

Mapping as Tacit Reconstruction of Colonial Worldviews

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Participation, Datafication and
Humanitarianism in the Age
of Digital Mapping

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Mapping Crisis: a reflection on the Covid-19 pandemic

This book is being published in the midst of the 2020 Covid-19 pandemic, an event that was beyond the imagination of most people at the time that the project started, but one that now grips the world and is one of the principal factors in how we presently organise our daily existence. It was suggested that we might add some information to the book about these changes and how they relate to the stories and research contained within. After much thought, it was felt that this preface was a more suitable space for such reflection. While there is no doubt at all that many of the chapters within this book could have easily been about the response to the Covid-19 outbreak, to insert this new narrative would have been to erode the experiences of those people who feature in these chapters. While the pandemic has rightly become a focus of much of the planet, it has already drawn our attention away from other inequalities and struggles around the world. This book though, despite being almost entirely finished before the pandemic was declared, has much to teach us about how we might respond to this global crisis. The pandemic, and our response to this crisis, has thrown up a great many questions in relation to how we use, collect, map and understand data, many of which are explored in these chapters.

Epidemiology and mapping have a long history, with early examples being Shapter's 1832 maps of cholera in Exeter, UK, and then the more famous maps of cholera deaths produced by John Snow in London. These maps and their authors were credited with bringing new understanding of waterborne disease and saving many lives. While now we often look back on these maps as being unquestionably useful and accurate, the results of the map production, rather than their process is what sticks in our minds. Yet, it is important to remember that at the time these maps were widely dismissed, and often misinterpreted as supporting the prevailing thoughts of the time that cholera was airborne. Indeed, Snow's maps become more famous than Shapter's not only because they were of London, but because of the evocative story of him striding in to Broad Street and tearing off the handle of the community water pump – an act required precisely because his data and mappings were not initially well received. As the world grapples with mapping and tracing the Covid-19 pandemic, the data and maps produced are also questioned by those who observe them. Data is being used to drive the daily movements of billions

of people in a way that we have never before seen, but the interpretations and collection of this data are wholly problematic – doctors and politicians looking at the same data draw wildly different conclusions about the course of action. People are being instructed to stay home, go to work, wear masks, or send their children to school based on the invisible hand of data. While I do not suggest we shouldn't be harnessing all the tools we can in the fight to save lives during this pandemic, it has also brought many issues of 'mapping crisis' to the fore. Issues of privacy, control, vicarious mapping, the datafication of people, incomplete data, dark data, prejudice in reading data, and inequality of access – even in the richest countries, those without a smartphone will be omitted from any digital tracing apps designed to protect people.

This book is not about epidemiology, it is about mapping many other moments of crisis, but the stories within foretell these issues. Throughout the book the authors explore and challenge the way in which people are mapped and turned into data when they are at their most vulnerable – in moments of crisis. These chapters explore the politics within data and ask why there is such uneven distribution. In asking these questions though, this book also offers solutions and hope. From active counter-mapping projects that show how to include voices and peoples often marginalised, to warnings of where things can so often go wrong, there are many lessons within these pages to guide us through using data to tackle the Covid-19 crisis.

Covid-19 has brought the world of data-driven crisis management to the doorstep of the whole world, but these are not new experiences. People around the world have already been reduced to data points, and had their lives dictated by algorithm, computation, and the biases built into these technologies. Many more are also pushing back with counter mapping and participatory practices that aim to force the inclusion of subjugated voices and knowledge. This book then is about those who have already been mapped or made maps in times of crisis, and through these pages lie many of the critical questions, and some of the answers, to mapping the Covid-19 pandemic.

Doug Specht

Abbreviations

AEDH	European Association for the Defence of Human Rights
AI	artificial intelligence
AIS	automated identification systems
AJPES	Agency of the Republic of Slovenia for Public Legal Records and Related Services
ARC	American Red Cross
BPRM	Bureau of Population, Refugees, and Migration
CBI	cash-based intervention
CCTV	closed-circuit television
CDSTs	citizen data scientist tools
CHAT	cultural-historical activity theory
CILD	Italian Coalition for Civil Liberties
CNVOS	Centre for Information Service, Co-Operation and Development of NGOs (Slovenia)
CPC	Commission for the Prevention of Corruption of the Republic of Slovenia
CRRF	Comprehensive Refugee Response Coordination
DHN	Digital Humanitarian Network
DJI	Dajiang Enterprises
DUI	driving under the influence
EOC	Uganda Ministry of Health Emergency Operations Committee
ESA	European Space Agency
EU	European Union
FSD	Fondation Suisse de déminage
G8	Group of Eight
GDP	gross domestic product
GIS	geographic information system
GMDAC	Global Migration Data Analysis Centre
GPS	global positioning system
GPSDD	Global Partnership for Sustainable Development Data
GPX	GPS Exchange Format
HDX	Humanitarian Data Exchange
HOT	Humanitarian OpenStreetMap Team

IAA	Institute for Applied Autonomy
ICMP	International Commission on Missing Persons
ICRC	International Committee of the Red Cross
ICT	information and communications technology
ICT4D	information and communications technology for development
IDPs	internally displaced persons
IOM	International Organization for Migration
IT	information technology
JOSM	Java OpenStreetMap Editor
MFERAC	Ministrstvo za finance enotno računovodstvo (Ministry of Finance Unified Accounting)
MP	Member of Parliament
MSF	Médecins sans frontières
NAM	Non-Aligned Movement
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organisation
NGO	non-governmental organisation
NULP	North Ugandan Land Platform
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
ODbL	Open Database Licence
ODK	Open Data Kit
OECD	Organisation for Economic Co-Operation and Development
OFPRA	Office français de protection des réfugiés et apatrides
OGD	open government data
OPM	Office of the Prime Minister (Uganda)
OSM	OpenStreetMap
PMO	parliamentary monitoring organisation
POS	point of sale
PPA	Public Payments Administration
QGIS	quantum geographic information system
ROV	remotely operated vehicle
RPU	Register of Budget Users
SBTF	Standby Task Force
SDGs	sustainable development goals
SMGI	social media geographic information
SMS	Short Message Service
SPCS	State Plane Coordinate System
UAV	unmanned aerial vehicle
UBOS	Uganda's National Bureau of Statistics

UN	United Nations
UNDGC	United Nations Department of Global Communications
UNGGIM	United Nations Global Geospatial Information Management
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations International Children's Emergency Fund
USGS	United States Geological Survey
USSD	unstructured supplementary service data
UTM	Universal Transverse Mercator
UV	ultraviolet
VGI	volunteered geographic information
WaSH	water, sanitation and hygiene
WFP	World Food Programme
WTM	WatchTheMed
XML	Extensible Markup Language

Introduction: mapping in times of crisis

Doug Specht

We are in the middle of a revolution, or so the mantra goes, our world having been reinvented through digital technologies, changing mapping techniques and the aerospace industry. Data are at the heart of this revolution, one that, according to the United Nations (UN) Secretary General's report *A World That Counts*, is a revolution for equality (cited in Satterthwaite, 2015). The coupling of vast data sets with geographic information systems (GIS) has already and will continue to change the world through knowledge sharing and codification (Hendriks, 1999). Increased computer penetration and ever-increasing speeds of internet access are transforming the world into an e-society, allowing more people to provide data about their lived experience, potentially improving the health and well-being of all whom it embraces (Fife and Pereira, 2008). Tim Berners-Lee's vision of a connected world with easy knowledge sharing for the benefits of humankind seems within grasping distance (O'Hara, 2004) and geospatial technologies are playing an increasingly large role in the way in which we understand and also create the world around us (Specht, 2018). We are witnessing an ongoing globalisation of space and a reshaping of the local through the accumulation and deployment of such technologies, leading to a situation in which space is not only homogenised (and global), but also always fragmented (Kirsch, 1995). Nowhere is this more apparent than in the humanitarian sector, where the rise of digital humanitarianism has seen a huge shift in the processes of mapping, now viewed as a vital tool in moments of crisis. These changes have themselves created a crisis in the humanitarian sector, which must now wrestle more than ever with the dualities of datafication, 'Othering' and the participation of some of the most vulnerable people in the world.

Geotagged digital photos, aid requests posted on Twitter, aerial imagery, Facebook posts, Short Message Service (SMS) messages, drones and many other tools now form part of the digital landscape of the humanitarian sector. These new and rich data streams are often brought together through mapping practices that are in many ways able to offer unprecedented depictions of communities' needs within a crisis. Yet, it is also understood that the cartographic order of the world has forced many peoples into an imperial

logic under the no-win situation often referred to as ‘map or be mapped’ (Edney, 2019; Paglen, 2008). Maps and data are not only poor at describing the qualities of the relationships of everyday life, but are also born of power that has traditionally been used as an instrument of both colonialism and the contemporary geopolitical ordering of the world (Paglen, 2008; Specht and Feigenbaum, 2018). These issues are both alleviated and compounded by the growth in the amount of data being collected, not only harnessing global positioning systems (GPS), but also sound-level, light and accelerometer sensors, as well as a wealth of ‘social’ data collected through means such as social media. Aggregating data from these diverse and plentiful sensors enables new forms of monitoring societal change and have become a mainstay of humanitarian responses (Buckingham Shum et al., 2012). The kind of abstract scientific knowledge collected in this way may seem universal, but in the real world, it is always integrated with supplementary assumptions that render it culture bound and parochial. The mode of communication itself also conveys a set of tacit cultural and social assumptions or prescriptions (Wynne, 1992). These issues are accentuated through digitisation, in which information is converted to bits – malleable, electronically stored bits that can erode cultural objects, information cultures and politics. As we attempt to manage information, information itself mutates into new forms that often require new types of management (Jordan, 2015).

This book concerns itself with one particular type of management, that is data management and codification undertaken through the use of GIS and other mapping practices such as citizen sciences and aerial mapping with drones. PGIS, and its related practices, evolved from the bringing together of a number of fields including geography, cartography and database management (Haklay and Tobón, 2003). These kinds of 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). Despite Esri,¹ one of the most powerful mapping companies, emerging in the 1970s, and software that would allow personal computers to develop GIS products appearing in the 1980s, the term GIS itself was not coined until 1992 (Haklay, 2010). The 1990s then saw a great deal of development in relation to GIS with companies such as Garmin (est. 1989) developing ever-more powerful GIS- and GPS-based systems. However, these remained out of reach of most people. The level of complexity and multidisciplinary knowledge required to operate them was too significant a barrier to entry. This also meant that the control over these maps, and the power they represent, has always rested with organisations connected to the military or

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

state, for example Ordnance Survey in the United Kingdom (Ballatore, 2014; Evans, 2013). Yet, more recent changes in web-based geo systems and open-source GIS have reduced both the technical and financial entry points into digital map-making (Goodchild, 2009). These new resources initially included Google Earth and Google Maps, introduced in 2005 (Crampton, 2009), but now encompass a huge range of tools, including OpenStreetMap (OSM) (est. 2004), and allow maps to be built from the bottom up, by people and not governments, mapping alternative visions of society (Evans, 2013).

The bringing together of GIS and the Web 2.0 has created a new space, termed the 'Geoweb' (Atzmanstorfer et al., 2014). This has allowed many more individuals, organisations and companies to make their own maps, but more importantly, like the Web 2.0 itself, this has also allowed for crowdsourcing of information and collective map-building through what is often referred to as volunteered geographic information (VGI) (Walker and Rinner, 2013). Many humanitarian projects rely heavily on the volunteered information provided by the public in order to build their maps, and in an 'app economy'² more and more people are contributing to VGI, knowingly or unknowingly (Tene and Polonetsky, 2012, p. 267). VGI data is most often used to make 'mash-ups'³ of maps where data is drawn from multiple sources, including base maps made available by the historical custodians of geographic information and other state-owned data sets (Atzmanstorfer et al., 2014; Ballatore, 2014; Brown et al., 2013; Crampton, 2009).

These changes to the way in which humanitarian work has been carried out has resulted in a very different landscape of response. While much of the work is carried out by traditional players, to only examine these would be a mistake. It must be also acknowledged that there is a multitude of 'minor' figures at all stages of codification and legitimisation who all play a part in the transformation of information and data within the humanitarian context (Lorimer, 2003). Digital humanitarianism has seen not only more non-governmental organisations (NGOs) and volunteer organisations enter the field, but also many more corporations and private, for-profit, businesses who are set on making humanitarianism their business model (Burns, 2019). This, coupled with what United Nations Global Pulse (UNGP) (2012) have termed a 'data deluge', has seen a significant change in who is employed in information management processes, as well as the collecting of ever-more data (Hunt and Specht, 2019).

2 'App economy' refers to the range of economic activity surrounding mobile applications. Mobile apps created new fortunes for entrepreneurs and changed the way business is done.

3 Mash-ups is a colloquial term used to describe maps created by combining multiple, perhaps classically incompatible maps or data sets to create a new map. Much like mash-up tapes (Miller, 2006).

Despite all these new actors in the humanitarian sector, the basic entry requirements for utilising GIS have not actually moved all that much (Elwood, 2006); fast internet, a computer or tablet are still required for producing the map tools themselves, even if a mobile phone is sufficient to provide the data. Indeed, the power and knowledge needed to process the vast amounts of data now available have become increasingly out of the reach of much of the world. This means that the control over the data produced is still in the hands of tech companies and larger humanitarian organisations (Haklay, 2013). Furthermore, what lies at the heart of a mapping project is the classification and codification of real-world objects into taxonomies and terminology, this again is done by those trained elites or corporations who make the software (Brown et al., 2013). It is then important to explore and examine these contradictions, which suggest, on the one hand, that people are better represented and aided in moments of crisis as more data is produced about and by them. And, on the other hand, that the codification of this data remains the task of a small number of people and organisations often from outside the situation itself.

Latour, in his work on the non-human, notes that as technology increasingly mediates society, the interconnections of humans and non-humans become increasingly complex (Latour, 1988; Kirsch, 1995). The idea that this is a simple transformation is, however, clearly a myth (Jordan, 2015). The appropriateness of these technologies to carry out this mediation is a complex issue, as they are designed by people with various degrees of understanding of sociology and technologies (Haklay, 2010) and are positioned within Western scientific patriarchal capitalism (Kirsch, 1995). When it comes to the world as experienced by humans, objects and their values can also be tied to complex sets of concepts and conventional rules governing their use, so there is an important sense in which we can, and indeed must, learn about some of the affordances that these new humanitarian technologies and interventions offer (Hutchby, 2001).

Affordances are functional and relational aspects that frame, while not determining, the possibilities for agentic action in relation to an object. In this way, technologies can be understood as artefacts that may be both shaped by and that shape the practices humans use in interaction with, around and through them (Hutchby, 2001). If the innovation, integration and stabilisation of a technology in society are processes moulded by the actions of scientists, workers, capitalists, commuters and mayors, and thus a wide range of social contingencies, then where does society end and technology begin? Theoretical analyses have constructed a divide that places humans on one side and their technologies on the other, thus representing an artificially folded society (Latour, 1988). Conversely, Latour offers a process-oriented definition of high

technology as a complex and dialectical association of humans and ‘non-human actors’. In Hutchby’s (2001) words, high technology is ‘a shifting network of actions redistributing competencies and performances either to humans or non-humans to assemble in a more durable whole an association of humans and things and to resist the multiple interpretations of other actors that tend to dissolve away the set up’ (p. 445). Technology, in this light, is a means of eliciting specific ends, but one that is always open to interpretation, resistance and change (Kirsch, 1995). In choosing our technology we become what we are, which in turn shapes our future choices (Feenberg, 1991).

It is then important to examine in detail these contradictions (Parker, 2006). To detach newer processes of humanitarian mapping from their background in GIS would be unwise (Weiner et al., 2002). The whole practice is somewhat of a movable feast, with both geospatial and data infrastructure technologies changing rapidly and with more people being connected to the resources that allow them to engage, many of these new practices are now somewhat removed from the critical discourses of the 1990s (Elwood, 2006). Approaching mapping as a spatial practice helps us to better understand them as a form of reframing societies rather than just remapping them (Bryan, 2011). In the same vein, these tools must 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, even after a crisis has passed (Johnson et al., 2005). It is certain that the role of citizens has shifted from being purely the object of maps to being increasingly involved in the creation of maps, but this has not turned maps into neutral objects separated from power, nor has it moved power to the citizen (Pánek, 2016). Regardless of the size of our data sets, any representation will necessarily exclude (Verplanke et al., 2016). Furthermore, the process of mapping has long been seen as instrumental in the forming of the Other, and with that the subjugation of the Other (Specht and Feigenbaum, 2018). Quite clearly an ever-more salient issue within the context of humanitarianism. It is essential too then that while collecting more data, it should be understood that this does not solve the deep psychological issue of feeling watched and tracked, which may well reduce the desire of people to participate in their own development and politics. Without additional safeguards and regulation around the way that data is used, collected, shared and then used for resource allocation, all these technological innovations become self-defeating in the face of the human desire for privacy (Dumbill, 2013).

The problem then is that codified expertise is really about speaking *for* others, and is not based upon a lived experience (Gaventa and Cornwall, 2008). The contradictions are deep and complex. There is a notion that scientific knowledge has much to contribute to the humanitarian sector; at the same time, local knowledge needs to be conveyed in a way that is understandable,

but that also respects its tacit nature, and this is a gap that is hard to bridge (Coletta and Raftopoulos, 2016; Compton, 1989; Sillitoe, 1998). These issues of legitimisation are compounded by the small number of actors and gate keepers through which knowledge passes. The knowledge that so greatly affects people's lives is held in the hands of a monopoly (Gaventa and Cornwall, 2008), a situation that often forgets, or ignores, the importance of knowledge in relation to who created it (Rose, 1997). So, while there has been a significant rise in the level of participation within the humanitarian sector (Tufte and Mefalopulos, 2009), the power of knowledge ultimately remains with the planners, the technicians and Western scientists. It has been accepted that more consultation needs to take place with beneficiaries (Sillitoe, 2000), but this has become a constant seeking of universalism of knowledge through the Western discourse, which often fails to account for the non-linear nature of alternative knowledges leading to deep ethnocentrism (Rose, 1997; Sillitoe, 1998). These issues are hard-baked into the notion of legitimisation (Forester, 1982). At every stage of information-seeking, searching with algorithms, interpretation and use, data are passing through stages of mediation, contextualisation and codification (Newsom and Cassara, 2011). If these mediated stages are based upon the historic prejudices and colonial power structures of old, then access to data in and of itself does not create equality, but instead drives a further divide between peoples (Catlett and Ghani, 2015). In order to overcome this issue, there needs to be a great deal of understanding and willingness to work through these problems. While there are many who might wish to do so, in the face of the juggernaut of what Burns (2019) terms 'philanthro-capitalism' within digital humanitarianism, finding community members and activists who can spare enough time and who are suitably motivated and knowledgeable is difficult at best, and their motivations can hardly be separated from their personal needs (Harlow, 2012; Mercea and Funk, 2016). Tools that bring people together are needed, but this is not a solution itself, and empowerment remains a complex issue (Perkins, 2007). People have a desire to be better informed generally (Carver, 2003), but no population is homogenous in the way data often present and the goals and aims of a community are often diverse (Bennett and Segerberg, 2012; Weiner et al., 2002), yet the new digital divide of algorithms and big data seeks homogenisation, which conversely leads to bigger divides between the haves and the have-nots and can also manifest as increased divides within a community.

The use of geographical information has changed dramatically since around 2010 and continues to do so; in particular users themselves are being encouraged to crowdsource data in moments of acute need. This though only serves to heighten questions over ease of data access. The digital divide then is not gone, and where it has been reduced, much like Hydra it has grown

more heads. Large humanitarian organisations risk a ‘Tower of Babel’ moment in the way they present the success of reducing the digital divide without acknowledging these emerging issues (McFarlane, 2006).

One can wear a dozen powerful sensors, own a smart mattress and even do a close daily reading of one’s poop, but [the world’s] injustices would still be nowhere to be seen, for they are not the kind of stuff that can be measured with a sensor. The devil doesn’t wear data. Social injustices are much harder to track than the everyday lives of the individuals whose lives they affect. (Morozov, 2014)

Data are meaningful because of how someone collects, interprets and forms arguments with it. Data are not neutral. This is why Lisa Gitelman calls raw data an oxymoron, a contradiction in terms that hides the reality of the work involved in creating it (cited in Neff, 2013).

This is a worrying prospect when it is considered that the humanitarian sector is increasingly engaged in a process of datafication in low- and middle-income countries, where the use of new communications and database technologies is generating digital data that are machine readable and computationally manipulable, particularly for big data analytics (Taylor and Broeders, 2015). Whether this data collection technology is driven by economic, military-strategic, scientific or apparently altruistic motives, it is subject to a variety of influences during its innovation, diffusion, regulation and codification (Bijker and Law, 1992; Latour, 1988). The forms and functions of a technology are transformed by its innovators, market strategists, government regulators and through social use (Kirsch, 1995). It is also worth noting again that many of the key components of the networked society – the digital computer, the Internet, GPS – all have military origins and have been developed within capitalist social relations of production and unequal gender relations, they therefore build upon and reinforce existing spatial and social divisions (Perrons, 2004; Potts, 2015). We live immersed in representation, be it digital or through the cartographic gaze, it is how we understand each other, and in turn how we understand ourselves (Webb, 2009). These new modes of information lead to a globalised notion of self and other and this newly established worldwide scale is leading in turn to new conflicts, crises, wars and even catastrophes (Lefebvre, 2009), to which the world’s poorest are most susceptible.

This book, then, aims to bring together critical perspectives on the role that mapping people, knowledges and data now plays in humanitarian work, both in cartographic terms and through data visualisations. Since the rise of Google Earth in 2005, there has been an explosion in the use of mapping tools to quantify and assess the needs of the poor, including those affected by climate change and the wider neoliberal agenda. Yet, while there has been a huge upsurge in the data produced around these issues, the representation of people

remains questionable. Some have argued that representation has diminished in humanitarian crises as people are increasingly reduced to data points. In turn, this data becomes ever-more difficult to analyse without vast computing power, leading to dependency on the old colonial powers to refine the data of the poor, before selling it back to them. These issues are not entirely new, and questions around representation, participation and humanitarianism can be traced back beyond the inauguration speech of Truman – which divided the world into the ‘developed’ and ‘under developed’ – but the digital age throws these issues back to the fore, as machine learning, algorithms and big data centres take over the process of mapping the subjugated and subaltern in moments of crisis. This book questions whether, as we map crises, it is the map itself that is in crisis.

In [Chapter 1](#), Tamara Bellone, Salvatore Engel-Di Mauro, Francesco Fiermonte, Emiliana Armano and Linda Quiquix provide us with an introduction to critical cartography. Born from decolonial movements of the 20th century, critical cartography has helped scholars reflect on the relationship between power and knowledge within colonial contexts of spatial representation and surveillance. The chapter engages with concerns of non-Western cartography, technological innovation and representation of territory and notes that even as the field of critical cartography has grown, Western cartography continues to be a powerful instrument in colonialist policies, even within postcolonial contexts.

In [Chapter 2](#), Gregory Asmolov builds upon these ideas and introduces us to the counter concepts of participatory mapping and volunteered geographic information (Goodchild, 2009), as well as a proliferation of crowdsourcing practices and new online mapping tools. The chapter offers a critical examination of digital mapping and its role in crisis mapping, as well as in solutions to social problems that draw on the notion of activity systems (Engeström, 1987). Asmolov also provides us with an analysis of a number of empirical cases of online mapping from the field of emergency response and social development to illustrate how we must distinguish between two major forms of activity that have been associated with online mapping: ‘mapping as activity’ versus ‘mapping-enabled activity’. The analytical framework also highlights how the location of digital maps in the context of activity systems is associated with a set of actors that has been included in/excluded from the system.

Maria Rosaria Prisco also explores the diffusion of Web 2.0 and geospatial technologies in [Chapter 3](#). Building on Harvey’s three-dimensional conceptualisation of space (absolute–relative–relational) with the spatial trialectic (experienced–conceptualised–lived space) proposed by Lefebvre (1974), the chapter explores the possibilities and the real strength of the bottom-up production of local data (VGI, collaborative mapping, citizen science, etc.) in counteracting the technoscientific epistemology provided by the growing and pervasive datafication in the representation of the reality.

The case of representation of space is then examined through some of the most well-known systems of indicators like the sustainable development goals (SDGs) (especially in relation to urban poverty and environmental justice in the Italian context) in order to provide ideas and thoughts on the way forward.

Faine Greenwood takes these notions further in [Chapter 4](#), examining data colonialism, surveillance capitalism and an increasingly prevalent new technology in the humanitarian sector, drones. Building on theories of the politics of verticality and surveillance, this chapter explores how inexpensive civilian drones can simultaneously enforce and subvert asymmetric power structures, by providing both historically underrepresented and historically powerless groups with access to high-quality aerial imagery. At the same time, vulnerable populations can be harmed by humanitarian drone users who participate in the system of data colonialism by extracting and sharing their spatial data without seeking their consent or collaboration. While many aid workers hold strong opinions about the potential harms or benefits that humanitarian drone use presents to affected populations, this chapter is one of the first to fully explore these contradictions. The chapter also puts forward a preliminary model of humanitarian unmanned aerial vehicle (UAV) use that is conscious of the dangers of data colonialism and calls for more collaborate research work on the impact and benefits of drone data collection in aid work.

In [Chapter 5](#), Giovanna Astolfo, Ricardo Marten Caceres, Garyfalia Palaiologou, Camillo Boano and Ed Manley explore the use of data analytics and statistics since the start of the 2015 Europe refugee crisis. The chapter sheds light on the methodological and ethical challenges posited by the collection, analysis and representation of data on migration and refugees. The chapter asks who is benefiting from such data-driven politics and to what extent it is harming individuals, organisations and society at large. The chapter builds upon the findings of a two-year data project called Refugee Spaces and argues that data analytics and statistics are often used as a ‘discursive practice’ to construct and uncritically reproduce narratives of crisis and threat and as a ‘governmental technology’ to invest political agendas on migration by ideals of evidence, rationality, progress and nationhood grounded in disputable truths.

Monika Halkort builds on this work in [Chapter 6](#), exploring how the rising death toll of irregular migrants in the Mediterranean has conjured up a dense matrix of geospatial intelligence aimed at reducing the number of destitute bodies crossing the sea. Measured by the mere amount of data generated through the combined force of real-time tracking devices, image satellites and big data mining, she argues that Europe’s alleged refugee ‘problem’ is one of the best documented and well-mapped ‘crises’ in recent history. Against this backdrop the chapter asks why information about the dead and missing is widely absent or scarce. Mapping the critical blind spots in the data repositories

of state and humanitarian actors against the technoscientific and juridico-political protocols underpinning big data regimes, this chapter interrogates the key factors contributing to the substantive gaps that assign dead and missing migrants the liminal status of 'known unknowns'.

While there are many factors that drive migration, changing climate is expected to become an increasingly salient factor. In [Chapter 7](#), Bogna M. Konior explores mapping crisis in the Anthropocene, a socio-geological era in which the uneven allocation of environmental risk follows global industrial development and denotes its own civilisational origin: capitalism and the global slave trade, the Great Acceleration, the fossil fuel economy and nuclear war. The chapter asks if climate capital and its uneven distribution can be mapped. The incomprehensibility of climate narratives forces a shift from analogue to digital and then computational media, where the processing of large data sets corresponds to the collective structures of feeling as defined cultural forms, a move central to all climate capital mapping: the blurring of realism and fiction and the paradoxical relation between the local and the commons. As a survey of these emerging digital climate fictions, this chapter examines post-global climate mapping in virtual reality projects such as the Stanford Ocean Acidification Experience and Melting Ice as well as digital cartography projects such as Italian Limes and the Welcome to the Anthropocene map by the Stockholm Resilience Center.

In [Chapter 8](#), Aleš Završnik and Pika Šarf provide us with the first of two chapters on fighting back. This chapter explores the potential of 'sous-veillance' for individual autonomy and dignity, fairness and due process, community cooperation, empowerment and social equality. Examining numerous examples, such as the Satellite Sentinel Project, which tracks troop movements and warns civilians of attacks in Sudan; Virtual Community Watch, a service that crowdsources surveillance of the Texas–Mexican border; and citizen 'cop-watching' programmes, which film and counter-film police with wearable cameras at protests, the authors argue that we are witnessing a new wave of computerised technologically enhanced counter-surveillance or 'sous-veillance'. The chapter focuses on three aspects: 'datafication' (the use and reuse of data), 'resistance' (from passive avoidance to active subversion) and the 'empowerment' of the user, applying these categories to three specific 'sous-veillance' visualisation tools: (1) Erar, an online business transaction application created by the Commission for the Prevention of Corruption of the Republic of Slovenia, which provides citizens with data on the business transactions of public sector bodies and government spending (awarded the '2013 United Nations Public Service Award'); (2) the Slovenian platform named 'Kdo vpliva?' (literally 'Who Influences?'), which shines a light on the connections between lobbyists, companies, politicians and state institutions through visualisations of three different kinds of networks: lobbying contacts,

the network of transactions between the companies represented by the lobbyists and the public sector; and (3) traffic-ticket monitoring with Redaar, a smartphone application that helps users identify where and when traffic tickets were issued.

In the [final chapter](#), Rupert Allan draws upon his experiences working as country manager for the Humanitarian OpenStreetMap Team (HOT) in Uganda, overseeing interventions such as CrowdSourcing Non-Camp Refugee Data (USSD (unstructured supplementary service data) BPRM (Bureau of Population, Refugees, and Migration)), the Uganda Open-Mapping Project (World Bank/OpenDRI), Data for Resilience in Refugee Settings (GPSDD (Global Partnership for Sustainable Development Data)) and Drone Data for Refugee Context National Risk Atlas Methodology (Embassy of Japan). Rupert also represented HOT/Missing Maps on the Uganda Ministry of Health Emergency Operations Committee (EOC) in developing the Ebola Data Resilience Strategy for preparedness and outbreak following cross-border events in the Democratic Republic of Congo. This chapter brings together many of the issues discussed throughout this book and works to explore ways through each, both via the experiences of working in Uganda as well as examining their theoretical underpinnings, leading to the conclusion that we are all part of a united statelessness.

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1. Mapping as tacit representations of the colonial gaze

*Tamara Bellone, Salvatore Engel-Di Mauro, Francesco Fiermonte,
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It took Frantz Fanon just a few pages into his book *The Wretched of the Earth* ([1961] 2005) to expose the colonial order as one built and fuelled by violent compartmentalisation and exclusion, calling into question Europe's pretensions as the universal standard of culture and civilisation. Fanon's intervention hoped to awaken the consciousness of the colonised, causing them to rise up and reclaim both their lands and human dignity – a project that could radically transform the notion of humanity into one no longer premised on domination and the negation of the Other. Fanon's decision to craft the moral core of decolonisation theory as a commitment to valorise 'the wretched' stands as his enduring legacy. Similarly, Paulo Freire in *Pedagogy of the Oppressed* ([1970] 2005) analysed the oppressor–oppressed binary to propose a path that, through 'conscientisation' or consciousness raising, could lead the oppressed to emancipation. Both Fanon the psychiatrist and Freire the educator captured the core of the modern world's alienation process; they argued that the mechanism of domination remains feasible as long as the oppressed continue identifying themselves with their oppressor, therefore making emancipation also a possibility when the oppressed come to identify otherwise (Goussot, 2012).

That the world in which we live has been produced and can thus be produced differently was a prominent focus of 20th-century continental philosophers and theoreticians who lived through colonialism's 'boomerang effect' on Europe as exercised by fascist Germany (Césaire, [1955] 2001). These thinkers included the Frankfurt School as well as Michel Foucault and Jacques Derrida, whose writings geographers have come to adopt in recent decades to expose the work that conceptions of space do to produce and reproduce the modern world. Within statecraft, for example, Foucault's writings have helped show how maps do work similar to that done by institutions such as mental hospitals and prisons: the map contributes to controlling territory as the state controls its inhabitants through those institutions, tools that transform inhabitants into subjects for the state's reproduction (Foucault, 1977). As another example, Derrida's suggestion that the literal is 'intensely metaphorical' has similarly

been adapted to suggest the science of the map itself also serves as metaphor (cited in Harley, 1989).

Drawing from such insights, geographers today argue that rather than simply revealing knowledge about the world, maps help *create* the world, leading scholars within the discipline to abandon any notion of space as a container or stage within which the world proceeds, and instead to now favour notions of space as undergoing continual construction (Massey, 2005; Thrift, 2003). Scholars engaging with critical cartography in particular have become cautious of the work that modern maps do in situating the viewer above and outside space, for such a view has been key in fostering a false sense of separateness between the viewer and what is viewed, promoting the notion of space as an object and engendering a geographical imagination where nature and its local inhabitants have become merely resources for settlement, domination and exploitation (Gregory, 1994).

To thus rewrite the relationship between periphery and centre from an anti-colonial perspective entails the deconstruction of the colonialist and imperialist ideology that has long dominated the system of Western knowledge and that remains today, in the age of globalisation, assuming more pervasive and occult forms (Ardito, 2007). Therefore, attempts at emancipation must aim to debunk any idea that the given situation is natural and what must be shown instead is that what is presented to us as necessary is, in fact, absolutely not inevitable (Fisher, 2009).

This chapter assesses the effectiveness of critical cartography in raising a broader anti-colonial consciousness since the field began, not only critiquing maps, but calling for movements to 'counter-map'. We begin by providing a brief overview of the cultural context that gave rise to Western cartography in order to denaturalise it, and we then expand on how critical theory helped develop theoretical frameworks for scholarship on critical cartography following the decolonial movements of the 20th century. We then illustrate how, in spite of the growth of critical cartography and the call to counter-map in the face of settlement, domination and exploitation, neocolonialism continues to advance the use of maps for its purposes in new, inventive forms. We conclude by suggesting that the dramatic rise in the gathering, storing, processing and delivering of geographic information today continues to influence neocolonial cartographic practices and suggest throughout that attention to competing worldviews is central if a critical cartography is to be effective in dismantling colonial impositions of time and space.

The rise of Western cartography in cultural context

European colonialism has famously imposed a notion of a universal human civilisation that negates or absorbs difference, aiming towards a universal sameness among those it considers civilised. Nikolai Trubeckoj (1982) traces this spirit to Roman-Germanic culture, a cultural context where a notion of cartography was born proclaiming itself as a universal conception of space. A characteristic trait of Roman civilisation, for example, was the pursuit of



Figure 1.1. Ebstorf map (c.13th century).

well-being in daily life, which it considered to be a central aspect of humanity. This was a pursuit maintained through the military administration of territory, as illustrated by its *Tabula Peutingeriana*, a third-century ancient Roman map that carefully listed and described the empire's military access roads.

The 13th-century Germanic Ebstorf world map (Figure 1.1) integrated biblical and classical elements and illustrated the world as a circular construction. Lands outside Europe and beyond North Africa and the eastern Mediterranean were understood as *terra incognita*, and like other medieval maps at the time, it followed the T-O construction with Jerusalem at its centre. The O depicted the outer ring of the ocean and the T the dividing lines of three continents as related to the biblical story of Noah's three sons: Shem who mapped on to Asia, the birthplace of Christianity; Japheth who mapped on to Europe, the realm of Christianity's expansion and domination; and Ham, the so-called 'cursed' son, who mapped on to Africa, Europe's most devalorised location.

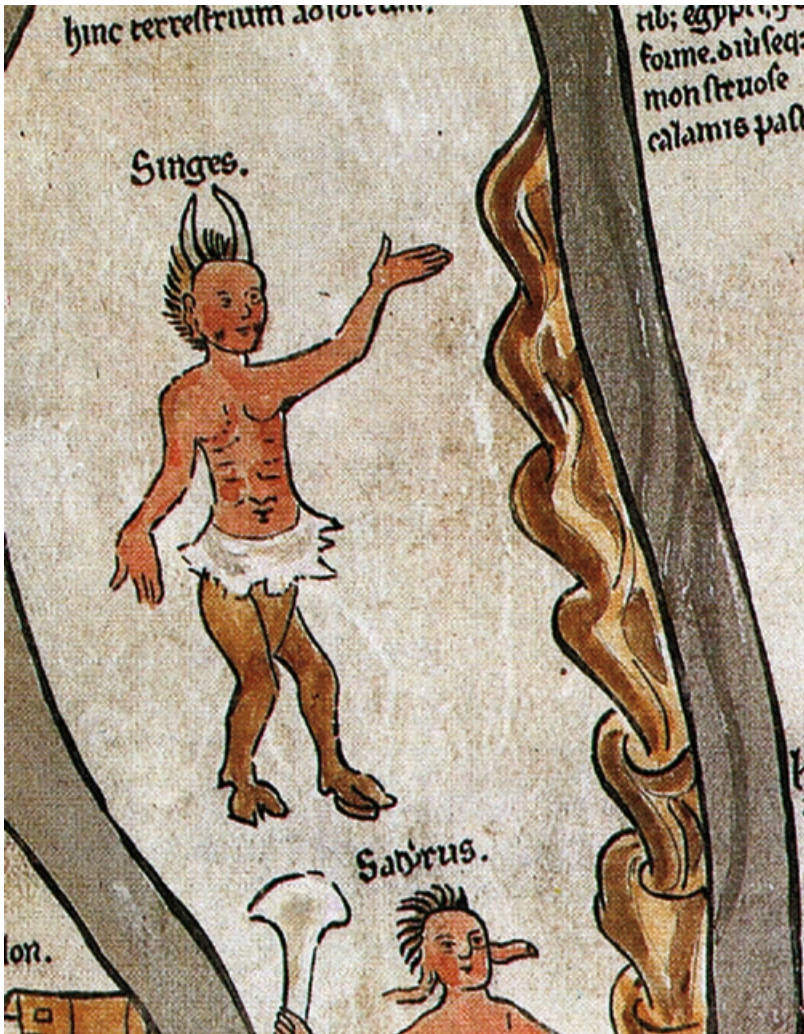


Figure 1.2. Detail of the upper-right edge of the Ebstorf map.

These medieval worldviews were clearly related to the views of Augustine's City of God, which suggested that the will of God placed Christians at the centre of the known world and relegated non-Christian peoples to the outer spaces, even along the boundary of non-human beings, or 'monsters', whose brilliant and decorative effects were often relegated to the margins of maps (Figure 1.2).

Meanwhile, for the civilisations of Abya Yala (the Americas), which Christendom had yet no place for, understandings of the world developed

quite differently. In Abya Yala, space and time were often intimately linked, rendering the map and almanac calendar one and the same (Milbrath, 1999). Time was cyclical; its study was mainly intended to predict future events, and scaled on enormous durations based on repetitive cycles. For example, Maya calendars and almanacs like the Dresden Codex (Figure 1.3) were shaped by astronomical observations and refined mathematical calculations. Maya maps might thus be seen as a cross between history, cosmology and descriptions of territory: when they marked their borders, they added information on how they had conquered those areas.

Medieval Western maps were often illustrations designed to clarify concepts of space and time based on the pre-Ptolemaic model. Their value lay not so much in their practical use but in how they depicted concepts that corresponded to sacred texts. These were illustrations of history, philosophy or encyclopedic references, not points that referenced the earth's surface. Columbus himself followed a medieval spirituality in many ways; he had intended to meet the Great Khan of China, about whom Marco Polo spoke at the time, in order to convert the Khan to Christianity. He also understood that the great purpose of all his voyages was to eventually undertake a new crusade to liberate the 'Holy Land' (Watts, 1985).

At the same time, Columbus was influenced by Toscanelli's calculations of the distance between Europe and Asia from the west, suggesting it might be relatively shorter if travelled at higher latitudes. Toscanelli had spoken with the king of Portugal and written to Columbus, and he was a friend of Nicholas of Cusa, the mathematician and astronomer who referred to experience, nature and the human condition rather than to tradition and the authority of the sacred texts. Thus, for Columbus, the earth was a terrestrial globe – that is to say, the totality of ocean and land, rather than a medieval flat disc.

Columbus believed in the significance and aptness of his names: Cristobal (bearer of Christ, from the Greek) and Colon (coloniser). He himself changed the names of the places 'discovered': Guanahani became San Salvador (God), and then in order of importance: Santa Maria de la Concepción, Ferdinandina, Isabela and Juana (the Virgin Mary, the sovereigns of Spain and the Infanta, respectively). He later renamed a vast number of places, as Tzvetan Todorov (1999) notes, which fell in line with Europe's problem with the Other.

In the mid 16th century, following Columbus's 'discovery' of Abya Yala, geographers and cosmographers in Europe would come to shape cultural worldviews that used science to legitimise conquest. Those in the Netherlands would become an important group in this history. Their practices came to focus on depicting the earth's surface by adopting the Cartesian reference system, Euclidean geometry and Galilean physics. Among the group was Gerardus Mercator, a mathematician and cosmographer who had studied at the Catholic University of Leuven where the Christian humanist and



Figure 1.3. The Dresden Codex, the oldest surviving Mayan manuscript (c.13th or 14th century).

Renaissance scholar Erasmus had been a student. Mercator became known for his treatise on triangulation and would later become known as the father of a cartography that came to treat the globe as a scientific instrument and the world as a physical surface to be scientifically measured (Figure 1.4). Also among the group was Willem Blaeu, a pupil of the astronomer Tycho Brahe, who drew high-quality maps of various states, created important atlases and, notably, became cartographer to the Dutch East India Company.

In the following century, Newton would come to assume that space was absolute in nature – a type of container of objects and facts – whose dimensions



Figure 1.4. The Geographer by Johannes Vermeer (c.1668–9).

he also based on Euclidean geometry. He founded his mechanics on the idea that space was distinct from bodies and that time would pass uniformly. Newton's universe was an infinite space in which bodies move in a straight line unless deviated by another body exerting a force. Meanwhile, his contemporary Leibniz would anticipate Einstein, arguing against the Newtonian absolute conceptions of time and space in favour of relational ones.

Kant came to legitimise Euclidean geometry and Newtonian physics along the way, arguing that space and time were inner conditions of the human, allowing for perceptions that would subsequently be ordered by logical categories, thus rejecting religious assumptions that had previously been sacred. Kant, a professor of physical geography, argued that space and time were not objective realities but subjective constraints allowing for the sensory-cognitive capacity of the human mind to represent objects (e.g. a priori forms of sensory intuition). Appearances were phenomena; things in themselves were noumena; space and time were a priori forms of intuition, both transcendental and universal. Kant's conception of the universal was quite specific: the capacity to exercise the human mind in this way belonged to those beings his society determined to be endowed with reason, thus excluding those deemed incapable of assimilating into this imposed-upon ideal.

In the same century, the Cassini family would map France using geodetic triangulation for the first time, then a technical innovation. Mapping by using a measurement apparatus with precision fell in line with the spirit of the Enlightenment, the *esprit de géométrie*, without adding ornaments or frills, setting a standard for cartography thereafter (Figure 1.5).

Mercator's projection of the world, which, in privileging distance over area, emphasised the size of the global North and de-emphasised the size of the global South, was to become hegemonic. Lambert's cylindrical equal-area projection (1772) became the first to privilege area over distance and was followed by others, including James Gall's projection (1855), which critiqued Mercator's map for privileging the needs of navigators while sacrificing form, polar distance and proportionate area. Arno Peters would later build on Gall with the Gall–Peters projection (1973), presenting a highly unconventional representation of the earth's surface and aiming to eliminate the 'normal' Eurocentric image of the world found in common atlases.

These alternative views of the world were controversial and even referred to as 'ugly', for Mercator's representation had become so familiar to Westerners that his map was often taken simply to represent what was true and natural, even though what was 'natural' turned out to be merely 'conventional', the result of tradition and ethnocentrism.

Just as the conditions of possibility for a (Eurocentric) Mercator projection are important to consider, so too are those related to the Gall–Peters projection. The



Figure 1.5. Cassini map of Paris (1750–1818).

Gall–Peters projection was born in the era of decolonisation, a time of hope for a more equitable and, above all, more peaceful world. The Bandung Conference of 1955 had marked the beginning of the efforts of non-North Atlantic Treaty Organisation (NATO) and non-Soviet countries during the Cold War to seek their own paths of development. Shortly thereafter in 1961, the Non-Aligned Movement (NAM) was born in Belgrade, one of whose fundamental principles was pacifism in relations between states, with India's Nehru, Egypt's Nasser and Yugoslavia's Tito as its major advocates. Later in 1989, Arno Peters would

publish the only atlas at the time to represent all areas on about the same scale, a historical context that also saw the release of the Brandt Report's map of the unequal relationship between the global North and global South (Figure 1.6).

New map families such as anamorphic maps would also come to relative prominence (Gastner and Newman, 2004; Tobler, 2004), in which cartographical techniques were able to conserve the relative proximity of areas even as the parameter under study involved an increase or decrease in spatial area. For example, cartograms allowed viewers to quickly grasp great differences for a wide range of practices in different societies and countries, irrespective of area and distance. In one specific case, for example, which maps daily income over 200 USD, the Netherlands appears much larger than its relative spatial area than India or Mexico (Figure 1.7).

Geography's shift?

Decolonial movements and the counter-maps they inspired were key in the rise of critical cartography within geography by the 1990s,¹ which continues to the present day. As a subfield, critical cartography has helped theoretically situate maps as discourses of 'power/knowledge' (Foucault, 1980), thus displacing them as neutral scientific documents. Key works within the literature suggest that the traditional manner in which we understand the map and the way it fashions knowing and seeing have often been negative and disabling (Harley, 1989; Wood, 1992).

The scholarship often draws upon Donna Haraway's (1988) notion of situated knowledges to throw into question the possibility of an all-knowing subject. Haraway's work exposes the problematic notion of an ostensibly disembodied scientist in his or her (but often his) claims to objectivity and universal knowledge, a phenomenon that her work referred to as a god-trick, or 'view from nowhere' that ignores our human limitations, convinces us objectivity is possible and obscures from us questions concerning who has the authority to look and from where. Rather than suggesting that claiming knowledge of anything is no longer possible, Haraway asks that we acknowledge

1 While critical cartography arose to prominence in the 1990s as a subfield, it must be understood in the historical context of the development of the cartographic discipline more generally along with its link to anticolonial movements, with anarchist geographers Élisée Reclus and Pëtr Kropotkin as precursors of this alternative geography.

In his youth, Reclus had worked in Nueva Granada (present-day Colombia) and was likely influenced by memories of the 'reductions' the Spanish created in the Andes (*reducciones de indios*) that forcibly relocated indigenous peoples into settlements in order to Christianise, tax and govern them more effectively. Kropotkin's role in compiling Reclus's monumental *La Nouvelle Géographie universelle, la terre et les hommes* (1875–94) marked the official birth of contemporary geography for many, which was deeply interconnected with new political philosophy and dedicated to universal solidarity.

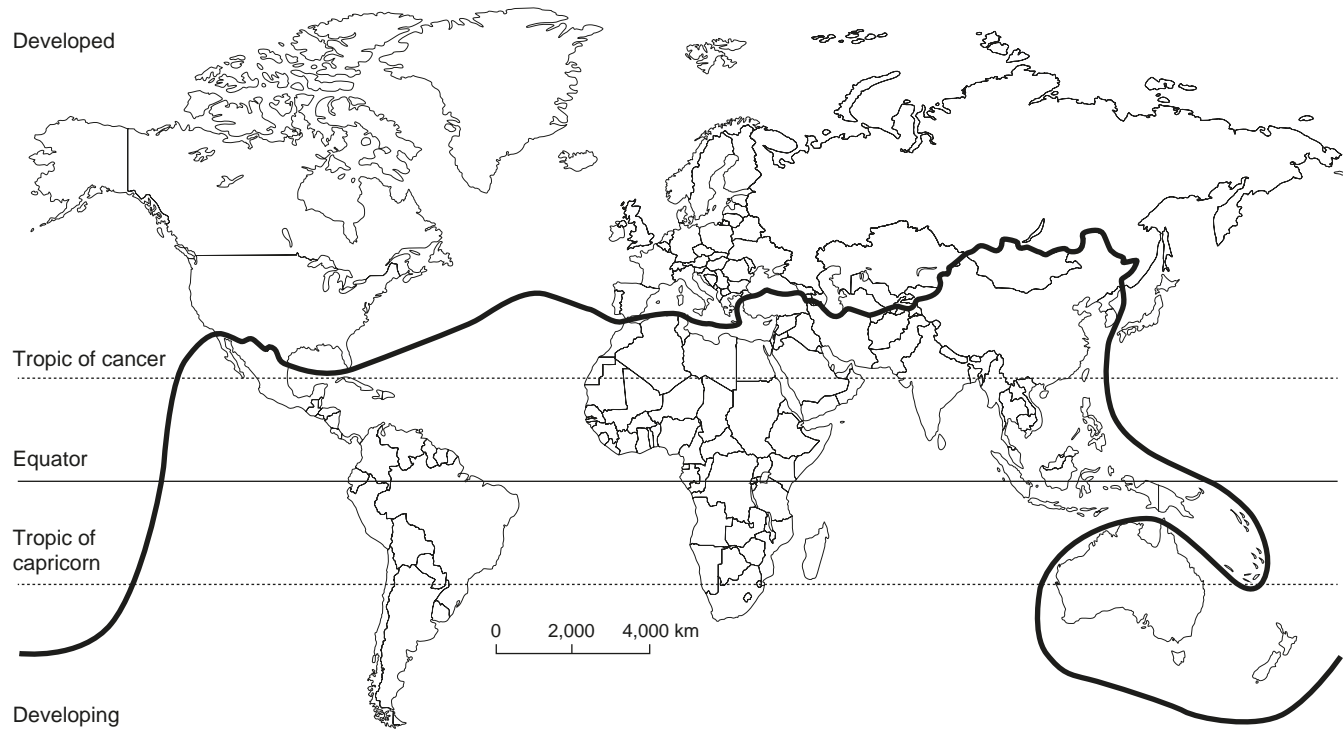


Figure 1.6. The Brandt Line, dividing the world into the 'developed' global North and the 'developing' global South.



Figure 1.7. Thematic map of families with daily income of over 200 USD.

that all knowledge claims are embodied and that we recognise that each of our positions as observers reflects our positions in society. With these, the best we can hope for is a situated knowledge where one can claim only partial knowledge of what there is to know. Thus, for the question of map-making, the cartographer's partial knowledge is relevant and interesting, but only as part of a bigger picture.

Insights such as these also allow for an understanding that the oppressor and oppressed will inevitably have distinct views of the world, leading us to better understand how scientific Truth (capitalised here to mark its imposition as universal) is intricately linked to power and the social, economic and cultural locus of the observer. In exposing this interplay, Edward Said (1978) showed how Europe produced and continues to produce 'the Orient' – its colonial gaze always seeking to 'know' the world in order to have power over it. It is a reason that sees, dominates and instrumentalises humans and space, developing the social sciences not simply to know or even to create the world, but to dominate it. This gaze perpetuates colonial institutions and practices even after formal colonialism has been dismantled, continuing to frame how the West knows, represents and ultimately *produces* the colonised themselves.

Much like Haraway would later argue, for Said no production of knowledge in the human sciences can ever ignore or disclaim scientists' involvement as human subjects in their own circumstances. And it is for this reason why, for Fanon ([1961] 2005), it would be the wretched of the earth who *could* play the revolutionary role – their position in society as wretched would have the least to lose and most to gain in the creation of the world anew.

From such impactful interventions, within the discipline of geography there thus exists a 'cartographic anxiety' (Gregory, 1994) about the map's complicity in imperial/colonial power and the chronic persistence of this relation in present assumptions about cartography. This is the case even when choosing map projections, as the Mercator/Gall–Peters controversy attests. These histories of the map's use and of its production itself highlight the complexity of cartography as a language of communication with functions that far exceed their role as mere bearers of spatial information that are commonly attributed to them. Maps are thus never replicas of reality; they interpret and can even create a reality laced with the assumptions and logic that guide the construction process itself. Indeed, the terrestrial ellipsoid cannot be developed on the plane, because the two surfaces have different total curvatures: the choice of the type of deformations (angular, areal, linear) always suggests, but not always consciously, a point of view. Ultimately, this choice reflects the prevailing cultural climate: the Mercator map of the world was itself produced following the invention of perspective by Renaissance painters.

Critiques of modern maps as weapons of the coloniser eventually led some scholars to suggest that 'more indigenous territory has been claimed

by maps than by guns ... [thus] more indigenous territory can be reclaimed and defended by maps than by guns' (Nietschmann, 1994), which led some indigenous movements to 'counter-map'. It was in the early 1990s when Edward Said and Nancy Peluso, writing about different contexts, introduced the term to describe grassroots map-making by indigenous peoples in Palestine (Said, 1993) and Indonesia (Peluso, 1995). It became immediately evident that counter-maps could be effective in disrupting truth claims and are interesting in themselves for their ability to engender notions that non-state actors could make competing and equally powerful maps (Wood, 1992). Nevertheless, counter-mappers did not always recognise that, without a strategy guiding the map's use, even indigenous counter-mapping could come to impose a new hegemonic reality that followed colonial logics, reproducing the colonial world itself (Wainwright, 2008).

The question for the counter-mapper that has often been overlooked, is if non-Western conceptions of space and time are being replaced when seeking cartographic recognition from the Western gaze. The points, lines and polygons that exist on maps are practically all human artefacts, falling into two categories: engineering works (roads, bridges, dykes, runways, railway lines, surveying landmarks) and administrative and property boundaries. As Couclelis (1992, p. 67) writes: 'Throughout the history of Western culture, these two categories of Euclidean features have been essential to the regulation, domination and control of the geographic world: the natural world, in the case of engineering works; the social world, in the case of boundaries'.

So while the map is not the territory, the map runs the risk of asserting that it is the only possible representation of the territory (Dematteis, 1985). We must recognise that maps – whether colonial or anti-colonial – are related to the cultures to which they belong and to whom they make sense, and in the first instance, to those cultures' metaphysical conceptions of space and time. There is no escape from the cartographic paradox: to provide a functional image, maps must lie (Monmonier, 1996) by favouring some elements over others, necessarily making invisible other possible stories, other possible ways of being, even extinguishing them. As Yves Lacoste states in the title of his (1976) book, *La géographie, ça sert, d'abord, à faire la guerre*, geography exists, first of all, to make war.

Maps and the persistence of colonised worlds: some examples

Cartography as a whole retains, for the most part, an overwhelmingly Eurocentric understanding of the world (Blaut, 1999; Castree, 2003; Sheppard et al., 2013). In mapping regions and continents, the main point of view represented continues to be that of colonial powers; they continue

to hold control over countries they once formally ruled over directly, with present-day political boundaries testifying to this continued order. In settler-colonial contexts, conventional mapping conforms to propensities for excising racially minoritised and colonised peoples *within* these boundaries. In both cases, whether colonial or settler-colonial, the shared logic that predominates is the desire to control, objectify, manipulate and exploit colonised people's environments. Also present is a generalised culture–nature or human–non-human dichotomisation that paves the way for separating people from their environments and relating to land in terms of its exploitable potential.

The mapping of Africa is a salient example. Africa is typically split into two parts, one north and one south of the Sahara. This is a colonial perspective that refuses to see continuities, papering over cultural unities among African peoples. It is as if centuries of knowledge sharing and trade across the Sahara never existed, simply because European colonial authorities either did not acknowledge them as historically important, or when they did acknowledge them, it was to prevent them from posing a threat to colonial rule. The current French military interventions in Mali, Libya and Chad serve as examples: the Tuareg must be forcibly assimilated into a Sahel-centred state (Mali), whose borders were carved out by French colonialism and traversing sections of the Sahara; crossings and flows from Libya to Chad must be suppressed to ensure the French-supported Déby dictatorship remains intact, along with resource control for French capital.

Maps that insist on drawing boundaries across deserts and savannahs reinforce the persistence of a colonial world order that remains imposed on many African peoples. It reduces space to what colonial powers deem to be acceptable, representing ecosystems as if they could be neatly divided by administrative fiat. A different map could show instead existing continuities (both social and ecological) and political contestation by displaying national state boundaries as interrupted lines and showing areas where alternative and/or rival political arrangements exist, such as the Tuareg struggle to establish Azawad or the Saharawi struggle for independence from the US- and French-supported Moroccan monarchy. To map out these existing alternatives and contestations would be a cartographical act that does not take colonial and derived national state impositions for granted and that speaks to the tenuous nature of boundaries, which are contingent on the relative successes of military interventions by colonial powers and the related dictatorial capacities of local regimes.

The construct of a sub-Saharan Africa is overwhelmingly common in cartography and has repercussions for understanding ecosystems and how African life-ways have co-evolved with them. To show the falsity of this construct and also the artificiality of separating African peoples, it is possible to create maps eliding the divide by showing contiguities of cultural traits (such as

the distribution of languages and religions) and of physical environments (the regional boundary, after all, rarely coincides with ecosystem differences). As a contrast to received mapping imaginaries, such an alternative map can provoke an exploration of the ideological underpinnings, involving colonial strategies of control by way of division, as Edward Said (1978) pointed out some time ago, and long-standing Eurocentric imperialistic obsessions with the spread or presence of Islam and/or Arabs.

The settler-colonial nature of North America can be exposed in similar ways. The relationship of ideological constructs with cartographical representation is evident in United States Geological Survey (USGS) topographical maps. In this case, omissions, obscuration and ethnocentric categories help reproduce colonial and racist worldviews. Because they are regarded as neutral and objective (authoritative) spatial representations of reality and because they continue to be used widely, even in urban and regional planning, USGS maps constitute an important process in the reinforcement of colonial processes.

There is much more than mere change over distance being represented in such cartographical products of the US state. There are factories, mines, boat landings, residential areas, channelised streams, dams, reservoirs and cemeteries (usually those of white people), among other features. Ecological processes are usually confined to marshes, surface waters, peaks, depressions and vegetation reaching heights above two metres, among other representations that focus on the layout of the terrain, rather than the distribution of organisms or interactions among them. The mapped features are divided between cultural and 'natural' features, with the latter portrayed in much fewer and more general categories and as subservient to the former. For example, marshland or forest is more generic than the differentiation shown among a society's land uses (representing a population within a single species, to put it ecologically). There are no beaver dams or distinctions between types of grasslands or forests. The emphasis is squarely on the 'cultural', even though the cartographers claim the map to display mainly topography. More than this, the cultural is really reflective of just one kind of society, the settler-colonial capitalist society. Nature is separated from society and reduced to what is useful to a particular social formation.

Every now and then, there are attempts, for example, to signal the importance of the historical presence of African diaspora communities, but typically this is by way of cemeteries or slave plantations, as if African people never taught whites anything, never imparted cropping system knowledge, never contributed to the actual shaping of a landscape through such activities as farming, agricultural innovations and much else (Carney, 2001). Native Americans also exist, but only by way of reservations. The USGS maps erase from view their historical reshaping of the landscape, such as large monumental architecture (incorrectly called 'earth mounds') and the persisting grassland-forest ecotones, the extent

of their original territories, their current struggles to regain land stolen from them, and the location of their ancient settlements. Such ideological terms and silences buttress a view of the world that justifies the annihilation of other peoples and, with it, other ways and possibilities of relating to land, environment and place. Such a process of settler-colonial indoctrination can be exposed by alternative representations showing the extent of conquered territories (including those illegally grabbed according to US federal laws), much beyond current reservation regimes and the presence of cultural markers in the landscape left by all peoples, not just Europeans.

In fact, what is seldom recognised is that USGS maps are landscape representations in part for military purposes and in part for partitioning conquered land for commerce and state use. Terrain maps have historically served military ends, and USGS maps do not depart from this tradition. Aside from longitude–latitude, Universal Transverse Mercator (UTM) coordinates, which are used primarily by the military, feature among the three coordinate systems. They are sometimes given prominence by the display of grid lines devoted to that coordinate system only. Critical industrial infrastructure is highlighted, such as power plants and lines, pipelines, port facilities and major factories, implying defensive as well as offensive military priorities. Green areas are used to symbolise vegetation but only if it is higher than two metres. As the USGS maps explain, the purpose is to identify troop movement or troop-concealing forest canopies. Actual US military installations are largely made absent or devoid of the same level of detail as other landscape features. Such omission is unsurprising, but what is taken for granted is a world of highly armed and belligerent institutions that have little care for the security of the vast majority of people.

More than this, USGS maps project a settler-colonial mindset through the use of the State Plane Coordinate System (SPCS) in addition to the focus (described above) on industrial infrastructure, the underpinnings of commerce. The SPCS was introduced in the 1930s to improve records of original land surveys by standardising measurements to a single datum (North American Datum of 1927), using Cartesian coordinates to divide each state into zones and using English imperial units (Stem, 1990). This facilitates and raises the accuracy of local and regional land surveying, while obscuring ecological and social differences and historical markers. Every surface is rendered into an empty, abstract polygon. Such divisions of land are crucial to delineating property boundaries. After all, if land is to be fungible – that is, exchangeable in the market – it must be eviscerated of meaning and ecological dynamism. In other words, in the case of the United States, conquered land (the loot) is thereby divided up according to capitalist logic of distribution to those with capital. It should be clear that such a topographical map is virtually useless to ecologists, botanists, organic farmers (who may, for instance, want to know much more about local ecosystems), pastoralists, gatherers or hunters,

to name a few other possible alternative imaginaries and actual uses. More importantly, such mapping directly pre-empts any notion of Native American self-determination and sovereignty. It is thus that USGS maps are specifically settler-colonial representations of the earth's surface.

Conclusion

The rules of Western cartography serve not simply to represent space but to impose one way of relating to, seeing and imagining the world – a worldview it claims to be superior. This is the case even though the creation of Western cartography itself was dependent on non-Western knowledges. As is well known, while the first colonisers renamed the lands they wished to conquer before even setting foot on them, in order to map those lands they needed the support of the indigenous peoples living there (Turnbull, 1998). Today, geomatic instruments such as drones equipped with topographic tools map from above in order to assist in further wars of dispossession and here again their use is never neutral. The technologies may evolve but the assumptions that inform Western cartography remain, contaminating if not colonising the very ways of being and doing that were previously non-Western.

As the move from paper to digital formats opens new perspectives, the dilemmas related to representation and map use have persisted, without solving or only partly solving previous conflicts. As smart devices become more map driven, users are folded into banal aspects of 'Where am I?' and 'Where would I like to go?' While it is possible to associate a global positioning system (GPS) image with a photo, to search for addresses and to follow directions from one place to the other, what users often find themselves doing is instead 'surfing' a reality that becomes more and more virtual. In this way, contemporary mapping emphasises the individual over national or collectivist projects. And in the meantime, the power the individual holds is itself deluded as social media companies capitalise on their map-driven aspects by extracting location data and by tracking users. Here we see a very different use for maps: a technology that previously sought to conquer territory now seeks to conquer everyday life.

A fundamental notion of critical cartography – that maps are expressions of power and desire – led scholars to take seriously the idea that maps can be used to show utopian worlds, create alternative social planes and aid groups in battles against domination. Nevertheless, late capitalism continues to succeed in subsuming and neutralising alternative points of view and protest – its response to ecological catastrophe via a 'green capitalism' is a prescient example (Leonardi, 2017). For counter-cartography, map-driven smart devices that allow one to act alone risk isolating users, further removing them from the community and rendering them dependent on a pervasive technology that seeks to take control of everyday life.

As the global liberal order continues replicating the colonial logic of asserting itself as the best of all possible worlds, it is important to keep in mind that critical cartography is concerned with the social relevance, politics and ethics of mapping (Firth, 2015). The order being imposed today follows a market-liberal utopia that claims the world will be perfect once market logic and human rights are applied, yet that results in ecological catastrophe, new forms of apartheid as are apparent in Palestine and in slums worldwide, and incentives to privatise intellectual creativity along with water, minerals, wood and human DNA. Thus, if we are to do a critical cartography under an ethics and politics of anti-colonial liberation, then we must keep in mind that the work of critique is to analyse what appears obvious, natural and inevitable in order to create the world anew. Critiquing cartography towards this end means not simply examining how maps helped colonise the world, but how maps continue to create the world in step with the colonial logics and worldviews that began being imposed globally over five hundred years ago.

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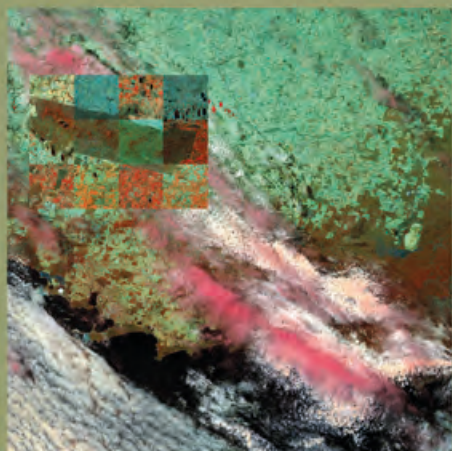
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Cover image: '12 Months Over the Stirling Ranges' (detail), Grayson Cooke, 2018. A false-colour composite image of Stirling Range National Park in Western Australia. This image has been produced with the support of Geoscience Australia, and with the assistance of resources from the National Computational Infrastructure (NCI), which is supported by the Australian Government.

The digital age has thrown questions of representation, participation and humanitarianism back to the fore, as machine learning, algorithms and big data centres take over the process of mapping the subjugated and subaltern. Since the rise of Google Earth in 2005, there has been an explosion in the use of mapping tools to quantify and assess the needs of those in crisis, including those affected by climate change and the wider neo-liberal agenda. Yet, while there has been a huge upsurge in the data produced around these issues, the representation of people remains questionable. Some have argued that representation has diminished in humanitarian crises as people are increasingly reduced to data points. In turn, this data has become ever more difficult to analyse without vast computing power, leading to a dependency on the old colonial powers to refine the data collected from people in crisis, before selling it back to them.

This book brings together critical perspectives on the role that mapping people, knowledges and data now plays in humanitarian work, both in cartographic terms and through data visualisations, and questions whether, as we map crises, it is the map itself that is in crisis.



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