate of data collection, processing, transmission, and actuation is limited by cellular bandwidth as well as on-board computing power. Mobileye is attempting to speed things up by compressing new map information into a "Road Segment Data" capsule, which can be pushed between the master map in the Cloud and cars in the field. If nothing else, the system has given us a memorable new term, "Time to Reflect Reality," which is the metric of lag time between the world *as it is* and the world as it is known to machines.

Machine mapping for the rest of us

Honestly, I don't give a leaping Lidar about self-driving cars. Or *any* cars, for that matter. I just can't get excited about innovations that fetishize private mobility and the alienating, landscape-destroying, maintenance-intensive infrastructure that sustains it.

What I really want to discuss is this: how can we use all these new and old technologies to improve the physical world that we humans (and our non-human companions) read and inhabit? Some urban designers imagine that the containment of vehicular traffic will allow more street space for walkways and bike lanes and parks (Schwab, 2017b). Others note that we need to be intentional about how we redesign cities to accommodate the semantic preferences of our robot companions. Geoff Manaugh (2016) mischievously suggests that the machines' sensory quirks, like Lidar's vulnerability to mirrored surfaces, might prompt us to consider "how we could design spatial environments deliberately to deceive, misdirect, or otherwise baffle" autonomous agents. In a coming age of robot warfare and policing, we could see designers specializing in the creation of robot-*illegible* worlds rather than machine-readable ones.

What further impact might these "other mappings," have on spatial design practices? Lidar is used by urban and transportation planners to create highly-detailed digital surface models, by preservationists to create point cloud surveys, by architects to model complex building sites, and by astronauts to study the surface of the moon. Aerial drone imagery is also emerging as a new way of seeing. Relief workers, including those laboring in the wake of hurricanes Harvey, Irma, and Maria, use drones to aid in disaster recovery. Archaeologists use drones to create site models, assess land uses and vegetation, and study earthworks and buried structures (Silva, 2017). Karl Kullmann (2017) has identified similar advantages for landscape architects. Designers long accustomed to the overhead view of GIS and satellite imagery, which emphasizes "large-scale associations, systems, and

infrastructures," can now operate from a "lower and more individualized oblique" vantage, sensitive to the "near-scale" qualities of place. Kullmann proposes that these two machine views—representing two different altitudes, scopes, and perspectives—are complementary ways of sensing and knowing a site. They embody distinct, though reciprocal, politics of vision and ethics of engagement. The operational premise here is similar to that underlying the self-driving car. We take it on faith that redundant data and multiple perspectives will yield greater precision, a better outcome, a higher truth.

Even techie jargon like "Time to Reflect Reality" points to looming social and philosophical questions about how machine vision will change our conception of the physical world. Artist James Bridle, who has made several works exploring the politics of automation, observes,

> Self-driving cars bring together a bunch of really interesting technologies—such as machine vision and intelligence—with crucial social issues such as the atomization and changing nature of labor, the shift of power to corporate elites and Silicon Valley, and the quasi-religious faith in computation as the only framework for the production of truth—and hence, ethics and social justice.
>
> *(Cited in Mufson, 2017)*

We need to consider how humans and machines experience space and time differently, through various senses. We need to examine how the components of spatial intelligence are operationalized differently by (and for) humans and machines. And we need to grapple with what it means to create an unprecedentedly robust map of the world meant mostly for non-human agents. The car itself is less interesting to me than the critical terrain it's mapping.

Some social researchers, activists, and humanitarian organizations have reframed their research questions—and even re-envisioned entire fields of practice—to take advantage of the investigative power of machine mapping. The same tools and methods used in business planning to evaluate prospective sites for Marriott hotels or Amazon distribution centers can be used in hazard forecast mapping, to determine where landslides or floods might occur (Altaweel, 2016). Some clever cartographic triangulation is also happening in the real Amazon, where environmental advocates have used satellite and drone imagery, supply-chain maps, and interviews with local farmers to identify newly cleared lands in Bolivia and Brazil. They have attributed nearly two million acres of deforestation to soybean farms that are allegedly supplying the huge American agribusinesses Cargill and Bunge (Tabuchi et al., 2017). Neural network learning algorithms are commonly used in geospatial analysis to identify changes happening on the earth's surface—from deforestation to coastal erosion—and to predict future changes (Gopal, 2016). The Disease Surveillance and Risk Monitoring project (DiSARM, 2017) plots malaria cases alongside weather and topographic data to predict outbreaks, creating high-resolution risk maps that can be used to prioritize mosquito control efforts across Africa

(Lieber, 2017). This is a variation on the "traveling salesman" problem: how to efficiently deploy resources, whether Uber cars or aid workers with vaccines. Development organizations are taking some of the same technologies that are fueling our driverless dreams and extending them into realms where ethics, environment, public health, and social justice are the primary concerns.

Yet it's difficult to use maps to address structural inequality when geospatial data aren't equitably distributed. This is often the case in poorer countries, where ground-level data is scarce, or not available in a form that is accessible to those who are making decisions about aid and development. A team from Stanford has attempted to identify impoverished and at-risk communities in Central and East Africa from 35,000 feet up, using only open data (Jean et al., n.d.). Satellite images of nighttime illumination are often used as an index for economic development, but the Stanford researchers trained a neural net to read nighttime and daytime images of the same regions, and to pick out variables, like roofing material or distance from urban areas, that contextualize clusters of nighttime light. Their model, trained also on World Bank statistics, learned to identify visible features—like roads, farmlands, and access to water—that correlated with nighttime illumination and economic well-being (Jean et al., n.d.; Jean et al., 2016).

Such triangulation is meant to fill in the gaps in mapping but is not a real substitute for the kind of ground-level engagement that should precede policymaking or aid work. Meanwhile, Digital Globe and Stamen Design have built Penny, a mapping tool that uses machine learning to analyze satellite image indices of wealth. Eventually, planners could use the tool (which doesn't account for income inequality) to select urban features that promote wealthier neighborhoods (Schwab, 2017a). And researchers at MIT and Harvard have created Streetchange (n.d.), which uses AI to correlate changes in cities' physical appearance with economic and demographic shifts and neighborhood "improvement" (Naik et al., 2017, 7571–7576). While these are useful avenues of research, it's important to remember that "poverty" is far more overdetermined and sensitive than any satellite image can capture. Poverty-as-lived is much more nuanced than its operationalization for any neural net. And urban planning should not be mistaken for an algorithmic "pattern language"; a city plan is more than a mere aggregation of spatial features an AI has correlated with "wealth."

Conor O'Shea makes a similar observation about the use of drones in landscape architecture. While drones and satellites, used in tandem, might help to critically reframe designers' perspectives, "human-to-human interviews, community outreach, political engagement, and research-based design strategies matter more than ever" (O'Shea, cited in Kullmann, 2017). We need multiple eyes, ears, hands, sensors, and brains—automated and manual, digital and analog, machinic and human—on the case.

Cartography's intelligent agents

So now we've examined the well-funded and widely publicized attempts to map the world as a *code-space* legible to machines. And we've considered efforts to use those machinic sensibilities and intelligences to solve perennial human and

environmental challenges. Social researchers and aid workers are also using "other," artificial intelligences to map human Others—the silenced, the vulnerable, the marginalized. It's a noble gesture, to recognize the subjectivity of a historically invisible population by rendering it visible on the map. But that visibility can also mean vulnerability to harm or exploitation. Since those human Others have long been absent in the datasets we use to make our maps, we now rely on methodological maneuvers and machine-readable proxies to render them mappable. We must take care not to equate the impoverished with the thatched roofs over their heads.

Of course, the history of cartography is deeply entangled with statecraft and colonialism, with the claiming of Other lands and the erasure of Other people. Yet indigenous groups have also embraced mapping as a means of "reclaiming their sovereignty over the lands, negotiating aboriginal rights, and regaining dignity during conflicts with governments and institutions," according to cartographer Sébastian Caquard (cited in Salinas, 2014). Often they have adopted the geospatial practices of their colonizers to concretize their land claims and try to shield themselves from land grabs and resource-extraction schemes. The politics of the overhead satellite view and the universal GPS grid—even the Euclidean demand for points, lines, and areas—do not always "map onto" the way traditional cultures relate to or conceive of their own environments. "The process of mapping," Nancy Lee Peluso argued in an influential 1995 article, "almost forces the interpretation of customary rights to resources *territorially*, thereby changing both the claim and the representation of it" (Peluso, 1995, 388).

Rather than merely incorporating the Other as a map subject, we should think more deeply about *Othering* cartographic subjectivity or acknowledging that Others have developed their own map-making practices that diverge from Western convention. Consider the wooden coastline maps made by Inuit communities of Greenland, the Marshall Islanders' stick charts, the Native North American petroglyphs, and Aboriginal Australian songlines. They all reflect unique ways of sensing, navigating, inhabiting, relating to, using, and finding meaning in an environment. Songlines, for instance, are oral maps that correlate star constellations and other astronomical phenomena with points on the ground. They embody an Aboriginal worldview, chronicling the nation's coming-into-being, while also serving a pragmatic economic purpose as a map of trade routes (Norris and Harney, 2014, 141–148).

Those Marshallese stick charts, meanwhile, recorded navigators' ability to identify nearby islands by sensing the disruption in ocean swell patterns. Since the island navigators were charting reflections, we might regard their methods as analog antecedents to contemporary sensing machines like sonar and Lidar. Yet the meaning of reflected waves is entirely different for these human "sensors." As Karin Amimoto Ingersoll (2016, 5–6) explains in *Waves of Knowing: A Seascape Epistemology*, many surfers and traditional navigators in the Pacific cultivate "oceanic knowledge" by irrational, intuitive means, by fusing mathematics and physics—which are among our computational sensors' strengths—with dreams, vibrations, and oral histories.

> It is an approach to knowing through a visual, spiritual, intellectual, and embodied literacy of the *'āina* (land) and *kai* (sea): birds, the colors of the clouds, the flows of the currents, fish and seaweed, the timing of ocean swells, depths, tides, and celestial bodies all circulating and flowing with rhythms and pulsations … .
>
> *(Ingersoll, 2016, 152)*

That knowledge simply couldn't be captured on the maps created by voyagers like Captain James Cook, who sought to locate all points of significance on a "static grid of coordinates," relying on stable coastlines for cartographic reference (Ingersoll, 2016, 146–147). Ingersoll argues that the European ideology of acquisitive exploration is reflected in a cartography based on categorization and control. In contrast, Pacific Islanders' maps are "inherently mobile." They make possible a type of movement that involves dynamic interaction between the islands, sea, stars, and those bodies floating between them. "In Pacific navigation, the map moves with the voyager" (ibid., 149).

Anthropologist Stefan Helmreich (2014) studies how waves carry different meanings for cosmologists, cardiologists, artists, oceanographers, surfers, economists, and social theorists. Ocean waves are formal, mappable objects, but they are also geographically specific, culturally shaped, and politically charged. Just as automated cars are trained to operationalize "safety" and machine learning models are trained to operationalize "poverty," the swells we call "waves" are measured, parametricized, and modeled through buoy sensors and computer simulations. And those wave models and maps are trained primarily on northern oceans, which are much more heavily instrumented. Our southern oceans, much like our land-based cultures of the Global South, tend to be "data poor"—despite the fact that they represent a tremendously diverse and expansive ecology. The southern hemisphere has more uninterrupted ocean, is hit by much more solar radiation, has extensive coral and mangrove depletion, and has more ice, which is breaking up as the climate changes. We need more "thinking from southern oceans," Helmreich (2014, 266, 269) argues—and, by extension, more modeling and mapping "from below," too.

Even as we turn to sophisticated computer models to understand global climate change, we should remember that many human communities have already vividly imagined their own climate futures (as well as climate pasts and presents). As environmental geographer Annette Watson and traditional hunter Orville Huntington explain, "indigenous peoples have been enrolled in climate change research for decades, participating in data-gathering, as writing collaborators, and serving as the symbolic 'canary in the coal mine' for public outreach and policy-making" (Watson and Huntington, 2014, 721). Yet their intimate local knowledge, their distinctive "seascape" or "icescape" epistemologies, are often filtered through Western Enlightenment methods and conventions. Much is lost in that filtering. Oral traditions chronicle environmental shifts that unfold over many generations, much longer than Western science has been collecting environmental data. And

there's often a sacred or spiritual dimension to their cosmological and geological knowledge, which rarely fits into geospatial data models.[3]Watson and Huntington (2014, 731) note that in the Koyukon communities of Alaska, ecological "respect" is a primary virtue: "Showing respect means that an individual understands 'their proper place' in relationship to Other beings, both animate and inanimate." "Respect" implies a critique of the Western fetishization of technology and the desire to witness, map, and catalog everything.

Watson and Huntington call upon environmental researchers and mappers to recognize that indigenous communities can offer much more than "local color" to substantiate researchers' theories—that, instead, indigenous knowledge furnishes valid and valuable Other epistemologies and ontologies. Margaret Wickens Pearce (2014), in her work with the Penobscot Nation in Maine, has been exploring new cartographic designs that embody the community's sense of place. She features descriptive place names, highlights particular vantage points that demonstrate how those descriptive names come alive on-site, embeds stories, and traces systems that organize various locations into networks of relations, like hunters' networks and ancestral stories, rather than grids of latitude and longitude (Pearce, 2014, 107–122).

Yet efforts to listen and learn from those Other cartographies can easily go awry. According to a Google blog post, the Anangu Aboriginal nation recognizes "no distinction between the physical and metaphysical, or the animate and inanimate. People, earth, plants and animals are inextricably connected" (Pellegrino, 2017). Not easily deterred in its quest to "organize the world's information," Google sought to "bring these cultural and spiritual dimensions to the Street View Experience" by supplementing the map with oral histories and songs in its Story Spheres (n.d.) platform. The company partnered with the "traditional owners" of Uluru-Kata Tjuta National Park and the regional government to "celebrate and preserve Anangu culture through technology." Yet when I "visited" the park through Street View imagery captured (in accordance with Tjukurpa law) by a regional tourism agent, the dimension I sensed most clearly was my own Otherness. I felt like an intruder. This act of "rendering visible" only reminded me of the embodied experience and cultural context I was missing—and that, perhaps, I shouldn't be privy to.

Hoping to bridge such gaps, and striving not for global reach but for local resonance, the Center of Creative Arts in St. Louis partnered with the Office for Creative Research (n.d.) in New York to create a pop-up St. Louis Map Room in a shuttered middle school. In a city with a deep history of racial divides and cultural Othering, the Map Room brought people together to think about the geography of their city, and to learn more about one another's urban patterns, city memories, spatial affinities, territorial aversions, and senses of place. The organizers stocked the room with historical maps and civic data on everything from land use

3 To recognize these different worldviews is not to reduce the indigenous to a mystical spirituality, which can be romanticized or fetishized.

to racial diversity to tree counts, and with abundant art materials and even some map-making robots. Then they invited community groups to draw on these cartographic resources and integrate their own place-based intelligences to construct 10×10-foot thematic maps. Museum curators, students, activists, health care workers, and others mapped multiple St. Louises: redlined St. Louis, homeless St. Louis, St. Louis schools, St. Louis transit, and so forth. Subsequent visitors could then take *those* maps, and project geo-rectified historic maps or city data on top, exploring new correlations.

As Jer Thorp (2017a) of the Office for Creative Research explained, the maps were intentionally big, to allow various physical modes of interaction: "Groups of people can gather around a map to look at it from different vantage points. People can walk across the map, experiencing distance in a meaningful way." Shifts in scale and perspective abet a new spatial awareness. There's a material politics at play here, too. Those large sheets structure collaboration and conversation, and they represent civic intelligence—a mix of official data and "indigenous" knowledge—writ large. They will become part of the official archive of St. Louis; and the Map Room hardware, plans, and curricula will be open-sourced so that other cities and towns can repeat the experiment. Thorp (2017b) told me a Map Room New Orleans is in the works, as well as a few projects in Canada.

Non-human mapping agents

Many of those who participated in the program had never before been granted authority to reimagine their city's geography. While community mapping projects are not uncommon, the Map Room was notable for its use of projected overlays and robot assistants, which plotted fixed cartographic objects like roads and landmarks, leaving the more interpretive, aesthetic, and connotative map activity to people. As Thorp (2017b) explained:

> I was specifically interested in the authority that machine-made marks seemed to hold over ones that are made by hand. While it seems like a commonly held belief that machines (robots, computers) make better, more accurate maps, it became clear to the mapmakers in the Map Room that the robots, while certainly precise, had nothing to say about the city. Indeed their ultimate purpose was to do the boring labor of laying the scaffolding for geographic narratives, marking the cross streets and walking paths and public parks so that the real stories of the city could emerge through the much more meaningful marks made by the human hands.

The robots symbolized the complementary relationship between mechanical and organic means of experiencing and representing place, between quantitative and qualitative methods, satellite views and fieldwork, rationalism and empiricism.

Non-human mapping agents—from Lidar sensors to drones to plotting robots—can be critical agents in the cartographic enterprise. Yet the non-human Other is

also an agent *in those landscapes we seek to map*. As we've already seen, fish and waves dominate Pacific Islanders' seascape epistemologies; ice and hunting paths shape Inuit maps; and flora and fauna are central to the landscape imaginaries of environmentalists and extraction companies alike. In most Western frameworks, non-human Others, from animals to plants to minerals, are represented as resources to be exploited: things to eat or mine or look at in a national park. But now the convergence of certain new ways of thinking—Anthropocene studies, new relational ontologies, Latourian actor networks, feminist ethics, and what Donna Haraway (2016) describes as "SF" thinking (science fiction, speculative fabulation, string figures, speculative feminism, science fact, so far)—have inspired many contemporary mapmakers to think about how to represent these Others not merely as human *resources*, but as entities with equal claim to the landscapes they inhabit, and with their own spatial intelligences.

Over the past 15 or so years, we've seen rising interest in animal geographies. Henry Buller, who wrote a three-part literature review for *Progress in Human Geography*, argues that this work advocates for "an interspecies contact … based upon a more convivial, less fixedly human and more risky approach to boundaries, to political actors and to political outcomes that inherently challenges what it means to 'belong' or to 'pertain' to a particular terrain" (Buller, 2014, 314). Other species have preceded humans, and they co-exist with humans, in pretty much every terrain—even those where they are now considered "invasive" or "pests." Researchers are recognizing, through these other species, the existence of multiple intelligences and spatial ontologies that exceed human capacity, and they are devising methodologies to "reveal what matters, or what might matter, to animals as subjective selves" (Buller, 2015, 379). How do other species perceive their own environments?

Animals are, in a sense, cartographers, too; they use cognitive maps for migration, foraging, nectaring, defining territory, ranging, predatory avoidance, and so forth (Fagan et al., 2013, 1316–1329). And they've evolved sensory techniques for spatial perception and memory: bats rely on echolocation, bees on scent, and fish on electroreception. Some researchers argue that chimpanzees are capable of mapping forest terrain in both Euclidean and topographic modes (von Uexküll, 1926; Castricano and Corman, 2016; Menzel, 1978, 372–422; Waterman, 1989). Slime molds use their slime trails to remember where they've been. Even the "crown-shyness" of some tree species, i.e. the maintenance of channels within their canopy, "could be seen as a map-like striation of space, a sort of territorialization" (Italiano, 2017). Animal space is "a lived space, multisensorial," argues Dennis Skocz (2006, 120–121), and GIS and other conventional mapping techniques are ill equipped to represent it.

Of course, we humans can never know "what [it's] like to be a bat," as philosopher Thomas Nagel (1974, 435–450) reminds us. Any attempt to represent, witness, or embody non-human subjectivity involves translating that experience through our own human senses and minds. Yet we cannot deny that these Others "have experiences fully comparable in richness of detail to our own."

Acknowledging that they share our cartographic terrains and that their spatial experiences are rich and relevant—maybe even as critical foils to our own—can help us appreciate the immeasurable diversity of our environments. For example, the Lower Elwha Klallam Tribe in Washington is documenting the restoration of the Elwha River after dam removal through "Fishview" maps, which is just one of the many mapping projects that center animal migrations or responses to changing ecological conditions. Catherine D'Ignazio (2017) argues that "what we gain from these [Other] mappings is situated, rich knowledge about the spatial experiences of beings other than ourselves (knowledge that could be incredibly useful for scientific research) as well as an awareness of how things could be different." Environmental artist Ellie Irons (2017) corroborates the importance of "seeing from other species' points of view"—especially from the view of uncharismatic species like weeds and fungi—"even if we know that, in the end, it's somewhat impossible, and even hubristic" to imagine that we understand their experience.

Plenty of artists and designers have wondered how other species perceive, inhabit, and construct their habitats and how the artists' own creative work can represent these non-human subjects' "lived multisensoriality." That work, whether conventionally cartographic or not, can be instructive for those seeking to map other spatial sensibilities. Sam Easterson's *Animal-Cams*, Diana Thater's immersive video installations evoking different animal subjectivities, and Lars Chellberg's and Tomas Saraceno's work with spider webs all explore how animals build and perceive their environments. The SPURSE collective uses "non-metric" mapping and other field methods to explore human and non-human ecologies—from the waterfronts of Maine to urban sidewalks—and how those assemblages impact forces as big as climate change and as small as local food systems. The Environmental Performance Agency (2017), created by Irons and collaborators as a rogue EPA in the early days of the Trump administration, conducts similar work.

Many of these artists conceive a non-human that extends well beyond the animal. Rachel Strickland's video work explores "the social lives of urban trees" (Strickland, 2017). Nina Katchadourian finds cartographic resonance in patches of moss, while Heather Burnett investigates slime mold navigation. Irons not only studies the geography of weeds but also uses their pigments to map them. D'Ignazio (2016) gives flowers a voice to address the water quality in their habitat, and Karolina Sobecka maps clouds, and the microbes that live in the troposphere, as environmental agents. Lauren Rosenthal (n.d.) has created an atlas where political boundaries are replaced by watershed divides, imagining a world in which ecological markers are as politically powerful as culturally defined states.

In their review of conservation maps, Leila Harris and Helen Hazen (2009, 56–57) interrogate how we use such maps to "cite, reconsider, challenge, or reify particular power relations between humans and non-human 'others,' solidify certain spaces as appropriate for particular species, [and] generate notions of 'desirable' species that we seek to conserve." They propose that conservationists avoid maps that (1) present humans and non-humans as separate; (2) privilege Western cartographic practices; (3) favor spaces and subjects that are deemed *more mappable*; (4)

frame all issues as *territorial*; and (5) privilege the static and localizable over the fluid, seasonal, and shifting. The ways that maps are created, funded, studied, and mobilized have profound implications for policymaking, governance, and the deployment of conservation resources, which may determine "the very survival" of the Other, or even ourselves (Harris and Hazen, 2009, 63).

So we know what *not* to do. But who is doing it right? Who else is effectively incorporating other subjectivities and intelligences in cartography? Consider *Bear 71*, an interactive web documentary produced by the National Film Board of Canada. The project was launched to much acclaim in 2012, then relaunched in a WebVR version in 2017. It compiles geographic data and trail and traffic camera footage chronicling the movements and life events of a single female grizzly bear in Banff National Park, thus documenting "the intersection between humans, animals and technology." The creators write that the bear was "tracked and logged as data, reflecting the way we have to see the world around us through Tron and Matrix-like filters, qualifying and quantifying everything, rather than experiencing and interacting." We see how human settlements, roads, fences, food smells, other species, and even 71's GPS tracking collar have changed the course of this creature's life; and, further, how maps and screens and sensors have profoundly changed the ways humans relate to the natural world. This gorgeous project, while not easily replicable or scalable, offers an exemplary map of multiple intelligences, while also embedding a critique of its own technologies of cartographic representation.

In 2016, the Office for Creative Research partnered with the Great Elephant Census and various NGOs to document the decline in Africa's elephant population, which dropped 30 percent from 2007 to 2014. Wildlife and park staff and pilots crossed the continent in low-flying airplanes, conducting a survey of live and dead elephants, as well as other wildlife, livestock, humans, houses, and environmental features, so that researchers could explore relationships between these variables (The Great Elephant Census, n.d.). All that data was mapped, contextualized, and made query-able on *The Elephant Atlas*. The website describes the census methodology and explores the impact on elephant populations of global forces like poaching, habitat loss, human conflict, and climate change, as well as political, cultural, and economic changes at the country level. Each of these compounding factors has its own geography, but not all those geographies lend themselves to representation in cartographic form. When I took my mapping class on a visit to the OCR studio, we learned that the Atlas's balance of specificity, abstraction, and context reflected the designers' sense of responsibility toward their subjects. They sought to "make visible" improving or declining wildlife conditions in different contexts, yet aimed not to provide *too much* granular specificity, since such visibility could render these threatened creatures and habitats even more vulnerable.

Mapping intelligently

Elephants are renowned for their spatial memory. Behavioral observations have long shown this to be true, but scientists recently corroborated the empirical evidence by

outfitting elephants with tracking collars that monitored their movement toward widely distributed watering holes on expansive, featureless terrains (Polansky et al., 2015). As advanced sensing machines and spatial technologies become cheaper and more powerful, we will see many more studies like this. Aided by aerial imagery and GPS, binoculars and audio recorders, we can now map everything from elephants and refugees to icebergs and Ubers. We should do so critically and intentionally, bearing in mind that those subjects and agents have their own geographies and spatial sensibilities, and so do the instruments we use to map them.

Increasingly, we turn to artificially intelligent sensing machines—with their purportedly more objective, efficient, exhaustive, and reliable means of observation and orientation—to shape the protocols and politics of interaction among the various beings who share our cartographic terrain. As we've seen, those computational instruments operationalize space differently—differently from one another and from other "species" of intelligent agents, including us. Drones and dragonflies sense and navigate the world in unique ways. Sonar and Lidar construct distinct empirical terrains, hearing and flashing their environments into existence. Satellites abstract terrestrial realities into macro patterns: from 500 miles up, the geography of hardship is a patch of thatched roofs. This chapter has demonstrated how these distinct cartographic agents operationalize space differently—and thus diverge in the ways they render space as a political terrain.

Our new, artificially intelligent agents may well generate efficiencies in transit and logistics. They might offer insight into how certain groups of people messed up the world and how we can fix it. Yet, as we've discussed, these computational intelligences, and *ours*, aren't the only ones that have a stake in that world's evolution. We need to recognize the world's myriad intelligent agents not only on our maps but also in our cartographic methods. We must choose our tools and methods wisely, fully aware of their affordances and limitations, sensitive to how they render the world knowable—and how they register and reflect the world as it is known to its many intelligent, invested inhabitants. Ideally, we should balance or juxtapose different modes of knowledge and production: Western scientific and indigenous epistemologies, human and other-species ontologies, mechanical and organic means of experiencing and representing place, cartographic rationalism and empiricism, projection and retrospection. No single über-map can encompass all such subjectivities and sensibilities. Instead, we can aim for an atlas, a prismatic collection of mappings like those we've explored here, that invites comparison and appreciation of the ways in which our world is both known and unknown.

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