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Representing

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Introduction

The earliest recorded use of the term *representation* is in France in the mid-13th century, when it referred to the presentation of letters, documents or evidence for view. Since then, representation has taken on various meanings, which concern the symbolic denotation of something; ‘standing in for’ others with the authority to act on their behalf; a discursive or written account; and the visual portrayal of a person or thing (Oxford English Dictionary, 2009). Today, many people around the world are immersed in representations, such as adverts, newspapers, debates and art. It is important to differentiate between the meaning of a representation, and the medium or form that it takes.

Representations can enable people to perceive things that in their natural form are imperceptible, such as sonographers’ images of an unborn baby or images of the lights of ‘the world at night’ when in reality it is never dark worldwide at any one time. This abundance of representations is often very useful in extending awareness and understandings, so it is valuable to consider what roles representations play in shaping

perceptions and geographical realities. Before moving to focus on maps, a range of other forms of representation that are pertinent to the work of geographers are touched upon, although these are not the central focus of this chapter.

Representations are essential to understanding the contemporary world for three reasons: firstly as a way of accessing information; secondly because they form the basis of other people's worldviews; and thirdly by offering insight into how the creator of a representation perceives the world. Representations enable people to learn about the world beyond their immediate experiences: one can view something of the Syrian conflict that began in March 2011; read about famines in the Horn of Africa; and listen to details of the lives of the world's rich and famous. Geographers are deeply involved in producing representations, as well as in analysing others' representations. The focus of this chapter is on visual representations in the form of maps, with a particular emphasis on mapping world inequality.

Political and Statistical Representation

Knowing and democratically governing populations requires the description and categorisation of often demographically heterogeneous groups. This division of a population into geographical and demographic sub-groups, or *grids of representation*, helps to render people imaginable and knowable (Foucault, 1977/1991; Hannah, 1997). Such statistics are often the basis of maps (for example, Thomas and Dorling, 2007); one form of representation thus makes another possible. Political representation is predominantly spatial, where a politician theoretically represents the interests of the population of a particular area. It is important to know about populations when drawing up electoral boundaries in order to balance roughly the number of people within each electoral area. Sometimes a more manipulative approach to electoral boundaries

(gerrymandering) is taken, where boundaries are altered based on the geography of political affiliations to maximise the candidates of a particular party likely to be elected or to alter the political influence of a certain demographic group.

Discourse as Representation

Discourse generally refers to spoken or written words. As people construct and express their realities, they do so ‘with points of view, interests, and principles of vision determined by the position they occupy’ (Bourdieu, 1996, p. 2). The same event or relationship could be described in very different terms. World inequality might be described as anything from ‘natural and inevitable’ to an ‘offensive injustice’ (Barford, 2010). Discourses are far from a clear window to the reality they describe and may perform various roles: informatively representing; misrepresenting and mystifying; rhetorically justifying and legitimising; distributing ideologies; and even generating imaginary alternatives, which if hegemonised could lead to social change (Fairclough, 2006, p. 165). The power of discourses, as with other representations, is that fact and opinion are, at times, inseparable. Discourses do not occur in isolation, but require *passeurs* or carriers for the ideas within them to spread (Bourdieu and Wacquant, 1999, p. 46).

Visual Representation

Images also communicate norms and values, focusing on one thing whilst omitting others. Photographs tell partial stories and present additional questions about their creation, such as who took the photograph, what was happening just outside of the frame, what happened just before and just after the photograph was taken, and has the image been manipulated? Images also influence our views of the world and expectations, for example some photographs tell stories about the horrors that occur in

‘backward – that is poor – parts of the world’, which encourage the belief in the inevitability of tragedy there (Sontag, 2003, p. 64). This might leave out the political and economic explanations for such tragedies, which would offer a more nuanced understanding. What is understood and interpreted from images is likely to be influenced by ‘scopic regimes’, the cultural construction of what is seen and how it is seen (Rose, 2001, p. 6). The viewing of images also involves the social practices of spectating and the social identity of the viewer. An example of social practices of spectating is the influence of social attitudes on our interpretation of images – Gillian Rose describes how feminism offers new perspectives on old images. Another social aspect of spectating is the selection of particular images for display in one’s own home in order to assert one’s identity (Rose, 2001, p. 27–28). It is worth considering that it may only be in a small rich part of the world that images hold such importance in defining and mediating experiences (Sontag, 2003, p. 98).

Some important concepts for thinking about representation include the politics of representation, ways of seeing, the gaze and situatedness. The politics of representation concern struggles over the ways in which the world is represented and the effects and consequences of particular representations (Hall, 1997a). For example, postcolonial writers interpret and redefine of colonialism and its aftermath in order to provide alternative accounts of colonialism to those offered by the former colonial powers themselves. Ngũgĩ wa Thiong'o characterises colonialism as dismemberment and embarks on a project to re-member Africa (wa Thiong'o, 2009), and Gayatri Spivak emphasises the importance of suspending a conviction that ‘I am necessarily better’ in order to understand others’ thinking and actions as valid (Spivak, 2008, p. 23). Thus there are multiple ways of seeing (or not seeing) things. John Berger (1972) points out that we only see what we look at, and that in looking we consider the relationship

between a thing and ourselves. Representations may exhibit their authors' ways of seeing, their gaze, which comes from a position. In the 1970s, the heterosexual 'male gaze' was identified within films, in which men were active and women were passive. Under this gaze, women became an object of desire both to men within the film and to the audience (Mulvey, 1975). In response, feminists identify the source of the gaze, arguing that objectivity is a situated knowledge. This 'allows us to become answerable for what we learn how to see.' (Haraway, 1988, p. 583).

The partial nature of representations offers insight into the views and awareness of the person or people representing something. Edward Said made this point about the views of the Orient from the Occident. In Western Europe, particularly France and Britain, the Orient is one of the most recurring images of the other. The Orient refers broadly to the Middle East and Asia. Orientalism, the European discourse on the Orient, contains ideas of European superiority, imperialism and racism, which 'has less to do with the Orient than it does with "our" world.' (Said, 1978/1995, p. 12). Representations can be very powerful, especially when referring to something beyond one's immediate experiences. Thus imperial and racist presumptions (amongst others) may be spread without being consciously acknowledged. Conversely, others such as film director Pedro Almodóvar take a playful approach to representation and enjoy its disassociation from reality. He commented, 'When I talk of reality, I think of something which exists, which one can show as well as transform – a representation. Reality interests me in so far as it is something which can be represented and used as an element to build a fiction.' (Almodóvar, 2006, p. 157).

A deceptive characteristic of representations is that it is easy to forget that something is a representation. We are reminded of this by René Magritte's painting 'The Treachery

Of Images' (Figure 12.1), where below the image of a pipe, it is declared that 'this is not a pipe' (*ceci n'est pas une pipe*) (Magritte, 1928–1929). However accurately an image is produced, the image does not become the thing that is represented. Nevertheless, representations do influence the ways in which we imagine, think and act geographically in the world. Representations offer ways of knowing about the world, which can then guide decision making or more subtly alter people's perspectives, thus playing a role in producing realities.



Figure 12.1 René Magritte's *The Treachery of Images*, 1928–1929.

Stuart Hall characterises the main perspectives on representation as reflective, intentional and constructionist. Reflective means that language (and images) mirror the world they describe; intentional means that the meaning carried by a representation is that which the author intended; and constructionist is that meaning comes into being through language. The constructionist approach has been the most influential within cultural studies – Ferdinand de Saussure's semiotic and Michel Foucault's discursive approaches are both constructionist (Hall, 1997b). A brief overview of various visual

methodologies follows. Content analysis considers the form and composition of images. Semiology studies signs as ‘vehicles of meaning in culture’. Psychoanalytical approaches are concerned with the influence of images on individuals and their sense of identity. Discourse analysis involves how our thought is structured and how that influences our actions. Audience studies focus on how images relate to social identity and the interpretation by audiences. The anthropological approach researches how visual objects are interacted with in daily life (Hall, 1997b; Rose, 2001). One’s choice of method would, as always, be influenced by both the type of visualisation and the research questions.

An awareness of the making and interpretation of representations can greatly enhance geographers’ understandings of human action by offering insight into constructions of the world. Representations have been described as being ‘guides to action and forces of change in themselves, stimulating and constraining the entire gamut of human emotion, from happiness to despair, from violence to love’ (Cameron and Palan, 2004, p. 66). Maps are noted for their influence on perceptions of the world, which may then affect feelings, opinions and behaviour. As Denis Cosgrove noted, mapping has become ‘a creative and critical intervention within broader discussions of space and the ways that it may be inhabited’ (Cosgrove, 1999, p. 19). The remainder of this chapter focuses on mapping, maps of world inequality and the occasionally emotionally charged interpretations of these maps. Depictions of space are inherently geographical, showing proximity and distance, enabling comparison between places and offering an overview of a given area. Maps are an interesting case for considering the peculiarities of representing because they incorporate aspects of partiality, apparent authority to define a place or space, and the roles of authorship and readership.

Maps as Representations

The Simplification of Complexity

A good map tells a multitude of white lies; it suppresses truth to help the user see what needs to be seen. Reality is three-dimensional, rich in detail, and far too factual to allow a complete yet uncluttered two-dimensional graphic scale model. Indeed, a map that did not generalise would be useless.

(Monmonier, 1996, p. 25)

The 'good map' is useful precisely because it simplifies reality. To learn about some places or events beyond our direct experience, the simplified version may be all we have; just as historical representations are all we have to learn about the past (Munslow, 1997, p. 85). The act of representing, determining which white lies to tell, has, for some, become as 'interesting and enlightening' as the events being described (Myers, 2000, p. 430). How something is represented is of interest partly due to the effects it can have on understandings and behaviour. Visual descriptions can be especially influential because they appear to be accurate representations of reality.

That representations provide transparency and clarify reality is contested because many recognise 'the pregnancy of the opaque' (Harley, 1992, p. 238). Simplifications encourage us to think in a particular way about others. Producing a simplified form can trick the reader into thinking that the complete story has been told, there is always a double game of production and seduction' (Doel, 2006, p. 345). Placing countries into colour-coded groups implies regional similarities, and bold uniform colouring for each country suggests internal homogeneity. Mapping one variable gives importance to that over others; atlases, which map many variables, highlight the plurality of ways to describe the world, and connections can be seen between maps: 'The map is dead. Long live maps.' (Painter, 2006, p. 347).

Representations are *partial* in two senses, being incomplete as well as not impartial. This matters because representations can manipulate information, world views and ultimately behaviour. ‘Wasn’t the map, after all, an archetypical symbol of military power, state bureaucracy, and instrumental science; “royal” science epitomized?’ (Pickles, 2006, p. 348). Taken a step further, propaganda maps are a conscious attempt to influence opinion: the anti-communist ‘John Birch Society’ used Mercator’s map to show the ‘red menace’, assisted by the Soviet Union’s large size on that map and the colouring of the Soviet Union and China in a rich red (Monmonier, 1996, p. 94–96). The preoccupation with land area, rather than population size, army size or weaponry demonstrates how maps can be persuasive despite sometimes presenting largely irrelevant or distorted information.

Perhaps it is the critique that land area is not always the most relevant variable to present that resulted in the suggestion that cartograms are more accurate representations of data (Perkins, 2009, p. 58; Whitehead, 2010). Cartograms are maps in which areas are resized based on data that is not necessarily land area; territory size could instead show population, extinct species or GDP for example. However, it has been suggested that such cartographic accuracy at times comes at the expense of comprehension (Whitehead, 2010). Cartograms of the United States, showing voting in the 2004 US presidential election are criticised for providing a ‘bewildering array of weird and wonderful images’ served with a ‘pervading sense that these maps were somehow more “accurate” or authentic depictions of Reality’ but ultimately making ‘the US election harder for me to comprehend and understand, not easier.’ (Whitehead, 2006, p. 342). Although cartograms simplify the world according to a single variable expressed as size, this simplification does not always help understanding. Nevertheless, map reading

can be learnt, and embracing new forms of mapping can open new ways to understand the world.

Creating Reality through Representation?

‘Is it possible to think of a map not as a representation of reality but as a tool to produce reality?’ (Karnarinka, 2006, p. 25). It has been suggested that maps pre-exist the referent (the real world) by conceiving of it and making it imaginable (Jacob, 1992/2006, p. 272). According to Denis Wood, maps are not representations, but are instead ‘systems of propositions’ that bring the world into being. This is particularly as maps show ‘whatever-is-not-here-present-to-our-senses-now’, which is the world according to people’s thinking rather than their senses. For Wood, describing maps as representations naturalises them, and this assists in obscuring the role maps play in establishing and maintaining social relations (Wood, 2010, p. 1–19); but of course this depends on what the word representation is taken to mean. John Pickles describes maps as inscribing the world, and explains maps as producing the social world:

‘The delimitation of territories and identities through the dash and the line is at one and the same time a bounding and separating that does violence to the world *and* a practice that gives our present world the meaning we understand and use on a daily basis. The categories we use and the demarcations we draw produce identity/difference relations in terms of which the world is structured and understood.’ (Pickles, 2004, p. 18)

A detailed example of the power of maps and geographical thinking in the creation of a nation is offered for Siam (the former name for Thailand). Modern knowledge of the ‘geo-body’ of Siam pushed out indigenous spatial concepts, and modern forms of mapping, backed up by military strength, ‘artificially and arbitrarily’ created the modern Thailand (Winichakul, 1997). A more recent study of mapping unfinished

housing estates in Ireland pays attention to the wider context in which these maps exist, in terms of their production and the media, state and public understandings. These maps were ‘evoked, challenged, denied, re-asserted – pushed and pulled through a series of media lens and public debates’ (Kitchin, Gleeson & Dodge, 2012). These post-representational approaches recognise that although maps are open to new interpretation and meaning, they nevertheless are frequently taken to be ontologically secure, which makes maps useful for practical tasks (Kitchin, Dodge & Perkins, 2011).

Our reliance upon maps to help us think about the world may result in certain neuroses: cartographic anxiety, the apprehension that something might not be mappable and cartographic desire, a longing for mappability (Painter, 2006, p. 347). This organising of ideas, people and spaces into Foucauldian grids of organisation (Foucault, 1977/1991, p. 195–228) creates ‘populations’ as knowable and manageable (Hannah, 1997). Understanding representation as creating an order poses the question of how ‘maps are an active part of the reality that they seek to depict.’ (Whitehead, 2006, p. 343). However the extent to which maps *create* reality may be exaggerated given that mapmakers draw on pre-existing interpretations of the world (Dorling and Fairburn, 1997, p. 3), as do map readers. Thus representations build upon one another, reinforcing particular understandings of reality.

World maps are often based on territorial boundaries, which is useful when trying to understand international relations, where states are the prime unit of interest (Taylor, Hoyler, Walker & Szegner, 2001, p. 215). However, the state can become a large grid of knowledge, and mapping at this level reifies states as mappable ‘bounded totalities’ (Painter, 2006, p. 347). Another limitation of static political world maps is that they do not provide an adequate spatial framework for understanding movement and flux: the

movement of people, money, disease and ideas around the world. Alternative forms of mapping can show contemporary hierarchies and global flows (Taylor et al. 2001, p. 214). Despite critiques of the ideological division of the world into nations, new representations of the global ‘still reflect the entrenchment of the geopolitical mode’ (Cuddy-Keane, 2002, p. 3), which reinforces this geopolitical approach in our understandings of the world.

Deconstructing Maps

It is generally agreed that maps are mediated representations of reality (Harley, 1992; Pickles, 1992; Monmonier, 1996; Dorling and Fairburn, 1997), despite often being interpreted as indisputable documents ‘blessed with the presumption of reality’ (Jacob, 1992/2006, p. 271–272). The deconstruction¹ of visualisations in a manner similar to that applied to written texts, in terms of their meaning, content and presentation, is a departure from positivist concerns with the technical methods of data presentation. The map itself and its broader context influence what is communicated. A closer look shows that the technical is political, for example a ‘rule of ethnocentricity’, where societies place themselves at the centre of the map (Harley, 1992, p. 233–236) makes them appear to be at the centre of the world. So too the writing surrounding maps points to specific meanings, influencing interpretation and understanding. Mapmakers’ values, intentions, culture and epoch influence what is represented and how (Pickles, 1992, p. 217, 211).

Many image production choices are highly logical, such as putting one’s own country in the centre because one’s location is central to one’s world. A battery of geometric alterations to map forms exists: simplification (reduce detail); displacement (stop overlaps and coalescences); smoothing (round the corners); enhancement (add

detail); graphic association (link a label to a symbol); aggregation (group similar features); abbreviation (shorten words to reduce ‘graphic congestion’); area conversion (show a general area where something is, rather than individual points); dissolution (remove some space); point conversions (group points) and segmentation (divide up space) (Monmonier, 1996, p. 25–30). Such neutral-sounding techniques obscure or highlight information about which mapmakers may sometimes be unaware because mapping conventions and their worldviews naturalise existing power distributions that are written into the map. Another convention is that many maps are depopulated, in the sense of not showing humans or animals, just showing static and more permanent features. However, such a technicality, at times, has politically germane implications: depopulated maps and images of war zones create the illusion that no one lives there, thus sterilising military actions and avoiding acknowledgment of the lives that are disrupted (Gregory, 2004).

More broadly, the presentation of a map affects its reception: Arno Peters arranged a press conference, presenting the Mercator Projection as a ‘straw man’ to be replaced by his equal area world map (Monmonier, 1996, p. 96). However, a map’s value often depends on use and the Mercator Projection was highly suitable for the task for which it was originally designed: mid-latitude seaborne navigation (Dorling and Fairburn, 1997, p. 52–53). Later, widespread use of the Mercator projection nevertheless resulted in a skewed perception of the size and significance of various countries. Similarly, the London Underground map obscures station level detail and highlights connections between tube lines, so is useful for navigating the tube (Willats, 2003, p. 125–126). Yet the use of a map is not solely dictated by intended purpose, and the tube map has become a cultural icon that symbolises London. This was also the case with the Mercator Projection, which came to symbolise the world, exaggerating the land area of

the northern hemisphere at the expense of the size of the southern hemisphere. Although not the original intention, it is important to note that the Mercator map nevertheless had political implications. It is quite common for representations to be used in alternative ways, and thus the meanings of a representation may evolve and be contested (Kitchin, personal correspondence, July 10, 2012).

The Social Lives of Maps

If we are who we are through the interactions we have and our social relationships, it would not be absurd to suggest that the same is true for visual representations. A map is a very different object to the cartographer who sees laborious measurements and partial data, and to the reader of the finished product (Jacob, 1992/2006, p. 273). To be influential, representations must be engaged with. The term ‘the diverse social lives of maps’ (Pickles, 2006, p. 348) acknowledges the influence and existence of the map beyond its physical form. Pickles muses about what roles maps may play in ‘dispossession, enclosure, and colonization and producing ... complex subjectivities’ (Pickles, 2006, p. 348). Maps can be particularly influential when referring to something beyond our immediate experiences (i.e. most of the world for most of human history and beyond) because it is impossible to check assertions against one’s own experiences and establish ‘ground-truth’. However, the authority ascribed to maps has led map readers to question their knowledge of their local area before questioning the accuracy of a contemporary local map (Deitrick, 2006).

Two types of reaction to visual images, specifically photographs, have been identified by Roland Barthes: the *studium* (general ‘polite’ interest; liking) and *punctum* (emotionally charged response and rupturing of complacency; loving) (Barthes, 1980/2000, p. 26–28; Emmison and Smith, 2002). Such reactions have elsewhere been

identified as those that ‘make us stop and think’ (Dorling and Fairburn, 1997, p. 155) as opposed to something being ‘non-obtrusive’ (Neuman, 1990, p. 162). Achieving punctum is desirable when maps are designed to be educational or challenge preconceptions. Simply turning a map ‘upside-down’, or South-Up, can provoke a punctum. The trick seems to be showing something that is almost recognisable, changing something familiar enough to be challenging but not unrecognisable. Yet, the possibility of punctum also depends upon several pre-requisites: the map reaching the target audience and being understood. Even then it may not change attitudes or instigate behavioural change (Handmer [1985] as cited in Haynes, Barclay & Pidgeon, 2007, p.125).

The authors’ intended interpretations of maps are not essential for a map reader to have a punctum response, and cartographic illiteracy comes in various forms. For instance, the reader could not understand what is shown by a map, perhaps due to not knowing how to interpret shapes or not understanding the data or its significance (or insignificance). Another form of illiteracy could be reading maps as faithful, accurate accounts of reality. This uncritical reading is invited by the nature of the map (Jacob, 1992/2006, p. 273). This point was also unambiguously made by Boggs, who coined the term ‘cartohypnosis’ (Boggs [1947, p. 469] as cited in Pickles, 1992, p. 198). Pickles upped the ante, stating that maps ‘seduce us, and that in being so seduced we all too often lose sight of the complex matrix of institutions, practices, and discourses on which they depend’ (Pickles, 2006, p. 348). Misinterpretation, such as mistaking one country for another, is another type of illiteracy. The moment of abstraction, when symbols and conventions are introduced, is when many map readers get lost.

Map use is common in the West (Jacob, 1992/2006, p. 272). The emergence of new forms of mapping, and new ways of using electronic maps, including map mashups and even map hacking is considered to have ‘released the inner cartographer in millions of ordinary people’ (Crampton, 2010, p. 3), yet millions of people are still just a tiny fraction of all people alive today. It is argued that it is a small rich part of the world where images hold such importance in defining and mediating our experiences, and to think otherwise is sign of provincialism (Sontag, 2003, p. 98). Minimal exposure to maps reduces the opportunities to learn map reading skills and conventions. Not understanding a map can be aggravating because maps have the aura of being logical, sense-making tools. Yet one person’s simplification is another’s confusion, exemplified by the way that the rules of cartography vary between societies (Harley, 1992, p. 233). If a reader is familiar with working at this level of abstraction, they will probably find it easier to understand abstract representations. Montserratian people when interviewed were generally better able to orientate themselves on aerial photographs taken from an oblique angle, rather than traditional plan view contour maps (Haynes et al. 2007, p. 1–3). For people who do not habitually use maps, a lower level of abstraction is often easier to understand.

Nevertheless, it has been suggested that the map that is most familiar to most of the world population *is* the world map. This is due to entertainment, communication and advertising industries presenting themselves globally and reflecting their worldwide interests, and also due to the adoption of the world map by internationalists and environmentalists (Dorling and Fairburn, 1997, p. 26). The world image is used because it is recognised, and recognised because it is used. Land–sea borders are particularly distinctive because the sea is usually coloured differently to land. Islands and peninsulas are generally easier to identify than countries with land borders (Clary et al. [1987, p.

46–47] as cited in Jacob, 1992/2006, p. 354). Continents stand out on world maps due to their land–sea borders and considerable size, giving world maps their distinctive shape. Still, mapping traditions exist in many parts of the world, and these have been carefully detailed in volumes produced by Brian Harley, David Woodward and Malcolm Lewis, which refer to the history of cartography in prehistoric, ancient and medieval Europe, traditional Islamic, Asian, African, American, Australian, Pacific and Arctic societies (Harley & Woodard, 1987, 1992, 1994; Woodward & Lewis, 1998). Other editors have followed with increasingly recent histories as part of ‘The History of Cartography’ project².

The visual studies literature offers a consideration of the effects of visual material, partly developed by the way that images invite the observer to look at them. Of the two types of knowledge that go into objects, only one is how to produce them, the other is how to appropriately consume them (IAQI Appadurai, 1986, p. 41). ‘Scopic regimes’, the cultural construction of what is seen and how it is seen (Rose, 2001, p. 6), mean that people are likely to understand images differently. What is seen and how it is seen can be analysed using various concepts: binary oppositions (e.g. poor/rich); frames (where it appears – a map becomes art when displayed in a gallery); genre (cartograms have their own codes and conventions); identification (how people relate to the image); narrative (the story told); reading (knowing how to read the image); the relation of the signifier to signified (there is no direct resemblance) and subject position (of those in the image) (Emmison and Smith, 2002, p. 66–69). The social modality of viewing images involves the social practices of spectating and the social identity of the viewer (Rose, 2001, p. 27). The reader, the process of map reading and the image itself influence responses to maps.

Despite the widespread acceptance of the manipulation and seduction that maps can perform, it is relatively rare to find recent analyses of map interpretation. In fact, the functioning of documents and texts in daily life is reasonably under-researched (Rapley, 2007/2009, p. 87). Most studies focus on the map and hypothesise about its social life. A study of hazard maps in Montserrat (Haynes et al., 2007), another about using cartograms in disease mapping (Tao, 2010), and my own PhD research into international interpretations of maps of inequality (Barford, 2010) are some examples of recent studies of audience map interpretation³. This is in the context of calls to ‘take seriously and focus on the potential work of documents – and other elements of material culture – in co-ordinating and producing people's actions and interactions.’ (Rapley, 2007/2009, p. 97). One way to do this is to follow objects because meaning exists in their trajectories and uses, as well as in their form (Appadurai, 1986, p. 5). I now focus on the specific example of the Worldmapper project and consider the production and consumption of the world cartograms that were drawn. I elaborate on Worldmapper because it demonstrates the many layers of information and decision-making folded into a representation. This includes data type, mapping conventions and supporting information. I also address the social lives of these maps, detailing how the same maps can be diversely understood with reference to discussions about these maps with Kenyan, Mexican and British teachers⁴.

Cartograms of an Unequal World

Worldmapper

Worldmapper is a mapping project that produced hundreds of maps of the world, showing an assortment of variables, which together describe something of the human geography of the planet. This mapping project offers an example of the choices involved in representing the world and draws upon international datasets to represent

the ways that people live around the world. These data were compiled from national sources by various UN agencies, and data availability influenced which maps could be drawn. There were choices to make about how the maps should look, which colours to use and what information to present alongside these maps. The circulation of these maps and how people respond to these often-unfamiliar images influences the impact they might have on public understandings of the world.

Cartograms are maps in which area represents data, and bigger territories represent more of the mapped variable. In Figure 12.2 and Figure 12., the area of each country shows the proportion of all people earning a certain amount who live there. Figure 12.2 shows that in 2002, the largest populations of people living on under Purchasing Power Parity⁵ (PPP) US\$2 a day were in India and China. So few people in the United States, Canada, Europe, Japan, Australia and New Zealand earned this little that these countries appear skeletal on the map. The reverse is true of Figure 12. – people living on over PPP US\$200 a day – where much of Africa and Asia have shrunk to be barely visible, and the United States dominates the map due to a large proportion of very rich people living there.

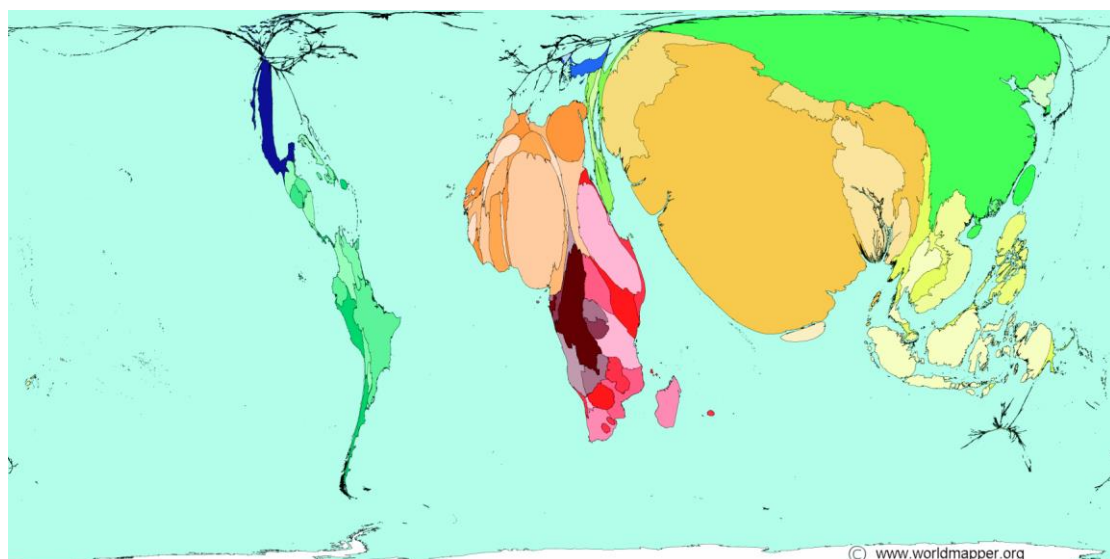


Figure 12.2 People living on under Purchasing Power Parity US\$2 a day in 2002.

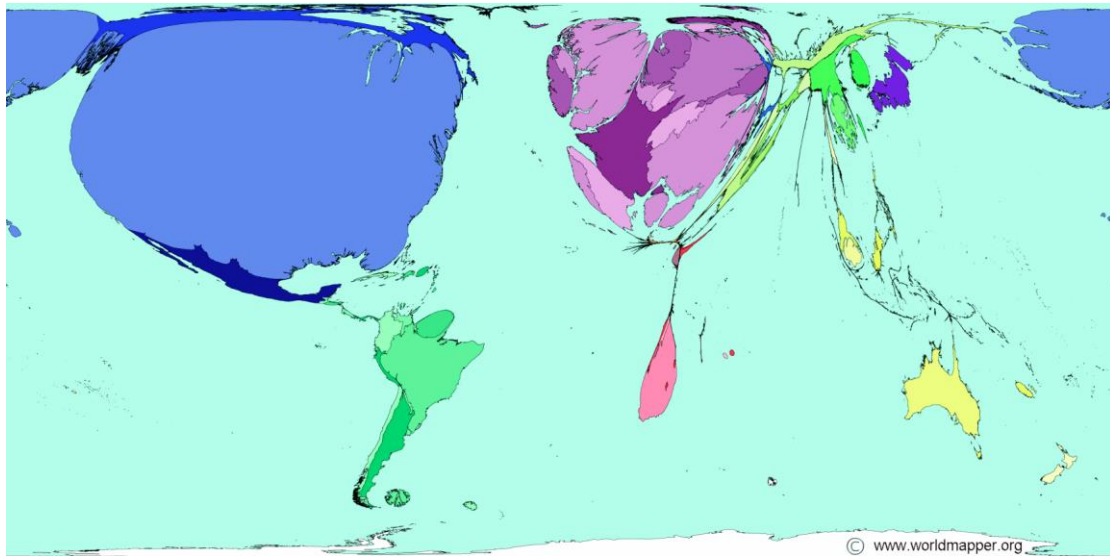


Figure 12.3. People living on over Purchasing Power Parity US\$200 a day, in 2002.3

These cartograms were made as part of the Worldmapper project, using an algorithm written by Mark Newman. Below is a description of how this algorithm works, and Figure 12.1 illustrates this re-sizing of areas using density equalisation:

To create a cartogram the population or other density function of interest is treated as a diffusing fluid, which spreads out from the areas where it is initially most dense into areas of lower density. As a simple analogy, imagine a bottle of ink emptied into a swimming pool: the ink is initially densest at the point where it is added to the water but over time will spread out until ultimately it is distributed uniformly throughout the pool. (Dorling, Barford & Newman, 2006, p. 4)

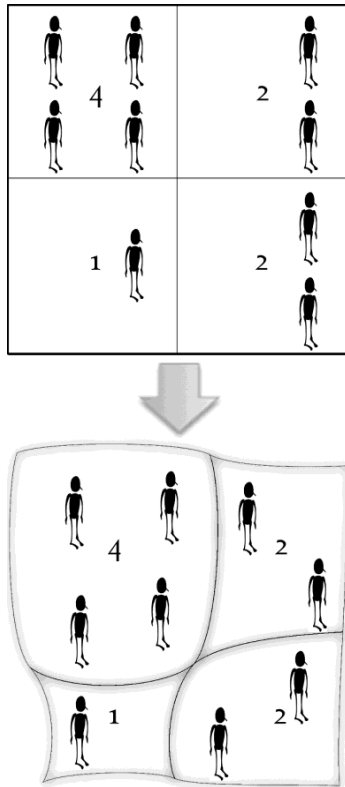


Figure 12.1 Re-sizing of areas based on population density. Note how the boundaries move to accommodate the resized area. Image created by Benjamin Hennig, 2013, p. 94, and cropped for use here.

Map work and cartography are sometimes accused of obscuring their own histories and origins (Pickles, 2006, p. 349), so here I explain, contextualise and historicise the Worldmapper project. Worldmapper was initiated in 2005 with the collaboration of Danny Dorling, a geographer who provided data, and Mark Newman, a physicist who processed that data using his algorithm to produce area-equalised cartograms. These mapmakers, both white, British-born men, were motivated to broaden knowledge and experiment with new techniques. I was a researcher and writer on this project. John Pritchard designed and maintained the website, and handled much of the data. There were many others involved in this project at different times. The Worldmapper team

comprised of relatively liberal academics, all white, mainly male, working between the United Kingdom and United States. However, the project was dreamt up on a beach in New Zealand, far from the demands of email and deadlines.

Certain mapping conventions are exhibited in Worldmapper maps, such as being North-up and Eurocentric. These conventions were followed to make the maps as legible as possible. Mapping conventions that were not included were a scale, a key, conventional regions and labelling. The maps resemble caricatures of the world and have been included in art exhibitions such as *Confini* at the *Istituzione Museo D'Arte Della Provincia Di Nuoro* in Sardinia in 2006. Technical criticisms of this work include questioning the colouring and the data type. At the 2006 Infovis conference, a member of the audience questioned the 'confusing' colouring, because she expected the colours to communicate pertinent additional information. The online⁶ Worldmapper cartograms show regional averages of the Human Development Index, along a rainbow scale from dark red in Central Africa to the dark purple in Japan.

Another technical point, raised at a seminar at the London School of Hygiene and Tropical Medicine, was that the mapping of rates might be more useful than mapping counts. The epidemiologist concerned argued that for population health, high rates of disease could be more important than high totals. However, cartograms are not suitable for presenting rates. Consider a cartogram as an elaborate pie chart where a count is divided between the countries rather than slices (pie charts are not used to present rates). In displaying totals, the importance of borders is diminished because totals are additive between adjacent areas, whereas rates are not. Totals are also democratising because each case or person gets the same space, whereas rates could inflate small countries with high rates to take up most of the map. As cartograms cannot show rates, it can be

helpful to supplement them with graphs, other maps, or tables. Of course, cartograms are not the most useful visualisation available for some purposes, navigation included. That the visualisation expert spoke of colours and the epidemiologist of rates shows how the particular interests of the map reader influences their critique, and aspects beyond their specialism are accepted less critically.

Initially hundreds of world cartograms were presented on a website (www.worldmapper.org) followed by a book, *The atlas of the real world: mapping the way we live* (Dorling et al., 2008). Both were presented as reliable reference material, which was reinforced by the logos of the Universities of Sheffield and Michigan, Leverhulme Trust and Geographical Association. The support of these mainly UK-based institutions made this work possible. Our worldviews (including our politics) influenced the technicalities and presentation of these maps, for example trying to balance the number of accompanying quotes that came from women and men. Another example is that private health care was critically defined in terms of care distribution based on ability to pay rather than need.

The point in time, as well as space, made Worldmapper possible: it came about through the combination of the availability of new world datasets as part of the Millennium Development Goals and the computational approach of Mark Newman's algorithm. Data, like maps, are not clear windows to reality, and the chosen way to describe a population can influence behaviour. An example of this is that the Millennium Development Goals are argued to have hijacked the term 'development' and emptied it of meaning by using measurements that result in the pursuance of targets in ways that are more likely to aggravate poverty than reduce it⁷ (Amin, 2006a, 2006b). In counting something other than what really matters, policy efforts may be directed

towards improving the numbers rather than addressing the issue (Boyle, 2000, p. xvi–xvii). Some people and events are not counted at all (Gordon, 2004, p. 4; Roy, 1999, p. 4–5). Whilst UN data enabled this mapping project, a dearth of other possible data, such as global economic flows or networks of interdependence between people, preclude other mapping possibilities (Sutcliffe, 2005, image 14; Taylor et al., 2001, p. 215). The data used by Worldmapper enabled the creation of static maps showing a mosaic of territories that reify the state, something that flow maps and world city maps attempt to overcome.

Worldmapper cartograms are presented as new: the tag line for the Worldmapper website is ‘the world as you’ve never seen it before’. The idea of re-drawing the world map appeals to a sense of play, that the world is not fixed but can be represented in many ways, with headlines such as ‘Development redraws the map’ (*Developments*, Issue 37, 31st March 2007), or ‘How the world really shapes up’ (*The Daily Mail*, 1st March 2007). Worldmapper maps have been appreciatively received by teachers, the media and the Geographical Association, yet a quick glance at Figure 12. shows that until October 2006, those who accessed the Worldmapper website were mainly European and North American due to language, computer access and how these influence the diffusion of information. By 2009, *The atlas of the real world* (Dorling et al., 2008) had been published in the United States, United Kingdom, France, Italy, Germany, the Netherlands, South Korea and Japan; all visible in Figure 12..

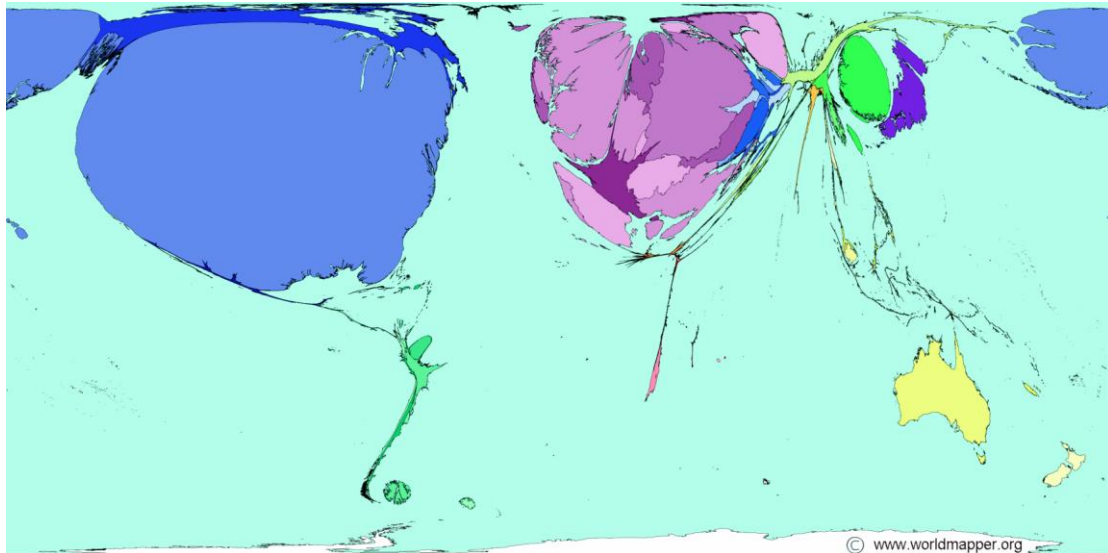


Figure 12.5 Unique hits on the Worldmapper website until October 2006.

Whilst Worldmapper maps are still relatively new representations of the world, newer and arguably more ‘accurate’ world maps have been designed by Benjamin Hennig. Gridded population cartograms (Figure 12.) account for the uneven distribution of people within countries. As such, on this population map, Alaska has a lower proportion of the area of the United States compared to a Worldmapper map, due to its small population density. The same is true for the area attributed to Scotland as a proportion of the United Kingdom.

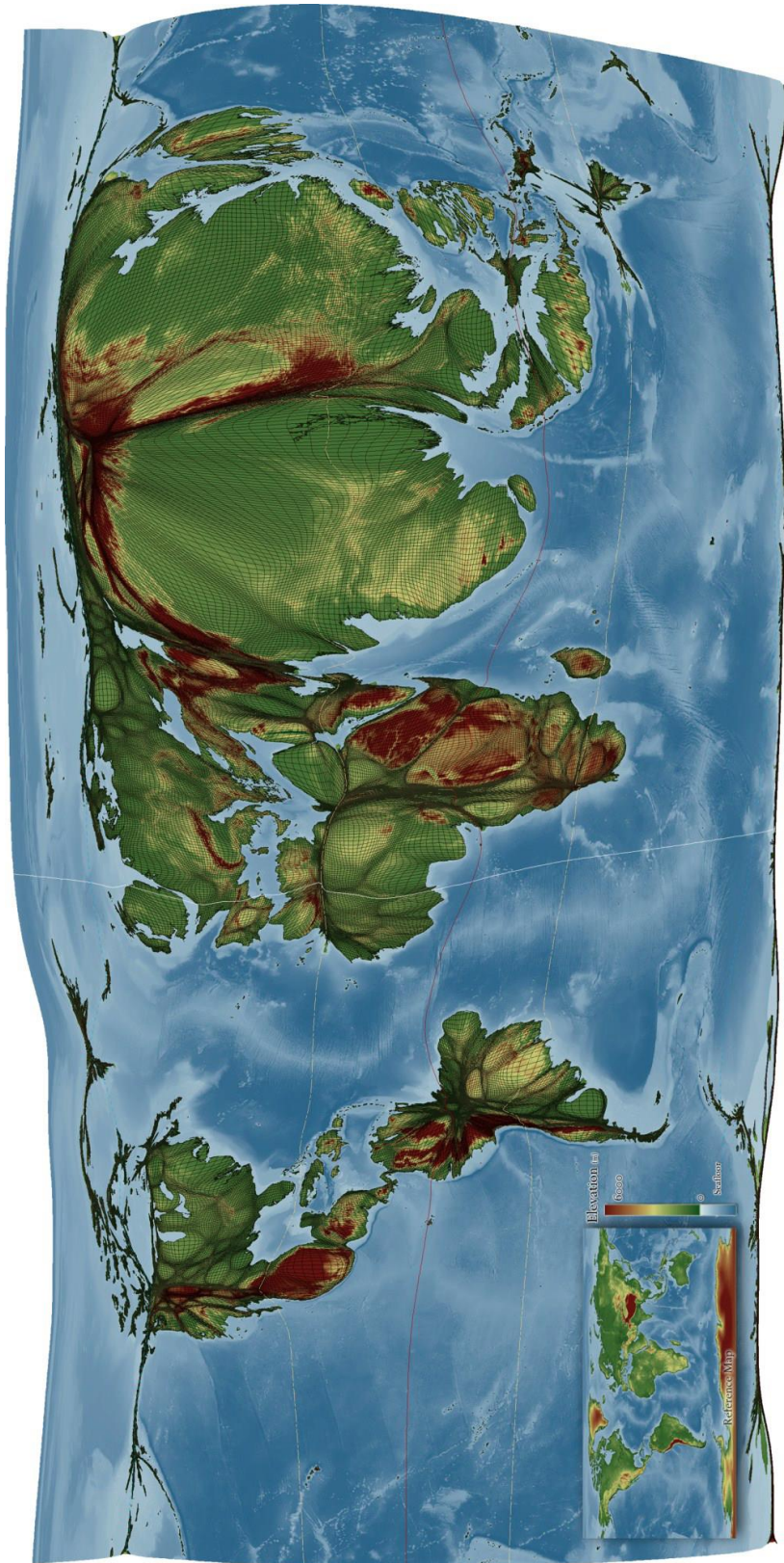


Figure 12.6 The 21st century map of the world. Gridded population cartogram displaying key geographic features by Benjamin Hennig (2013, p.227), using data from CIESIN & CIAT 2005, USGS 2009, NOAA 2009.

Reading Maps of World Inequality

[AQ2] If these maps have social lives, what social circles do they move in? Where people read these maps has been outlined (Figure 12.). At the sub-national level, it is suggested that these maps, particularly in the form of *The atlas of the real world* are ‘radical chic, safely commodified for the bleeding heart liberal: global inequalities are a serious business and here they are ready to be consumed in the safety of a middle class household or map library.’ (Perkins, 2009, p. 59). Making these maps freely available on the Internet is an attempt to make them accessible to a more socio-economically diverse, international audience than the atlas would reach alone. The radical nature of these maps, whilst attempting to appear as neutral illustrations of most available world datasets, has not escaped other commentators. In a recent BBC documentary about maps, presenter Jerry Brotton commented that ‘these maps with their swollen and shrunken countries are a dramatic call to action, they take a mountain of statistics which are usually so easy to ignore and provide shocking clarity, a profound understanding of the most pressing problems that face our world today’ (Nixon, 2010). The members of the Worldmapper team have also used the maps in publications to challenge the status quo (e.g. Dorling, Barford & Wheeler, 2007; Dorling and Barford, 2007; Barford, 2009).

‘I love maps. There, I’ve said it. I am coming out as a cartophile.’ (Painter, 2006, p. 345). But not everyone is a cartophile, and many people find map reading challenging and even unpleasant. How representations are received is influenced by how comfortable the reader is about interpreting them. Degree of difficulty in reading and interpreting visualisations can be understood as concentric rings from a central comfort zone to a confusion zone (Figure 12). The comfort zone is familiar and understood; the confusion zone is so uncomfortable that going there will be of little value and because

nothing is familiar there are no legible signposts to assist the reader. The place to expand horizons is the coping zone, where just some information or elements of the mapping technique are new. For example, ‘Peters’ map’ (the Gall-Peters projection) was widely received as radical and new, although in many respects it was highly conventional, e.g. Eurocentric and North-up (Dorling and Fairburn, 1997, p. 36–38). In the coping zone, the reader is stretched, learns something new, and is not defeated. Which zone the maps fall into depends partly on participants’ approach to new ideas, because refusal to engage precludes understanding. The terms comfort, coping and confusion arose in discussion groups about Worldmapper maps.

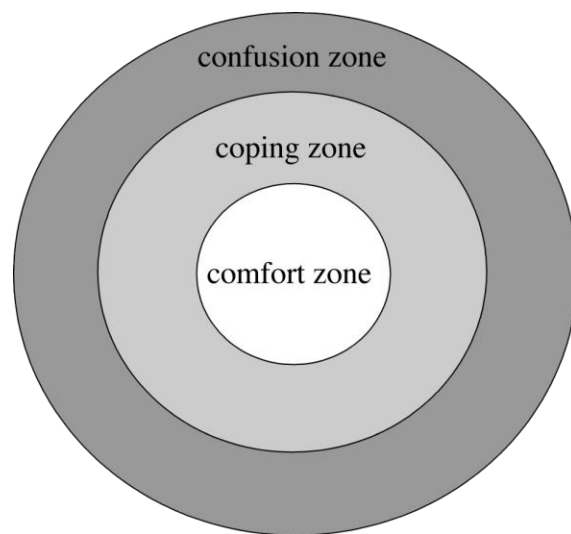


Figure 12.7 Zones of understanding.

Following objects as they move between settings is an approach that has been applied to studying food and other commodities (Appadurai, 1986; Cook, 2006). In what follows, I present responses to Worldmapper maps when they were presented to discussion groups of secondary school teachers in Kenya, Mexico and the United Kingdom (see Barford, 2010 for methodology). The rationale was to show maps of

world inequality to people living in high-, middle- and low-income countries, to understand how maps of the world travel around the world and how people respond to what they see. The range of responses to these maps, even within a discussion group, is considerable:

‘... just within our group, see Elsie can’t cope and Jill immediately jumps to it and knows what it’s about and what it’s doing, and after I’ve looked at it I can pick this out and think well it’s similar to ones we’ve done before. ... and Hannah’s just fascinated, she wants to know more (laughter)’

(Urban fee-paying girls school, United Kingdom)

The comfort zone, where there is familiarity and a good understanding of the maps, was the territory of people who had seen Worldmapper maps previously. As one might expect of a project run from the United Kingdom and United States, the British groups were most aware of these maps. Promotion of Worldmapper has been international, but particularly widespread in the United Kingdom, receiving attention at the teacher-focused Geographical Association conferences and in geography magazines, and the broader media including articles in *The Times* newspaper and *Vanity Fair* magazine. One UK participant (from a rural fee-paying school) had bought *The Atlas of the Real World*, another (from an urban fee-paying school) had the maps displayed on the classroom wall, and a third UK group (urban trainee teachers) had recently been told about cartograms and were curious to see an example. However, Worldmapper maps are by no means ubiquitously known amongst UK teachers, and there were three groups that had not heard of Worldmapper before. Those who had already seen these maps understood the concepts and generally appreciated them as a rich source of information. Teachers from a British urban private girls school were quick to discuss the maps despite only some participants being familiar with them:

‘Look at Alaska though, it goes off there and on there.

It’s amazing when you look at that, and how Canada is squeezed in, yes.

And Mexico

...

Where is Nigeria?

And poor little Russia

I was trying to find Russia (*disappointedly*)

It’s green, this green bit here look

That one’s Nigeria

...

Again I was just surprised that India was so big in comparison to so many countries in Africa, because these started out smaller, yeah?

Because the number of people’

(Urban fee-paying girls school, United Kingdom)

In this quotation, the participants engage with the map, spotting countries and developing their understandings. They are just outside their comfort zone. Knowing enough to work out more from the map, they have little trouble in identifying countries and considering the reasons behind the distortions. One woman, however, self-reportedly did not ‘do’ maps and sounded plaintive when voicing her confusion. Her discomfort was accentuated by its juxtaposition with the others making sense of the maps. This woman was so uncomfortable with maps that she physically pulled away and defensively crossed her arms as they lay on her lap; she visibly relaxed when she returned the maps to me. The positive attitude of those who did understand contrasted

with the defensiveness and negativity of the woman who did not. If something is easy and rewarding, people are encouraged; if it is hard and it makes one feel stupid, one is less likely to try to engage. When asked what she would do if she saw these maps in a magazine, she replied:

‘... I don’t even look at it, it would mean absolutely nothing, it doesn’t even now, it means absolutely nothing to me at all, I’m afraid.

Anna: and is there any way we could change it to mean something to you?
Or is it just...

It would be very painful and I would get very ratty (*laughter of others*)

Anna: do you want me to take those off you and? (*referring to the maps; laughter of others*)

And have a piece of cake, quick!’

(Urban fee-paying girls school, United Kingdom)

Despite this discussion being in good humour, there is tension surrounding the maps and the participant is uninterested in learning more, considering that it would be an unpleasant experience to try. Another reaction, also of not engaging with these maps, was amongst a Kenyan group at a high-achieving urban government school. Instead of blaming themselves as in the previous example, they criticised the maps for being incomprehensible. These middle-aged men offered the strongest critique of all the groups, the basis of the critique being that the maps did not follow mapping conventions. Map reading and conventions are a core part of the syllabus of Kenyan secondary school geography, thus mapping conventions are firmly established amongst Kenyan teachers. Through applying his understandings of map conventions to an

unfamiliar form of mapping, the teacher quoted next arrives at the conclusion that the wealth map shows that people are living in the sea:

‘One thing is that this is a population map. A map that is supposed to be talking of population, living people, and you see it is a map that has extended into the sea in some parts, and the shading gets out of the margin of the land, that gives a different impression altogether, because when you are talking of people living more than this, you cannot shade in the sea because you don’t have people living there. It creates a big big problem. And then just the disfigurement of the continents themselves, you see it doesn’t show that the map is to scale. See the scale is a very important factor here, because it will help you tell, maybe the perception of people in terms of land, in terms of area. But you see if you look at this big bloated kind of situation in the US here, it’s sends an impression that really the map is talking about the US and nothing else. So these other things are extraneous, they’ve just come in by accident or something, but the map is supposed to be talking of one thing, because the one that is being blown up, the rest is being shrunk. So it will create an element of confusion, it will not send the message that it is supposed to send.’

(High-achieving urban government school, Kenya)

This commentary shows an expectation that the countries should remain the same size; if a country expands beyond its usual land–sea border, it indicates people living in the sea. This literal interpretation of the map shows a misinterpretation of cartograms due to an inflexible grounding in more established mapping techniques. The cartograms are seen as flouting mapping conventions: the absence of a scale and a key were seen as basic errors in Kenyan critiques of these maps. The participant finds the maps insufficient and erroneous. For this participant, Worldmapper maps were too unfamiliar, and his critique stems from a desire for the maps to be closer to what he was accustomed to, his comfort zone. It was common for groups to state a preference for

chloropleth maps or cuboid cartograms, and Worldmapper cartograms were described as abnormal using terms like *disfigured* and *deformed*, which comes with connotations of being changed from what would be normal and correct:

‘Why didn’t you make them as a cartogram where each little square represents a fixed quantity? The one that has the biggest income, is biggest in size, so that it is not so deformed?’

(Urban fee-paying Catholic school, Mexico)

Cuboid cartograms and chloropleth maps are older, more established forms of mapping. New maps that play with the shape of the world and illustrate that there is no single correct world map were unappealing to some, provoking the question: why would one use a new form of representation when a perfectly serviceable one already exists? Worldmapper cartograms were considered less easy to understand than more established forms. A lack of understanding was sometimes expressed in the third person; perhaps teachers are averse to saying they don’t understand, perhaps because their job is conventionally understood as imparting knowledge (although education’s importance for raising critical consciousness is a preferable conceptualisation, after Freire, 1970/1990). Pupils’ and the general public’s understanding was often discussed. Teachers who disliked the maps often reported their pupils would not understand them, whereas teachers with an appreciation for the maps said their pupils would manage. Thus it is reasonable to take hypothetical pupil understanding as a proxy for research participant understandings.

‘... the world takes time to know that we have to refer to this, to understand this. It’s a problem, so the person has to be explained to. ... but it is really useful, especially when they can be used to publish books for research but not for learning. [Anna: not learning? Ah.] Be, because for students in our schools it will be very difficult to interpret.’

(Rural Catholic girls boarding school, Kenya)

‘It’s not so much that, it’s that [land area map] next to that [cartogram]. If you give them that one at the same scale, at the same size, they COMPLETELY GET IT. They completely get it and from the beginning they get a bigger picture. You can then unpick, rather than start with some data, some numbers and a place and build it up. So they are INCREDIBLY, INCREDIBLY valuable. And the fact that some countries disappear and you can’t find them, that’s the point isn’t it? And I’m, sometimes I’m not terribly good at recognising the countries once they’ve been distorted.’

(Urban fee-paying school, United Kingdom)

The use of the third person drawing on their professional experience with their pupils bolsters the claims made by teachers; they are not simply describing their own reactions. This has a similar discursive effect to critiquing the production of these maps with reference to map conventions: protecting the reader from saying that they do not understand. Reactions to these maps range from them being seen as suitable just for ‘sophisticated’ adults to being an accessible form of data presentation. A Mexican teacher also pointed out that pupils have differing understandings:

‘I work in a public and private school, in the private school there is more focus on reading and research, so this would grab their attention more than for a child in the public school.’

(Urban teachers from different schools, Mexico)

Those who are trained to think in that way will understand these maps; those without that support will have more difficulties. Map reading is learned, like writing or mathematics, and cartograms require general map skills but also an openness to something unconventional. What is considered sufficient understanding also varies. The earlier UK group considers that Worldmapper maps are good communication tools,

and that it is not necessary to recognise all of the countries shown. Yet not understanding the basics of these maps precludes people from learning from them.

Knowing something of the world map and having some knowledge of where countries are located in relation to one another is an important prerequisite for reading Worldmapper maps and enjoying the experience. One Mexican group expresses this as *la concepción espacial* (spatial awareness), noting that many people do not know the world map, which renders reading these deformed and unlabelled maps particularly challenging. Kenyan and Mexican groups made the point that teaching may be limited by the available resources, and that this sort of novel representation would not make it to the classroom; groups from each country asked whether I would give them the maps used in the discussion groups. Another limitation, expressed by a British-system school in Kenya, was that the curriculum is very demanding so teaching becomes a drilling exercise in preparation for exams where imaginative and wide-ranging material is discouraged.

It appears to be worth stepping outside of the comfort zone to use new forms. When people are familiar with using these maps, they find them a valuable resource about which they are enthusiastic: 'I just think they're absolutely brilliant' (urban fee-paying school, United Kingdom). But for the time being, the benefits are greater in the United Kingdom than in Mexico or Kenya due to greater familiarity and accessibility of Worldmapper, plus the availability of supplementary teaching resources in the United Kingdom. One's location in a nexus of flows influences exposure to various media, including novel maps that represent United Nations data describing how lives differ around the world.

Map Reading from Somewhere

Maps create the illusion of the possibility of a bird's eye view, a view that is located nowhere because there is no point from which you can see the spherical world looking like a two dimensional map. This omnipresent and omniscient gaze is described as a 'God trick', with its accompanying 'ideology of direct, devouring, generative, and unrestricted vision, whose technological mediations are simultaneously celebrated and presented as utterly transparent' (Haraway, 1988, pp. 581–582). Neither the production nor reading of maps is placeless. Many researchers have focused on how maps have particularities to their provenance. What is less commonly considered is the location of audiences in time and space. Audience location in a space of flows grounded in a particular time and place influences interests and sensitivities when reading a map. Pre-existing knowledge is gauged against the maps, and the maps against that knowledge. Location influences geographical awareness, which could be broadened by looking at different visualisations of the world. The particularities of maps and audiences mean that their conceptual abstraction might detract from our understandings of the meanings generated through map reading.

The introduction of maps and graphs to the groups altered the geographical focus of their discussions, partly in line with what was represented within these visualisations. With cartograms, bigger territories tend to attract more attention, although the influence of size in attracting attention is mediated by the map reader's own position on the map. The United States is the biggest territory on the wealth map, and greater attention was paid to North America when map reading than in general conversation. On the poverty map, more attention might go to India and China; however, there is no large increase in conversation about these regions. Both Kenyans and Mexicans spoke most about their own regions when shown the maps. In contrast, the overall focus of conversation within UK groups shifted away from Africa and towards both North America and Asia. This

difference suggests that the UK groups were more responsive to the largest areas of the map, which may reflect an openness to new forms of mapping and a confidence in talking about many parts of the world. In contrast, the Kenyan and Mexican groups' regional focus suggests a greater interest and/or confidence in the map reading and discussion of their neighbouring countries.

There is a dialectical relationship between how geographical awareness shapes map reading and how this influences geographical awareness. The observations earlier, whilst based on rather small numbers, imply that where you come from influences your geographical awareness in terms of what you look for, what you comment upon and what is noticed if absent. In Kenya and Mexico, an interest in participants' own regions directed considerable attention to those regions despite the whole world being represented. This heightened awareness of particular regions enhances confidence in commenting about certain places rather than others. That conversation often focuses on the nearby reflects local interest and knowledge. The United Kingdom, however, is a different case as far as worldviews are concerned; the British post-colonial imagination is broad due to the cultural influences of former colonies of the United Kingdom. Kenyans and Mexicans both spoke of Europe most frequently after their own region (after the interviewer bias is accounted for), reflecting historical and linguistic connections.

Punctum Responses

Size is the primary means of communicating information in the maps shown in these discussion groups. In all cases, a larger size indicates more of something: more rich or poor people. Given that size and shape are related in cartograms, shape is also a feature of size because a large country may look 'ballooned out' and a smaller country may

appear ‘squished’ as suggested by one participant. Size, particularly when it differs from what is expected, may be a cause of punctum. Often larger sizes attract attention more than smaller sizes because they take up more space. However, there are cases when absence, or smallness, was of interest to the readers of these visualisations: this was mainly when their country or continent was small. In the same way that largeness can equate to importance, smallness can imply an unimportance to which people are probably most sensitive in relation to their own country. In a world city network analysis, Africa is barely on the map (Taylor, 2004). Peter Taylor comments that leaving out Africa makes a point about how Africa really *is* left out (Taylor, personal communication, 2006; Dorling, personal communication, 2009). As I suggested earlier, those most concerned about Africa’s place on the map were the Kenyan participants. The African continent almost disappears on the earning over PPP US\$200 a day map.

‘So Africa has disappeared. What is left here is which country?’

Anna: South Africa.

South Africa. The rest of it is just sort of like a blank.

Anna: mm

(chuckles)

We’re in real problems.

There’s a strip, a black one, (chuckles)

A black strip, of Africa (laughs)

Anna: that’s where Kenya is, in the black line

Yeah (laughs)

Anna: why are you laughing?

Because it is not there (laugh) it is not seen. So it's likely to be seen on the other side. (Group laughter)

Anna: This is the first time you've seen a world map without Africa?

Yeah, without Africa (laughs) The whole world without Africa.'

(Rural government school, Kenya)

'But on some maps Africa disappears, doesn't it, like a little mosquito squish, and you think, you absolutely notice when things aren't there as well as when they are, when they are there. And here they were totally like 'what is going on here?' you know what is this sort of tear drop in the end there?'

(Urban private school, United Kingdom)

'I think er with such kind of graphical images, the problem maybe becomes more stark to us now, the reality is hitting us even more, how poor or how unequal, er where we are. [Anna: really?] Yeah, if we are not on the world map then it means that we need to maybe do something. Sort of change.'

(Rural government school, Kenya)

In these quotations, the absence of almost all of Africa, except for South Africa, is noted. Whereas one Kenyan group described the shrinking of Africa with some hilarity and amazement, the UK participant took a more negative view, comparing the continent to a squashed mosquito, the 'tear drop' shape of South Africa adds a sad tone. Size draws attention when something is bigger or smaller than expected, and in response to this mismatch map readers seek explanations. It is easier to spot if something is an 'abnormal' size if one is familiar with the 'normal' size. A punctum response is more likely when set in the context of pre-existing awareness. Punctum shows a strong engagement with the information being presented and the consideration of this information in consultation with pre-existing understandings. This can be seen clearly in the example of Kenyans being most surprised at high levels of poverty in Nigeria. It

follows that interest, knowledge and possibility of punctum should be highest with regard to one's own country or region, based on the assumption that local knowledge is generally greater than knowledge of distant places.

The semiotic forms in which inequality is expressed are highly influenced by the context of their production and reading; however, context is not local and bounded, but is to be understood by transcending local–global distinction to ‘think of how places are linked and intertwined’ (Mercer, Mohan & Power, 2003, p. 433). This framework better accounts for Kenyan interest in the United Kingdom, and the lack of UK interest in the rest of Europe. For map readers to learn from world cartograms, it is preferable that they are comfortable with the conventional world map, which means that they have some knowledge to base their interpretations on. Having little confidence using maps or very fixed views about the correct way to map can result in confusion when dealing with new map forms. As well as coping with the map, to achieve a punctum response rather than simply studium (after Barthes, 1980/2000) pre-existing knowledge or expectations are needed to provide a context which new information can expand or contradict. This awareness is usually greater where it is local because information is usually more available and there is greater emotional investment; however, post-colonial relationships of aid, trade and geo-politics continue to bind countries over considerable distances.

Conclusion

The example of the Worldmapper project demonstrates the layers of information and other influences folded into a representation. This project was made possible by the availability of data and the development of a new method for producing maps. The influence of the authors and their attempts to ease interpretation, control meaning and

make attractive images are evident in the decisions about which mapping conventions to observe, how to colour the maps and how to present them. However, after releasing an image into the public domain, representations are separated from their authors and interpretations can take unpredicted directions. The Worldmapper maps were not always easily interpreted; where interpretation is difficult, these maps have less influence on people's understandings of the world. Other representations may have similar limitations in that when a representation resonates with local perspectives or experiences, it will be more likely to be shared and discussed. The meanings constructed through readings of representations are highly likely to vary through time and over space.

Whilst many representations describe and reinforce existing power structures, critical analyses and representations are designed to challenge social injustices. This can be done by drawing public attention to injustices using verbal or visual descriptions. Mapping inequality using cartograms shows very stark contrasts between how people's lives are lived. Representing such contrasts on juxtaposed maps challenges map readers to compare richer and poorer parts of the world, which are often discussed in ways that make them seem incomparable. When visual representations offer new ways of understanding reality, they have the potential to disrupt earlier assumptions and prompt new ways of seeing things. Maps, along with other forms of representation, range from being highly conservative to radical, and where they fall on this spectrum is influenced by their audience as much as their authors. Representations do more than reflect reality, they also reassert and redefine aspects of social and economic life in ways that highlight uncomfortable issues. As Susan Sontag aptly states: '... our own privileges are located on the same map as their suffering, and may – in many ways we might prefer not to

imagine – be linked to their suffering, as the wealth of some may imply the destitution of others ...’ (Sontag, 2003, p.92).

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¹ Deconstruction is helpfully summarised by Kitchin et al. (2012, p. 6): 'Texts are understood to be mediators of a message and through forensic examination of their deeper meanings can be revealed and understood. In essence, deconstruction looks beyond surface signs and face values to challenge the taken-for-granted reading of a text ...'.

² The History of Cartography project can be viewed here: <http://www.geography.wisc.edu/histcart/> (accessed: 31 July 2012).

³ Other examples can be found in Kitchin et al. 2012 and Dodge, Kitchin & Perkins, 2009.

⁴ This research involved 24 discussion groups conducted with mainly secondary school teachers, of which nine groups were in Kenya, eight in Mexico and seven in the United Kingdom. The discussion groups addressed questions about the causes and consequences of inequality, and responded Worldmapper maps depicting unequal distributions of wealth. Kenya, Mexico and the United Kingdom were chosen due to their spread along an axis of national wealth. Their location in different regions also increases cultural and linguistic diversity. Teachers were identified as being an interesting group to study because they are influential members of society, they collectively interact with a range of people, and they deal with inequalities between their students on a daily basis. Further, sharing a profession acts as a control variable, rendering findings more comparable. Nevertheless, teachers are a heterogeneous group both within and between countries in terms of their teaching experiences, their backgrounds and the curricula covered (see Barford 2010 for further details).

⁵ Purchasing Power Parity (PPP) is a widely used measure and forms the basis of many poverty and inequality measures. PPP aims to equalise buying power by currency, rather than relying on exchange rates. This is done by pricing comparable baskets of basic goods across countries and calculating the PPP equivalents in terms of the purchasing power of the currency.

⁶ The maps available at www.worldmapper.org have a different colour scheme to those in *The atlas of the real world* (Dorling, Newman & Barford, 2008).

⁷ Samir Amin points out that during conferences to create the Millennium Development Goals (MDGs), European, United States and Japanese views often diverged with those from the global south. These differences were smoothed over in the creation of the MDGs. Amin recognises that each goal is individually ‘commendable’, yet notes that debates about how to actually achieve these goals have been avoided. His main critique is that these goals are assumed to be compatible with current capitalist economic strategies (Amin, 2006). By September 2010 most of the eight goals were off target for meeting the 2015 deadline (<http://www.bbc.co.uk/news/world-11364717>; accessed on 23 September 2010).