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JERRY BROTTON

A History of the World in Twelve Maps

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Introduction

Sippar (Tell Abu Habbah, modern-day Iraq), sixth century BC

In 1881, the Iraqi-born archaeologist Hormuzd Rassam discovered a small fragment of a 2,500-year-old cuneiform clay tablet in the ruins of the ancient Babylonian city of Sippar, today known as Tell Abu Habbah, on the south-west outskirts of modern-day Baghdad. The tablet was just one of nearly 70,000 excavated by Rassam over a period of eighteen months and shipped back to the British Museum in London. Rassam's mission, inspired by a group of English Assyriologists who were struggling to decipher cuneiform script, was to discover a tablet which it was hoped would provide a historical account of the biblical Flood.[1] At first, the tablet was overlooked in favour of more impressive, complete examples. This was partly because Rassam, who could not read cuneiform, was unaware of its significance, which was appreciated only at the end of the nineteenth century when the script was successfully translated. Today, the tablet is on public display at the British Museum, labelled as 'The Babylonian Map of the World'. It is the first known map of the world.

The tablet discovered by Rassam is the earliest surviving object that represents the whole world in plan from a bird's-eye view, looking down on the earth from above. The map is composed of two concentric rings, within which are a series of apparently random circles, oblongs and curves, all of which are centred on a hole apparently made by an early pair of compasses. Evenly distributed around the outer circle are eight triangles, only five of which remain legible. Only when the cuneiform text is deciphered does the tablet begin to make sense as a map.

The outer circle is labelled 'marratu', or 'salt sea', and represents an ocean encircling the inhabited world. Within the inner ring the most prominent curved oblong running through the central hole depicts the Euphrates River, flowing from a semicircle in the north labelled 'mountain', and ending in the southern horizontal rectangle described as 'channel' and 'swamp'. The rectangle bisecting the Euphrates is labelled 'Babylon', surrounded by an arc of circles representing cities and regions including Susa (in southern Iraq), Bit Yakin (a district of Chaldea, near where Rassam himself was born), Habban (home of the ancient Kassite tribe), Urartu (Armenia), Der and Assyria. The triangles emanating outwards from the outer circle of sea are labelled 'nagû', which can be translated as 'region' or 'province'. Alongside them are cryptic legends describing distances (such as 'six leagues between where the sun is not seen'),[2] and exotic animals – chameleons, ibexes, zebus, monkeys, ostriches, lions and wolves. These are uncharted spaces, the mythical, faraway places beyond the circular limits of the known Babylonian world.

The cuneiform text at the top of the tablet and on its reverse reveals that this is more than just a map of the earth's surface: it is a comprehensive diagram of Babylonian cosmology, with the inhabited world as its manifestation. The tantalizing fragments speak of the creation myth of the battle between the Babylonian gods Marduk and Ti'amat. In Babylonian mythology, Marduk's victory over what the tablet calls the 'ruined gods' led to the foundation of heaven and earth, humanity and language, all centred on Babylon, created 'on top of the restless sea'. The tablet, made from the earth's clay, is a physical expression of Marduk's mythical accomplishments, the creation of the earth and subsequent achievements of human civilization, fashioned out of the watery primal chaos.

The circumstances of the tablet's creation remain obscure. The text on the back of the tablet identifies its scribe as a descendant of someone called 'Ea-bēl-ilī' from the ancient city of Borsippa (Birs Nimrud), to the south of Sippar, but why it was made and for whom remains a mystery. Nevertheless, we can tell that this is an early example of one of the most basic objectives of human understanding: to impose some kind of order and structure onto the vast, apparently limitless space of the known world. Alongside its symbolic and mythic description of the world's origins, the tablet's map presents an abstraction of terrestrial reality. It

comprehends the earth by categorizing it in circles, triangles, oblongs and dots, unifying writing and image in a world picture at the centre of which lies Babylon. More than two millennia before the dream of looking at the earth from deep space became a reality, the Babylonian world map offers its viewers the chance to look down on the world from above, and adopt a god-like perspective on earthly creation.

Even today, the most committed traveller can never hope to experience more than a fraction of the earth's surface area of more than 510 million square kilometres. In the ancient world, even short-distance travel was a rare and difficult activity, generally undertaken with reluctance and positively feared by those who did so.[3] To 'see' the world's dimensions reproduced on a clay tablet measuring just 12 by 8 centimetres must have been awe-inspiring, even magical. This is the world, the tablet says, and Babylon is the world. To those who saw themselves as part of Babylon, it was a reassuring message. To those who saw it and were not, the tablet's description of Babylonian power and dominion was unmistakable. No wonder that from ancient times, the kind of geographical information relayed by objects like the Babylonian tablet was the preserve of the mystical or ruling elite. As we shall see throughout this book, for shamans, savants, rulers and religious leaders, maps of the world conferred arcane, magical authority on their makers and owners. If such people understood the secrets of creation and the extent of humanity, then surely they must know how to master the terrestrial world in all its terrifying and unpredictable diversity.

Although the Babylonian world map represents the first known attempt to map the whole known world, it is a relatively late example of human mapmaking. The earliest known examples of prehistoric art showing the landscape in plan are inscribed on rock or clay and predate the Babylonian world map by more than 25,000 years; they stretch back to the Upper Palaeolithic period of 30,000 BC. These early inscriptions, much debated by archaeologists as to their date and meaning, seem to represent huts with human figures, livestock enclosures, divisions between basic dwellings, depictions of hunting grounds, even rivers and mountains. Most are so stark that they might easily be mistaken for abstract, geometrical attempts to represent the spatial distribution of objects or events when they are in fact probably more symbolic marks, connected to indecipherable mythic, sacred and cosmological references for ever lost to us. Today, archaeologists are more

cautious than their nineteenth-century predecessors in ascribing the term 'map' to these early pieces of rock art; establishing a clear date for the emergence of prehistoric rock art seems to be as futile as defining when a baby first learns to differentiate itself spatially from its immediate environment.[4]

The urge to map is a basic, enduring human instinct.[5] Where would we be without maps? The obvious answer is, of course, 'lost', but maps provide answers to many more questions than simply how to get from one place to another. From early childhood onwards, we make sense of ourselves in relation to the wider physical world by processing information spatially. Psychologists call this activity 'cognitive mapping', the mental device by which individuals acquire, order and recall information about their spatial environment, in the process of which they distinguish and define themselves spatially in relation to a vast, terrifying, unknowable world 'out there'.[6] Mapping of this kind is not unique to humans. Animals also use mapping procedures, such as the scent-marking of territory performed by dogs or wolves, or the location of nectar from a hive defined by the 'dance' of the honey bee.[7] But only humans have made the crucial leap from mapping to map*making*.[8] With the appearance of permanent graphic methods of communication more than 40,000 years ago, humans developed the ability to translate ephemeral spatial information into permanent and reproducible form.

So what is a map? The English word 'map' (and its derivatives) is used in a variety of modern European vernaculars such as Spanish, Portuguese and Polish, and comes from the Latin term *mappa*, meaning a tablecloth, or napkin. The French word for map – *carte* – originates in a different Latin word, *carta*, which also provides the root for the Italian and Russian words for map (*carta* and *karta*) and refers to a formal document, which in turn is derived from the Greek word for papyrus. The ancient Greek term for map – *pinax* – suggests a different kind of object. A *pinax* is a tablet made of wood, metal or stone, on which words or images were drawn or incised. Arabic takes the term in a more visual direction: it uses two words, *ṣūrah*, translated as 'figure', and *naqshah*, or 'painting', while Chinese has adopted a similar word, *tu*, meaning a drawing or a diagram.[9] The term 'map' (or 'mappe') only enters the English language in the sixteenth century, and between then and the 1990s more than 300 competing definitions of it have been proposed.[10]

Today, scholars generally accept the definition provided in the ongoing multi-volume *History of Cartography*, published since 1987 under the general editorship of J. B. Harley and David Woodward. In their preface to the first volume, Harley and Woodward proposed a new English definition of the word. 'Maps', they said, 'are graphic representations that facilitate a spatial understanding of things, concepts, conditions, processes, or events in the human world.'[11] This definition (which will be adopted throughout this book) 'naturally extends to celestial cartography and to the maps of imagined cosmographies', and frees them from more restricted geometrical definitions of the term. By including cosmography – which describes the universe by analysing the earth and the heavens – Harley and Woodward's definition of maps enables us to see archaic artefacts like the Babylonian world map as both a cosmic diagram and a map of the world.

Self-conscious perceptions of maps, and the science of their creation, are relatively recent inventions. For thousands of years what different cultures have called 'maps' were made by people who did not think of them as being in a category separate from the writing of formal documents, painting, drawing or inscribing diagrams on a range of different media from rock to paper. The relationship between maps and what we call geography is even more subtle. Since the Greeks, geography has been defined as the graphic (*graphein*) study of the earth (*gē*), of which mapping represents a vital part. But as an intellectual discipline geography was not properly formalized as either a profession or a subject of academic study in the West until the nineteenth century.

It is in this disparate variety of maps – as cloths, tablets, drawings or prints – that much of their remarkable power and enduring fascination lies. A map is simultaneously both a physical object and a graphic document, and it is both written and visual: you cannot understand a map without writing, but a map without a visual element is simply a collection of place names. A map draws on artistic methods of execution to create an ultimately imaginative representation of an unknowable object (the world); but it is also shaped by scientific principles, and abstracts the earth according to a series of geometrical lines and shapes. A map is concerned with space as its ultimate aim, according to Harley and Woodward's definition. It offers a spatial understanding of events in the human world; but, as we shall see in this book, it is often also about time, as it asks the viewer to observe how these events unfold one after

another. We of course look at maps visually, but we can also read them as a series of different stories.

All these strands meet in the type of map that is the subject of this book: maps of the world. But just as much as the term 'map' has its own elusive and shifting qualities, so too does the concept of 'the world'. 'World' is a man-made, social idea. It refers to the complete physical space of the planet but can also mean a collection of ideas and beliefs that constitute a cultural or individual 'world view'. For many cultures throughout history, a map has been the perfect vehicle to express both these ideas of 'world'. Centres, boundaries and all the other paraphernalia included in any map of the world are defined as much by these 'world views' as they are by the mapmaker's physical observation of the earth, which is never made from a neutral cultural standpoint anyway. The twelve maps in this book all present visions of the physical space of the whole world which result from the ideas and beliefs that inform them. A world view gives rise to a world map; but the world map in turn defines its culture's view of the world. It is an exceptional act of symbiotic alchemy.[12]

World maps pose challenges and opportunities for the mapmaker different from those involved in mapping local areas. To begin with, their scale means they are never seriously used as route-finding devices to enable their users to get from one location on the earth's surface to another. But the most significant difference between local and world mapping is one of perception, and presents a serious problem in making any map of the world. Unlike a local area, the world can never be apprehended in a single synoptic gaze of the mapmaker's eye. Even in ancient times, it was possible to locate natural or man-made features from which to look down on a small area at an oblique angle (a 'bird's-eye' perspective) and see its basic elements. Until the advent of photography from space, no such perspective was available to perceive the earth.

Before that momentous innovation, the mapmaker creating a world map drew on two resources in particular, neither of which was physically part of the earth: the sky above and his own imagination. Astronomy enabled him to observe the movement of the sun and the stars and to estimate the size and shape of the earth. Connected to such observations were the more imaginative assumptions based on personal prejudice and popular myths and beliefs, which indeed still exert their power over

any world map, as we shall see. The use of photographic satellite imagery is a relatively recent phenomenon that allows people to believe they see the earth floating in space; for three millennia before that, such a perspective always required an imaginative act (nevertheless, a photograph from space is not a map, and it is also subject to conventions and manipulations, as I point out in this book's final chapter on online mapping and its use of satellite imagery).

Further challenges and opportunities beyond perception affect all world maps, including those chosen in this book, and each one can be seen in embryo by looking again at the Babylonian world map. An overriding challenge is abstraction. Any map is a substitute for the physical space it claims to show, constructing what it represents, and organizing the infinite, sensuous variety of the earth's surface according to a series of abstract marks, the beginnings of borders and boundaries, centres and margins. Such markers can be seen in the rudimentary lines of topographical rock art, or the increasingly regular geometrical shapes of the kind on the Babylonian tablet. When these lines are applied to the whole earth, a map not only represents the world, but imaginatively produces it. For centuries the only way of comprehending the world was through the mind's eye, and world maps showed, imaginatively, what the physically unknowable world might look like. Mapmakers do not just reproduce the world, they construct it.[13]

A logical consequence of mapping as a powerful imaginative act is that, in the dictum coined by the Polish-American philosopher Alfred Korzybski in the 1940s, 'the map is not the territory'.[14] Rather like the relation between language and the objects it denotes, the map can never consist of the territory it purports to represent. 'What is on the paper map', argued the English anthropologist Gregory Bateson, 'is a representation of what was in the retinal representation of the man who made the map; and as you push the question back, what you find is an infinite regress, an infinite series of maps. The territory never gets in at all.'[15] A map always manages the reality it tries to show. It works through analogy: on a map a road is represented by a particular symbol which bears little resemblance to the road itself, but viewers come to accept that the symbol is *like* a road. Rather than imitating the world, maps develop conventional signs which we come to accept as standing in for what they can never truly show. The only map that can ever completely represent the territory it depicts would be on the effectively

redundant scale of 1 : 1. Indeed, the selection of scale, a proportional method of determining a consistent relationship between the size of the map and the space it represents, is closely related to the problem of abstraction, and has been a rich source of pleasure and comedy for many writers. In Lewis Carroll's *Sylvie and Bruno Concluded* (1893), the other-worldly character Mein Herr announces that '[w]e actually made a map of the country, on a scale of *a mile to the mile*!' When asked if the map has been used much, Mein Herr admits, 'It has never been spread out', and that 'the farmers objected: they said it would cover the whole country, and shut out the sunlight! So we now use the county itself, as its own map, and I assure you it does nearly as well.'[17] The conceit was taken a stage further by Jorge Luis Borges, who, in his one-paragraph short story 'On Rigour in Science' (1946), recast Carroll's account in a darker key. Borges describes a mythical empire where the art of mapmaking had reached such a level of detail that

> the Colleges of Cartographers set up a Map of the Empire which had the size of the Empire itself and coincided with it point by point. Less Addicted to the Study of Cartography, Succeeding Generations understood that this widespread Map was Useless and not without Impiety they abandoned it to the Inclemencies of the Sun and of the Winters. In the deserts of the West some mangled Ruins of the Map lasted on, inhabited by Animals and Beggars; in the whole Country there are no other relics of the Disciplines of Geography.[18]

Borges understood both the timeless quandary and potential hubris of the mapmaker: in an attempt to produce a comprehensive map of their world, a process of reduction and selection must take place. But if his 1 : 1 scale map is an impossible dream, what scale should a mapmaker choose to ensure their world map does not endure the fate he described? Many of the world maps described in this book offer an answer, but none of their chosen scales (or indeed anything else about them) has ever been universally accepted as definitive.

A further problem that presents itself is one of perspective. At what imaginary location does the mapmaker stand before beginning to map the world? The answer, as we have already seen, invariably depends upon the mapmaker's prevailing world view. In the case of the Babylonian world map, Babylon lies at the centre of the universe, or what the historian Mircea Eliade has called the '*axis mundi*'.[19] According to

Eliade, all archaic societies use rites and myths to create what he describes as a 'boundary situation', at which point 'man discovers himself becoming conscious of his place in the universe'. This discovery creates an absolute distinction between a sacred, carefully demarcated realm of orderly existence, and a profane realm which is unknown, formless and hence dangerous. On the Babylonian world map, such sacred space circumscribed by its inner ring is contrasted with the profane space defined by the outer triangles, which represent chaotic, undifferentiated places antithetical to the sacred centre. Orienting and constructing space from this perspective repeats the divine act of creation, shaping form out of chaos, and placing the mapmaker (and his patron) on a par with the gods. Eliade argues that such images involve the creation of a centre that establishes a vertical conduit between the terrestrial and divine worlds, and which structures human beliefs and actions. Perhaps the hole at the centre of the Babylonian world map, usually regarded as the result of a pair of compasses marking out the map's circular parameters, is rather a channel between one world and the next.

The kind of perspective adopted by the Babylonian world map could also be called egocentric mapping. Throughout most of recorded history, the overwhelming majority of maps put the culture that produced them at their centre, as many of the world maps discussed in this book show. Even today's online mapping is partly driven by the user's desire to first locate him- or herself on the digital map, by typing in their home address before anywhere else, and zooming in to see that location. It is a timeless act of personal reassurance, locating our selves as individuals in relation to a larger world that we suspect is supremely indifferent to our existence. But if such a perspective literally centres individuals, it also elevates them like gods, inviting them to take flight and look down upon the earth from a divine viewpoint, surveying the whole world in one look, calmly detached, gazing upon what can only be imagined by earthbound mortals.[20] The map's dissimulating brilliance is to make viewers believe, just for a moment, that such a perspective *is* real, that they are not still tethered to the earth, looking at a map. And here is one of the map's most important characteristics: the viewer is positioned simultaneously inside *and* outside it. In the act of locating themselves on it, the viewer is at the same moment imaginatively rising above (and outside) it in a transcendent moment of contemplation, beyond time and space, seeing everything from nowhere. If the map offers its viewer

an answer to the enduring existential question 'Where am I?', it does so through a magical splitting which situates him or her in two places at the same time.[21]

This problem of defining where the viewer stands in relation to a map of the world is one geographers have struggled with for centuries. For Renaissance geographers, one solution was to compare the viewer of a map to a theatre-goer. In 1570 the Flemish mapmaker Abraham Ortelius published a book containing maps of the world and its regions entitled *Theatrum orbis terrarum* – the 'Theatre of the World'. Ortelius used the Greek definition of theatre – *theatron* – as 'a place for viewing a spectacle'. As in a theatre, the maps that unfold before our eyes present a creative version of a reality we think we know, but in the process transform it into something very different. For Ortelius, as for many other Renaissance mapmakers, geography is 'the eye of history', a theatre of memory, because, as he put it, 'the map being laid before our eyes, we may behold things done or places where they were done, as if they were at this time present'. The map acts like a mirror, or 'glass', because 'the charts being placed, as it were certain glasses before our eyes, will the longer be kept in memory, and make the deeper impression in us'. But, like all the best dramatists, Ortelius concedes that his 'glasses' are a process of creative negotiation, because on certain maps 'in some places, at our discretion, where we thought good, we have altered some things, some things we have put out, and otherwhere, if it seemed to be necessary, we have put in' different features and places.[22]

Ortelius describes the position from which a viewer looks at a world map, which is closely related to orientation – the location from which we take our bearings. Strictly speaking, orientation usually refers to *relative* position or direction; in modern times it has become established as fixing location relative to the points on a magnetic compass. But long before the invention of the compass in China by the second century AD, world maps were oriented according to one of the four cardinal directions: north, south, east and west. The decision to orientate maps according to one prime direction varies from one culture to another (as will be seen from the twelve maps discussed in this book), but there is no purely geographical reason why one direction is better than any other, or why modern Western maps have naturalized the assumption that north should be at the top of all world maps.

Why north ultimately triumphed as the prime direction in the Western geographical tradition, especially considering its initially negative connotations for Christianity (discussed in Chapter 2), has never been fully explained. Later Greek maps and early medieval sailing charts, or portolans, were drawn using magnetic compasses, which probably established the navigational superiority of the north–south axis over an east–west one; but even so there is little reason why south could not have been adopted as the simplest point of cardinal orientation instead, and indeed Muslim mapmakers continued to draw maps with south at the top long after the adoption of the compass. Whatever the reasons for the ultimate establishment of the north as the prime direction on world maps, it is quite clear that, as subsequent chapters will show, there are no compelling grounds for choosing one direction over another.

Perhaps the most complex problem of all that confronts the mapmaker is one of projection. For modern cartographers, 'projection' refers to a two-dimensional drawing on a plane surface of a three-dimensional object, namely the globe, using a system of mathematical principles. It was only consciously formulated as a method in the second century AD by the Greek geographer Ptolemy, who employed a grid of geometrical lines of latitude and longitude (called a graticule) to project the earth onto a flat surface. Prior to this, maps like the Babylonian example provided no apparent projection (or scale) to structure their representation of the world (though of course they still projected a geometrical image of the world based on their cultural assumptions about its shape and size). Over the centuries, circles, squares, rectangles, ovals, hearts, even trapezoids and a variety of other shapes have been used to project the globe onto a plane, each one based on a particular set of cultural beliefs. Some of these assumed a spherical earth, some of them did not: on the Babylonian world map the world is represented as a flat disc, with its inhabited dimensions encircled by sea, beyond which are its literally shapeless edges. Early Chinese maps also appear to accept the belief in a flat earth, although as we shall see this is partly based on their own particular fascination with the square as a defining cosmological principle. By at least the fourth century BC the Greeks had shown that the earth was a sphere, and produced a series of circular maps projected onto a plane surface.

All these projections struggled with an enduring geographical and mathematical conundrum: how is the whole earth reduced to a single

flat image? Once the earth's sphericity was scientifically proved, the problem was compounded: how was it possible to project the sphere accurately onto a plane surface?[23] The answer, as the German mathematician Carl Friedrich Gauss conclusively proved in his work on projections in the 1820s, was that it was not possible. Gauss showed that a curved sphere and a plane were not isometric: in other words, the terrestrial globe could never be mapped onto the plane surface of a map using a fixed scale without some form of distortion of shape or angularity; we shall see some of the many distortions which have been adopted in the course of this book.[24] Despite Gauss's insight, the search for 'better', more accurate, projections only intensified (even Gauss went on to offer his own method of projection). Even today, the problem remains hidden though in plain view, invariably acknowledged on world maps and atlases, but buried in the technical detail of their construction.

One of the many paradoxes of maps is that, although mapmakers have been creating them for thousands of years, our study and understanding of them is still in its relative infancy. It was only in the nineteenth century in Europe that the academic discipline of geography came into existence, coinciding with the professionalization of the mapmaker, who was redesignated with the more scientific title of 'cartographer'. As a result, geography has only recently begun a systematic attempt to understand the history of maps and their role in different societies. In 1935 Leo Bagrow (1881–1957), a Russian naval officer trained in archaeology, founded *Imago Mundi*, the first journal dedicated to the study of the history of cartography, followed in 1944 by the completion of his *Die Geschichte der Kartographie* (*History of Cartography*), the first comprehensive study of its subject.[25] Since then, only a handful of popular books on the subject have been published by experts in the field, and the multi-volume *History of Cartography* edited by Harley and Woodward (who have both tragically died since the project's inception) will not be brought up to the present for years to come. Cartography remains a subject in need of a discipline, its study generally undertaken by scholars trained (like myself) in a variety of other fields, its future even more uncertain than the maps it seeks to interpret.

This book tells a story which shows that, despite the strenuous efforts of generations of cartographers, the ultimate claims of scientific cartography have never been realized. The first great national survey of

a nation based on Enlightenment principles of science, the *Carte de Cassini*, discussed in Chapter 9, was never really finished, and its global equivalent, the International Map of the World, conceived at the end of the nineteenth century, and whose story is told in the Conclusion, was abandoned towards the end of the twentieth. Geography's erratic development as an academic and professional discipline over the last two centuries has meant that it has been relatively slow to question its intellectual assumptions. In recent years, geographers have developed serious reservations about their involvement in the political partition of the earth. Belief in the objectivity of maps has found itself subject to profound revision, and it is now recognized that they are intimately connected to prevailing systems of power and authority. Their creation is not an objective science but a realist endeavour, and aspires to a particular way of depicting reality. Realism is a stylistic representation of the world, just like naturalism, classicism or romanticism, and it is no coincidence that the claims for cartography's objectivity reached their height at the same moment as the ascendancy of the realist novel in Europe in the nineteenth century. Instead of arguing that mapmaking follows an inexorable progress towards scientific accuracy and objectivity, this book will argue that it is a 'cartography without progress', which provides different cultures with particular visions of the world at specific points in time.[26]

The book takes twelve world maps from cultures and moments in world history, and examines the creative processes though which they tried to resolve the problems faced by their makers, from perception and abstraction to scale, perspective, orientation and projection. The problems are constant, but the responses are specific to the mapmaker's particular culture, and we discover that what drove them was as much personal, emotional, religious, political and financial as geographical, technical and mathematical. Each map either shaped people's attitudes to the worlds in which they lived, or crystallized a particular world view at specific moments in global history – often both. These twelve maps were created at particularly crucial moments, when their makers took bold decisions about how and what to represent. In the process they created new visions of the world that aimed not only to explain to their audiences that this was what the world looked like, but to convince them of why it existed, and to show them their own place within it. Each map also encapsulates a particular idea or issue that both motivated

its creation and captured its contemporaries' understanding of the world, from science, politics, religion and empire to nationalism, trade and globalization. But maps are not always shaped exclusively by ideology, conscious or unconscious. Inchoate emotional forces have also played their part in making them. The examples here range from the pursuit of intellectual exchange in an Islamic map from the twelfth century, to global conceptions of toleration and equality in Arno Peters's controversial world map published in 1973.

Although this book makes no claim to provide anything approaching a comprehensive story of the history of cartography, it does offer several challenges to prevailing assumptions about the subject. The first is that, however we interpret the history of maps, it is not an exclusively Western activity. Current research is revealing just how far pre-modern, non-Western cultures are part of the story, from the Babylonian world map to Indian, Chinese and Muslim contributions. Secondly, there is also no hidden agenda of evolution or progress in the historical mapping of the world. The maps examined are the creation of cultures which perceive physical, terrestrial space in different ways, and these perceptions inform the maps they make. This leads to the third argument, that each map is as comprehensible and as logical to their users as the other, be it the medieval Hereford *mappamundi* or Google's geospatial applications. The story told here is therefore a discontinuous one, marked by breaks and sudden shifts, rather than the relentless accumulation of increasingly accurate geographical data.

The map, whatever its medium or its message, is always a creative interpretation of the space it claims to represent. The critical 'deconstruction' of maps as objective representations of reality by writers like Korzybski, Bateson and others has left them looking like malevolent tools of ideology, weaving a conspiratorial web of deceit and dissimulation wherever they are to be found. Instead, the maps in this book are interpreted more as a series of ingenious arguments, creative propositions, highly selective guides to the worlds they have created. Maps allow us to dream and fantasize about places we shall never see, either in this world or in other, as yet unknown worlds. Perhaps the best metaphorical description of maps was graffitied in 45-centimetre letters on a wall next to the railway line approaching Paddington Station in London: 'Far away is close at hand in images of elsewhere.' A metaphor, like a map, involves carrying something across from one place to another.

Maps are always images of elsewhere, imaginatively transporting their viewers to faraway, unknown places, recreating distance in the palm of your hand. Consulting a world map ensures that faraway is always close at hand.

'How valuable a good map is,' wrote the seventeenth-century painter Samuel van Hoogstraten in a similar vein, 'wherein one views the world as from another world.'[27] Oscar Wilde developed Hoogstraten's transcendental sentiment when he famously remarked that a 'map of the world that does not include Utopia is not even worth glancing at, for it leaves out the one country at which Humanity is always landing. And when Humanity lands there, it looks out, and seeing a better country, sets sail.'[28] Maps always make choices about what they include and what they omit, but it is at the moment such decisions are made that Wilde dreams of the possibility of creating a different world – or even new worlds beyond our knowledge (which is one of the reasons that science fiction writers have been drawn irresistibly to maps). As Ortelius admitted, every map shows one thing, but therefore not another, and represents the world in one way, and as a consequence not in another.[29] Such decisions might often be political, but they are always creative. The ability expressed by all the mapmakers in this book to rise above the earth and look down on it from a divine perspective represents an idealistic leap of imaginative faith in humanity, but so powerful is this vision that various political ideologies have sought to appropriate it for their own ends.

This legacy brings the discussion right up to the present day, and the ongoing controversy surrounding the increasing domination of digital online mapping applications, exemplified by the subject of my final chapter, Google Earth. After nearly two millennia of being made on stone, animal skins and paper, maps are now changing in ways unknown since the invention of print in the fifteenth century and are facing imminent obsolescence as the world and its maps become digitized and virtual. Perhaps these new applications will create an unprecedented democratization of maps, allowing greatly increased public access, even giving people the ability to build their own maps. But it seems more likely that the corporate interests of multinational companies will bring a new world of online maps in which access is prescribed by financial imperatives, subject to political censorship and indifferent to personal privacy. One of the arguments of this book is that anyone who wants to

understand the consequences of online mapping and why the virtual, online map of the world looks like it does today needs a longer perspective, one that reaches back as far as the first Greek attempts to map the known world and beyond.

The world is always changing, and so are maps. But this book is not about maps that have changed the world. From the Greeks to Google Earth, it is not in the nature of maps meaningfully to change anything. Instead, maps offer arguments and propositions; they define, recreate, shape and mediate. Invariably, they also fail to reach their objectives. Many of the maps chosen were heavily criticized at the moment of their completion, or were quickly superseded. Others were neglected at the time, or subsequently dismissed as outdated or 'inaccurate', falling into obscurity. But they all bear witness that one way of trying to understand the histories of our world is by exploring how the spaces within it are mapped. Space has a history, and I hope this book goes a little way towards telling that history through maps.

I

Science

Ptolemy's Geography, c. *AD 150*

Alexandria, Egypt, c. *AD 150*

Sailing to Alexandria by sea from the east, the first thing a classical traveller saw on the horizon was the colossal stone tower of the Pharos, on a small island at the entrance to the city's port. At more than 100 metres high, the tower acted as a landmark for sailors along the largely featureless Egyptian coastline. During the day a mirror, positioned at its apex, beckoned sailors, and at night fires were lit to guide pilots into shore. But the tower was more than just a navigational landmark. It announced to travellers that they were arriving in one of the great cities of the ancient world. Alexandria was founded by Alexander the Great in 334 BC, who named the city after himself. Following his death it became the capital of the Ptolemaic dynasty (named after one of Alexander's generals) that would rule Egypt for more then 300 years, and spread Greek ideas and culture throughout the Mediterranean and the Middle East.[1] Gliding past the stone Pharos, a traveller entering the port in the third century BC was confronted by a city laid out in the shape of a chlamys, the rectangular woollen cloak worn by Alexander and his soldiers, an iconic image of Greek military might. Alexandria, like the rest of the civilized world at the time, was wrapped in the mantle of Greek influence, the 'umbilicus' of the classical world. It was a living example of a Greek polis transplanted onto Egyptian soil.

The city's rise represented a decisive shift in the political geography of the classical world. Alexander's military conquests had transformed the Greek world from a group of small, insular Greek city states into a series of imperial dynasties spread across the Mediterranean and Asia. This concentration of wealth and power within empires like the

narrow isthmus at approximately 30° N. To the north, the continent ends abruptly with a right-angled line drawn at 50° N; to the west are mountains and a legend stating 'Terra ultra incognita' (the land beyond is unknown). It is a highly abbreviated version of modern North America, but with intriguing elements, including what look like the Florida peninsula and a Gulf coast. The Caribbean Islands, including 'Isabella' (Cuba) and 'Spagnolla' (Hispaniola), are shown off the eastern coast, in a sea labelled for the first time as 'Oceanus Occidentalis', or Western Sea. The continent supports Spanish claims to the region by flying the flag of Castile, but is not given the name of America. Instead, in its southern regions, it is named 'Parias' in capital letters. So the great birth certificate of America actually calls North America 'Parias', a word taken from Vespucci's account of his meeting with the local inhabitants who used it to designate their homeland.

The map reserves the name 'America' to describe the southern land mass, and is placed in the location of modern-day Brazil. This southern region is far more extensive and detailed than its northern neighbour. Although the southernmost point is cut off at 50° S (conveniently eliding questions of its possible circumnavigation), the region bears the imprint of fifteen years of intensive Spanish and Portuguese exploration of the coastline. To the north, a legend reads, 'This province was discovered by order of the King of Castile', and a legend above the Castilian flag flying off the north-east coast states that 'these islands were discovered by the Genoese admiral Columbus by commission of the Castilian king'. Although these legends give prior political claim to Spain, the legend off the south-east coast below the depiction of a Portuguese ship reads, 'the vessel was the largest of ten ships, which the King of Portugal sent to Calicut [in India], that first appeared here. The island was believed to be firm and the size of the previously discovered surrounding part was not known. In this place men, women, children and even mothers go about naked. It was to these shores that the King of Castile later ordered voyages to ascertain the facts' – a reference to Pedro Alvares Cabral's voyage of 1500.[30] Because Cabral sailed further out into the Atlantic than da Gama, he accidentally 'discovered' Brazil. Like Waldseemüller and his colleagues, he assumed it was an island, and left to sail on to India.

The map's representation of this new western continent was without precedent, but within the map as a whole it was hardly advertised as

1. The earliest known world map: the Babylonian world map, from Sippar, southern Iraq, *c.* 700-500 BC.

2. The world as a theatre: the frontispiece to Abraham Ortelius, *Theatrum orbis terrarum* (1570).

3. The world map from one of the earliest known copies of Ptolemy's *Geography*, written in Greek, thirteenth century.

Mackinder's 1904 map represented the ultimate version of a globe seemingly bereft of collective agency, where the messy reality of the world is reduced to enduring warfare between cultures for ever determined by their physical location and quest for increasingly scarce resources. It was an indispensable part of Mackinder's extraordinarily successful mission to elevate the study of geography to a hitherto unknown stature, and situate it within the cartographic imagination of international political relations. But it was a double-edged legacy. The impact of decolonization after the Second World War has slowly led geographers and mapmakers to question the ease with which their discipline surrendered to the established political powers. Although many reaped the benefits of Mackinder's legacy, others became deeply uncomfortable about the enhanced authority of geography.

The world view of Mackinder's map continues to influence foreign policy across the globe. In an article written for the US Army War College's journal *Parameters* in the summer of 2000 entitled 'Sir Halford Mackinder, Geopolitics and Policymaking in the 21st Century', Christopher Fettweis argued that 'Eurasia, the "World Island" to Mackinder, is still central to Amercian foreign policy and will likely continue to be so for some time'. Today, as Fettweis points out, the 'heart of the Heartland is floating on top of a sea of oil'.[80] The first Gulf War of 1990–91 is already regarded by many political observers as the first of a series of 'resource wars' launched to ensure US control over global oil supplies. Writing in the *Guardian* newspaper in June 2004, Paul Kennedy, a distinguished professor of history at Yale University and an expert on Mackinder, wrote that '[r]ight now, with hundreds of thousands of US troops in the Eurasian rimlands and with an administration constantly explaining why it has to stay the course, it looks as if Washington is taking seriously Mackinder's injunction to ensure control of "the geographical pivot of history"'.[81] It is a disturbing fulfilment of Mackinder's original predictions, and current US involvement in the Gulf shows it will not be the last international conflict over increasingly scarce physical resources. It is a sobering reminder that, although Mackinder's world map is virtually obsolete, the world view that it expressed continues to affect people's lives right across the globe.

11

Equality

The Peters Projection, 1973

India, 17 August 1947

In June 1947 the British Government commissioned Sir Cyril Radcliffe, a lawyer and former Director-General of the Ministry of Information, to travel to India for the first time in his life to produce a report partitioning the subcontinent. His mission was to divide the country along religious lines, separating Hindus from Muslims in the creation of India and Pakistan. Over just three months the Radcliffe Boundary Commission was required to create a 6,000 kilometre geographical boundary dividing 90 million people living in a region covering over 400,000 square kilometres. Without any experience of India, and with no inclination to commission updated geographic surveys or revised boundary demarcations, Radcliffe set about using outdated census reports in partitioning the country to 'demarcate the boundaries of the two parts of the Punjab on the basis of ascertaining the contiguous majority areas of Muslims and non-Muslims'.[1] His so-called Award was published on 17 August 1947, just two days after the official declaration of the independent states of India and Pakistan. The Indian artist Staish Gurjal remembered the chaos involved in communicating news of the partition. 'Curiously,' he recalled, 'the news of such magnitude was conveyed to us not by newspapers (which had ceased publication) but by posters pasted on the walls.'[2] The consequences of Radcliffe's map of partition were swift and disastrous. It sparked the largest migration in history, with between 10 and 12 million people moving across the newly established borders of Punjab and Bengal. The new border areas descended into bloody violence, with as many as a million people murdered in communal massacres.[3]

Radcliffe's Award satisfied nobody. The mainly Islamic Kashmir joined India, while Muslim minorities remained, and by late 1947 India and Pakistan were at war over the contested borders. Further wars followed in 1965 and 1971, and the tensions between the two states continue to this day, although now with the added threat of nuclear confrontation. Never before had the drawing of a line on a map led to such terrible human consequences.

The catastrophic geographical partition of India was a logical, if not necessarily inevitable, consequence of the ambitious but incomplete mapping projects of the eighteenth and nineteenth century, and their preoccupations of nation-building and imperial expansion. In France, as we have seen, several generations of the Cassini family had created ambitious but imperfect mapping techniques that played a part in shaping a distinctly French national consciousness. Their cartographic methods were soon adopted throughout Europe as the political geography of the continent slowly evolved from a group of disparate empires and monarchies into a series of sovereign nation states. In England, the gulf between the claims to cartographic practice and their reality in the administration of Britain's imperial dominions in Africa, India, South Asia and the Middle East meant that any partition of a country like India would inevitably lead to conflict. The legacy of Mackinder's geopolitical version of a world order, underpinned by imperialism and vividly illustrated by his infamous 1904 world map, showed how mapmaking could be appropriated by a range of political ideologies with little interest in its claims to scientific objectivity and impartiality.

The ease with which political power used cartographic expertise is a recurrent theme of twentieth-century history. As the century progressed and Europe descended into global conflict, maps became more explicitly politicized than ever before, and in some cases transformed into servants of what is now very familiar political propaganda. Even before the outbreak of the Second World War, the Nazis had grasped the power of maps to convey their political message. An infamous map of 1934 purports to show the danger posed to German sovereignty by Czechoslovakia, a manufactured threat that would ultimately provide the pretext for the Nazi invasion in March 1939. Lacking a proper scale or toponymy, the image hardly qualifies as a map in a technical sense, but its use of light and shade creates a contrast between the passive, blank space of Germany and the more menacing outline of Czechoslovakia.

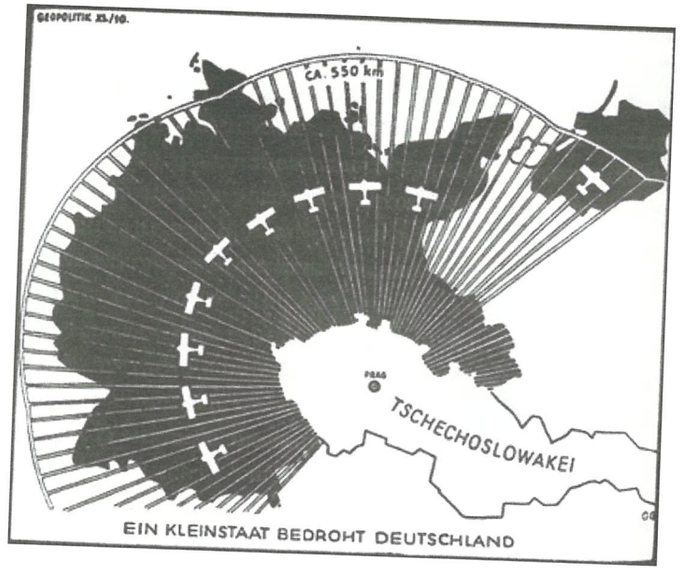


Fig. 34 'A small state threatens Germany!' Propaganda map, Germany, 1934.

The crude approximation of a fan-shaped graticule suggests the threat of airborne bombing (despite the minute size of the Czech air force). As one commentator wrote during the Second World War, in propaganda maps such as these, 'geography as a science and cartography as a technique become subservient to the demands of effective symbol manipulation'.[4] Although crude in its execution and message, this map exemplified the systematic political distortion of German maps and geographical textbooks throughout the 1930s, as the racial and ethnic message of Nazism appropriated the supposedly objective and scientific methodology of geography.[5]

The process of cartographic manipulation reached new and tragic heights during the Second World War, when the Nazis used maps in the pursuit of their 'Final Solution', the systematic mass murder of European Jews. In 1941 Nazi officials drew up an ethnic map of the puppet state of Slovakia based on official statistics of population distribution based on ethnicity. The map is a highly accurate representation of Slovakia, but its clusters of black circles betray its more sinister function: they depict the location of Jewish ('Juden') and Gypsy ('Zigeuner') communities. Labelled 'For official use only', this map was used with the

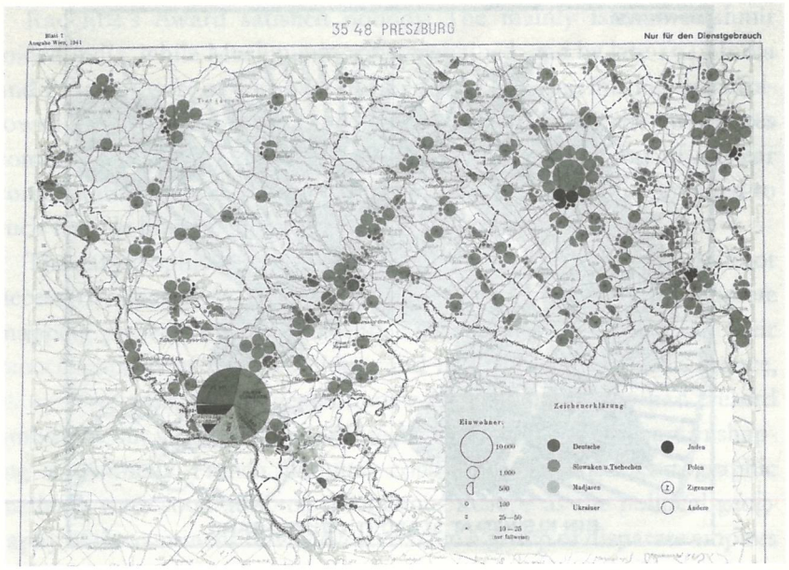


Fig. 35 Ethnic map of Slovakia, 1941.

support of the sympathetic Slovak authorities to round up Jews and Gypsies the following year, who were deported to extermination camps, where most met their death.

The appropriation of maps throughout the Second World War quickly translated into the political brinksmanship of the Cold War, exemplified by *Time* magazine's map of 'Red China' published in 1955. The illustration suggests the global stakes of the post-war military confrontation between the Soviet Union and the United States, with its depiction of China, Japan, Korea and Vietnam, with American possessions in the Pacific vulnerably positioned in the foreground. It mimics cartographic 'accuracy' in implying a geopolitical subtext which Mackinder would undoubtedly have understood: the fear of the spread of 'Red' Communism throughout South-east Asia and the threat to American interests in the Pacific.

As Cold War strategists on both sides of the ideological divide used 'persuasive cartography' to play on the anxieties of their fearful publics, geography also inevitably found itself tracing the collapse of European imperial dominion in Africa and South Asia. Having imposed arbitrary cartographic lines dividing ethnic, linguistic and tribal groups

across entire continents like Africa in the nineteenth century, the former colonial powers were required to unravel these prescriptive cartographies in the post-war period of decolonization. The results, as in India's case, were rarely convincing, and often fatal for those who found themselves, literally, on the wrong side of a line.

The impact of political influence and manipulation on mapmaking also led to new developments to its medium, which could sometimes lead to different, more positive perspectives on the world. One of the most momentous shifts in twentieth-century perceptions of the earth began on 7 December 1972, when the three astronauts on board NASA's Apollo 17 spacecraft took a series of photographs of the earth with a handheld camera. One of the photos, taken at more than 33,500 kilometres above the earth's surface, was released by NASA following the safe return of the mission on Christmas Day. It became one of the most iconic images of not only a new age of space travel and exploration, but also of the earth itself. Since the time of Ptolemy, earthbound mapmakers had speculated and projected imaginative visions of the appearance of the world as seen from space. Historically, most map projections adopted such a perspective. But implicit in such projections was the assumption that no human would ever actually witness the earth from such a position. Now, for the first time, the whole earth, the subject of the study of geography since its inception, was finally captured for all to see, not on a map or through the skills of a mapmaker, but by a photograph taken by an astronaut.[6]

The Apollo 17 photograph, in its depiction of both the sublime grandeur and exquisite beauty of a singular blue world floating in the dark abyss of empty, inhospitable space, inspired wonder and also indignation at the state of 'our' world. The language of religious awe that accompanied the photograph's reception was quickly superseded by political and environmental reflections on the fragility of a world that united all its inhabitants, regardless of creed, colour or political orientation. The impact of the image found its way into 'The Brandt Report', a commission chaired by the former West German Chancellor Willy Brandt, which was published in 1980 to address the problems of economic development between the northern developed world and the southern developing nations. The report's authors wrote that 'from space, we see a small and fragile ball dominated not by human activity and edifice but by a pattern of clouds, oceans, greenery and soils.

Humanity's inability to fit its doings into that pattern is changing planetary systems fundamentally.'[7] Indeed, the whole-earth photograph had a significant influence on the growth of thinking about environmentalism and climate change. As this is the only world we possess, reasoned this new strand of ecological thinking, we had better look after it, and transcend our petty, earth-bound disputes in favour of a more holistic approach to the environment. It also had an impact on James Lovelock, who was developing his 'Gaia' hypothesis of the earth as a self-sustaining organism when he worked for NASA in the 1960s (but did not publish it until 1979), and gave new impetus to the Canadian thinker Marshall McLuhan's invention of the idea of a 'global village' in the early 1960s. Such sentiments echoed the transcendent global image that ran throughout the history of mapmaking, from Ptolemy through Macrobius to Mercator, although now with an added political urgency.

A further consequence of the Apollo earth photographs was their impact on global cartography. If it was now possible to photograph the whole earth rather than produce partial maps of its surface based on unsatisfactory projections, who needed mapmaking at all? One answer was of course that photographs from space were still limited to showing the earth as a disc, not a globe or a map on a plane surface (and the Apollo 17 photograph was centred on eastern Africa and the Persian Gulf, with no sign of the Americas or the Pacific Ocean). Another would be provided by the rapid improvement of Geographic Information Systems (GIS) which merged aerial and satellite photographic imagery with electronic database technologies to begin the rise of online mapping, examined in the final chapter.

Less than six months after the release of the Apollo 17 earth photographs, a world map was unveiled in Germany that claimed to turn its back on the selective political mapmaking of the twentieth century and to present an image of the world that promised equality to all nations. In May 1973, the German historian Arno Peters (1916–2002) called a press conference in Bonn, then capital of the Federal Republic of West Germany. In front of an assembled gathering of 350 international reporters, Peters announced a new map of the world based on what he called the Peters Projection. It was an immediate sensation, and it quickly made international front-page news. In the United Kingdom, the *Guardian* newspaper ran a story entitled 'Dr Peters' Brave New World', heralding the new map and its mathematical projection as 'the

most honest projection of the world yet devised'.[8] *Harper's Magazine* even went as far as to run an article on Peters's projection entitled 'The Real World'.[9] For those who first saw the map in 1973, its novelty lay in its appearance. To those used to Mercator's projection, the northern continents appeared radically reduced in size, while Africa and South America took on the appearance of enormous teardrops sliding down towards Antarctica, or as one reviewer infamously put it, 'the landmasses are somewhat reminiscent of wet, ragged, long winter underwear hung out to dry on the Arctic Circle'.[10]

Peters claimed that his new world map offered the best alternative to the 400-year-old hegemony of Mercator's 1569 projection, and the supposedly 'Eurocentric' assumptions that lay behind it. In unveiling his map, Peters believed that the 'usual' map of the world by his German-speaking forebear, with which his audience were so familiar, 'presents a fully false picture particularly regarding the non-white-peopled lands', arguing that 'it over-values the white man and distorts the picture of the world to the advantage of the colonial masters of the time'. In explaining the technical innovations of his own map, Peters pointed out that Mercator put the equator nearly two-thirds of the way down his map, effectively placing Europe at its centre. On Mercator's projection the land masses were subject to distortion, leading to an inaccurate increase in the size of Europe and the 'developed' world and a subsequent decrease in the size of what Peters called 'the third world', in particular Africa and South America. Peters insisted that his own map provided what he called an 'equal area' projection that accurately retained the 'correct' dimensions of countries and continents according to their size and area. It therefore rectified what he regarded as the Eurocentric prejudice of Mercator and offered 'equality' to all nations across the globe.[11]

The impact of Peters's projection and his attack on Mercator was extraordinary. Over the next two decades it became one of the most popular and bestselling world maps of all time, rivalling the American cartographer Arthur Robinson's 1961 projection reproduced in the international bestselling Rand McNally and National Geographic Society's world atlases, and even Mercator's ubiquitous projection. In 1980 it adorned the cover of the Brandt Report, and in 1983 it appeared in English for the first time, in a special issue of the global development magazine *New Internationalist*. Praising what it called a 'remarkable new map', the magazine reproduced Peters's claims that

Mercator's map 'shows the ex-European colonies as relatively small and peripheral', while his own map 'shows countries according to their true scale', which, it believed, 'makes a dramatic difference to the portrayal of the Third World'.[12]

In the same year the British Council of Churches distributed thousands of copies of the map, which was also endorsed by OXFAM, Action Aid and more than twenty other agencies and organizations. Even the papacy praised its progressive agenda. But the United Nations was the most passionate advocate of Peters's map. UNESCO (the Educational, Scientific and Cultural wing of the organization) adopted it, and UNICEF (the United Nations Children's Fund) issued an estimated 60 million copies of the map under the slogan 'New Dimensions, Fair Conditions'. The map was so successful that Peters issued a manifesto in German and English outlining his approach. It was published in English in 1983 as *The New Cartography*, and was soon followed in 1989 by *The Peters Atlas of the World*. More than 80 million copies of the map have probably now been distributed across the world.[13]

But if the media and progressive political and religious organizations quickly accepted the map and Peters's cartographic methods, the scholarly community reacted with horror and disdain. Geographers and practising cartographers queued up to launch a bitter and sustained attack. The projection's claims to greater 'accuracy', they countered, were inaccurate: Peters, untrained in cartography, lacked an understanding of the basic principles of map projection; as a target, Mercator was a straw man, his influence unnecessarily overstated; Peters's skilful marketing of his map and the subsequent atlas looked like someone cynically exploiting an ignorant public to promote his own personal and political ends.

This response, even by academic standards, was vicious. In one of the first English language reviews of Peters's projection, published in 1974, the British geographer Derek Maling condemned it as 'a remarkable act of sophism and cartographic deception'.[14] Another British geographer, Norman Pye, dismissed the publication of Peters's *Atlas* as 'absurd', and complained that 'only the cartographically naïve will be deceived and fail to be exasperated by the pretentious and misleading claims made for the atlas by the author'.[15] Reviewing *The New Cartography*, the prominent British cartographer H. A. G. Lewis wrote that '[h]aving read this book many times in German and in English, I still marvel that the author, any author, could write such nonsense'.[16]

The most damning review of Peters's projection came from Arthur Robinson. In 1961 Robinson had created a new projection with the explicit aim of offering a compromise between conformal and equal-area projections. He used evenly spaced, curving meridians which did not converge onto a single point, limiting distortion at the poles, which allowed for a relatively realistic representation of the whole earth as a globe. The projection is also known as orthophanic (from the French for 'correct speaking'), although Robinson's colleague John Snyder captured its inherent compromises when he described it as providing 'the best combination of distortions'.[17] Nevertheless, with the backing of the Rand McNally publishing house and the National Geographic Society, millions of copies of the projection were circulated, and it finally eclipsed Mercator's as the most popular and widely distributed map of the world. Reviewing Peters's work in 1985, Robinson was unsparing in his attack on his German rival. *The New Cartography* was 'a cleverly contrived, cunningly deceptive attack' on the discipline of cartography, but its method was 'illogical and erroneous', 'absurd', 'the arguments spurious and in some instances just plain wrong'. Echoing Lewis's review, Robinson concluded that '[i]t is difficult to imagine how anyone who claims to be a student of cartography can write such things'.[18]

Even in Germany, the attacks continued. Following the release of Peters's projection in 1973, the German Cartographical Society felt compelled to issue a statement condemning it. 'In the interests of truthfulness and of pure scientific discussion', the society decided to intervene in what it called 'the continuing polemic propaganda by the historian Dr Arno Peters'. Invoking 'the mathematical proof that the projection of a spherical surface to a plane surface is not possible without distortions and imperfections', the society's statement went on: 'If Mr Peters, in the "catalogue of world map qualities" produced by him, maintains that his world map possesses only positive qualities and no shortcomings, then this contradicts the findings of mathematical cartography and arouses doubts regarding the author's objectivity and the usefulness of his catalogue.' Having systematically dismantled most of Peters's claims, the statement concluded, 'the Peters map conveys a distorted view of the world. It is by no means a modern map and completely fails to convey the manifold global, economic and political relationships of our times!'[19]

Despite such ferocious responses, Peters's supporters continued to champion the map through government and aid organizations. By 1977

the West German government's Press and Information Office were circulating press releases endorsing Peters's new map, much to the consternation of many cartographers. When one of the releases was published in the bulletin of the American Congress of Surveying and Mapping (ACSM), its members responded in November 1977 with an article entitled 'American Cartographers Vehemently Denounce German Historian's Projection'. The article was even more intemperate than the response of the German Society. Written by Arthur Robinson and John Snyder, two of the organization's most distinguished members, it savaged Peters as having little 'good sense', and his projection, which was 'ridiculous and insulting to dozens of other inventors' of more valid map projections.[20]

From the academic response to Peters's map, it would be easy to say that he created a flawed projection, and that his conclusions were wrong. But it is never that simple with maps. Both sides in the controversy claimed that objective truth was on their side, but invariably this objectivity quickly unravelled to disclose more subjective beliefs and vested personal and institutional interests. Gradually the debate turned into a deeper reflection on the nature of mapmaking. Were there established criteria for assessing world maps, and, if so, who should establish them? What happened when a map was accepted by the public at large but rejected by the cartographic profession, and what did this say about people's ability to read (or misread) maps? What was an 'accurate' map of the world, and what was the role of maps in society?

Initially, such questions were ignored in the professional condemnation of Peters's projection because most technically trained cartographers were so busy falling over themselves to dismiss the projection as 'bad' and Peters's claims as 'wrong'. There was indeed much to criticize. Of greatest concern was that Peters seems to have simply got his calculations wrong when drawing up his world map. Having measured the graticule on Peters's projection, one of his earliest critics noticed that his parallels were out by up to 4 millimetres, which on a global scale was a serious distortion, and meant that, technically speaking, 'Peters' projection is not equal area'.[21] Peters's claim that scale and distance were correctly represented on his projection was also mathematically impossible, as any plane map that attempts to replicate the distances between two points on the globe must adopt a scale relative to the curvature of the earth's surface. The argument that his projection dramatically

reduced territorial distortion and correctly represented those countries colonized by the European powers was also not borne out by closer inspection. Reviewers claimed that on his map Nigeria and Chad both appeared twice as long as they should be, while Indonesia was represented at twice its north–south height and half its actual breadth east to west.[22] These were serious mistakes, but, when challenged, Peters stuck to his calculations, and refused to accept he had made any. Ironically, the distortions of shape which affected his projection were at their greatest in Africa and South America, two of the continents he argued suffered so greatly from European 'misrepresentation'. In contrast, regions predominantly covering the middle latitudes, including most of North America and Europe, suffered very little distortion. These errors and contradictions were only compounded with the subsequent publication of *The Peters Atlas of the World* in English in 1989. Here Peters altered his standard parallels, and also contradicted his claim to use one universal projection for every regional map: in his polar maps he adopted two of the more traditional projections (including Mercator's) which had been summarily dismissed in his *New Cartography*.

As well as exaggerating his map's accuracy, Peters also failed to practise what he preached. If he was so eager to reorient the cartographic tradition of putting Europe at the centre of the map and distorting colonized nations, then why, asked his critics, did he reproduce Greenwich as his central meridian when somewhere in Africa, China, or the Pacific could have been easily adopted? Another problem identified by the critics was the political dimensions of his projection. 'Since area alone is neither the cause nor the symptom of division between the North and South,' wrote David Cooper, 'does this map improve our understanding of the problems of the world?'[23] By producing a map which ostensibly offered equality of surface area in its projection, Peters implied that it was possible to address political inequality. Size, at least for Peters, did matter. But, as another critic asked, did a more accurate representation of the size of Indonesia really address that country's exceptionally high infant mortality rate, or only further obscure it? To some extent it was a valid question, but Peters's point was that perceiving Indonesia according to its actual relative size was an important step in establishing its place in the wider geopolitical world. Such criticisms suggested the need for a debate (not pursued for several years) as to how *any* world map could meaningfully address statistically derived social inequalities in graphic form.

Nearly all of Peters's critics questioned his attack on Mercator to the exclusion of almost all other projections. To ascribe 'Eurocentrism' and complicity in the subsequent colonization of large sections of the globe to Mercator appeared anachronistic, and conceded far greater power and authority to the map than it actually possessed. Many reviewers pointed out that the technical limitations of Mercator's projection had been acknowledged from the eighteenth century, and that its influence in maps and atlases had been on the wane since at least the late nineteenth century. Mercator was too easy a target to condemn as producing an 'inaccurate' world map to allow the promotion of Peters's 'accurate' map with its depiction of equal-area over all other elements. It was a grossly simplistic opposition that ignored countless other projections, but one which, in its visual clarity, would quickly capture the public imagination.

More than thirty years after its first publication, the Peters projection still causes consternation among the cartographic profession, and curiosity in the media. In 2001 the acclaimed US television political drama series *The West Wing* featured the fictional 'Organization of Cartographers for Social Equality', lobbying presidential staff to 'support legislation that would make it mandatory for every public school in America to teach geography using the Peters projection map instead of the traditional Mercator [map]'.[24] Following the episode's release the Peters projection experienced a fivefold increase in sales. The distinguished American geographer Mark Monmonier remained unimpressed. In 2004, two years after Peters's death, Monmonier revisited the controversy in his book *Rhumb Lines and Map Wars*, a social history of the Mercator projection. He castigated Peters for offering 'a ludicrously inapt solution' to the problem of how to revise Mercator's methods, and argued that 'the Peters map is not only an equal-area map but an exceptionally bad equal-area map that severely distorts the shapes of tropical nations its proponents profess to support'.[25]

By the time Monmonier made his reflective but still hostile criticism of Peters, the map and its projection were no longer used in atlases, and were already becoming objects of historical curiosity. In reassessing now both the technical and political controversy of the Peters projection, it is possible to see it as what has been called a 'defining moment' in the history of mapmaking. Peters's methods were suspect and his world map made unsustainable claims for greater accuracy, but his

work revealed a more important truth about mapmaking: by arguing that all maps and their projections are either deliberately or inadvertently shaped by their social and political times, the 'map wars' ignited by Peters forced mapmakers to concede that their maps had never been, and never could be, ideologically neutral or scientifically objective 'correct' representations of the space they claimed to depict. Peters asked both cartographers and the general public to confront the fact that all maps are in some way partial and, as a consequence, political.

This turn to politics was a direct consequence of Peters's personal experience of a century that witnessed the political appropriation of maps for the purposes of military conquest, imperial administration and national self-definition. But in the phenomenal impact of the Apollo 17 earth photographs he also saw the power of the image of the whole earth to inspire awareness of the environment and of the baleful effects of inequality across the globe. If Peters made one mistake above and beyond his questionable cartography, it was in failing to acknowledge that his own map was just another partial representation of the world, and was subject to the same interplay of political forces that he identified throughout the course of Western cartography. Now, nearly forty years after it was first published, we can see more clearly the place of Peters and his world map in the history of mapmaking.

Despite his antagonism towards Mercator's projection and the historical gulf that separated them, Peters's own life reveals that he and Mercator had more in common than he probably liked to admit. Like Mercator, Peters was born in the German-speaking lands east of the Rhine during a time of political and military conflict. Growing up in the Weimar Republic of the 1920s and the Nazi Germany of the 1930s, and building his career in the post-Second World War context of a politically divided West and East Germany, Peters understood better than most how geography could be used to divide nations and people. He was born in Berlin in 1916 into a family of labour and union activists, and his father was imprisoned by the Nazis for his political beliefs. The teenage Peters was educated in first Berlin and then the United States, where he studied film production, writing his Ph.D. thesis on 'Film as a Means of Public Leadership' as Europe descended once again into total war (it was this interest in propaganda that many of his later critics would seize on when claiming his 'manipulation' of cartography). Recalling the

origins of his politicization in the 1970s, Peters wrote that 'it was here in Berlin, three decades ago, that my basic criticisms of our historic-geographical view of the world crystallised'. Having witnessed the widescale manipulation of cartography throughout the Second World War, Peters concluded that his critique would be aimed subsequently at 'the narrowness of our European-oriented – nay German-oriented – view of the world and the realisation of its incongruity with the broad, all-embracing manner of regarding the world and life in our epoch'.[26]

In the late 1940s Peters worked as an independent scholar, receiving funding from the German regional government and the US military to write a textbook on global history that could be used in both East and West Germany. The result, the *Synchronoptische Weltgeschichte*, or 'Synchronoptic World History', was published in 1952. A synchronoptic perspective involves displaying several timelines concurrently, and this is what Peters created in attempting to avoid the traditional linear, written accounts of history focused on Western achievements. Using noticeably geographical language, Peters complained that, in concentrating on European history, 'the remaining nine tenths of the occupied earth' gets ignored. A good example of his revisionist approach can be seen in his account of the Middle Ages: 'six hundred years of Greco-Roman flowering are stretched in our world histories to make it seem as though human civilization began with them. After the decline, history books move rapidly again. As is well known, the so-called Middle-Ages are "Dark Ages" in Europe, and therefore in our history books. But for the rest of the world, these thousand years were an age of flowering.'[27] In an attempt to provide equal weight to each slice of history, Peters abandoned a written narrative and instead described the period from 1000 BC to AD 1952 through a series of tables 'of eight colours divided into six bands: economics, intellectual life, religion, politics, war and revolution'.[28] Central to its creation was, Peters argued, the 'idea of charting time in the same manner as space is charted on our maps'. Describing the genesis of his book, Peters recalled, 'I took a sheet of blank paper and first entered time as such to scale. Each year got a vertical strip, one centimetre in breadth.' As a result, 'the map of time was born'.[29]

The right-of centre German magazine *Der Spiegel* described the book as 'the biggest scandal of the last two weeks'.[30] Peters's later critics would leap upon the controversy to suggest that decades before publication of

his geographical projection he had already been manipulating academic information for personal and political ends. In December 1952 the right-wing American magazine *The Freeman* published an article entitled 'Official Misinformation', in which it reported with indignation that US officials in Germany had 'with the laudable motive of "democratizing" that country', commissioned Peters and his wife to write their 'World History', but 'only after they had spent $47,600 on the project and distributed 1100 of 9200 copies received, did they learn that the authors of the book were Communists and the book itself pro-Communist, anti-democratic, anti-Catholic and anti-Semitic'. Such lurid accusations were hardly justified by the text of Peters's book, which went on to become a bestseller, but that did nothing to abate *The Freeman*'s wrath. 'So the American taxpayers are not merely the victims of a £47,600 swindle,' it thundered; 'they have been gravely injured by incompetent and disloyal officials who used their funds to finance enemy propaganda.'[31]

But *Der Spiegel* took a more emollient approach to the controversy. Its main objection to the book lay not with its content, but with the revelation that it was partly financed by a member of the SPD (German Socialist Party). *Der Spiegel* praised the book as a laudable but unsuccessful attempt to provide a comprehensive account of world history. Peters claimed that his book was trying 'to bring equality and balance to the treatment of history', but within the context of the polarized world of US–Soviet Cold War politics, such progressive initiatives by academics like Peters were inevitably prey to ideological attacks by not just right-wing publications like *The Freeman*, but also left-wing authorities like the SPD, who argued that simply allocating space to huge periods of prehistory during which, as far as they were concerned, nothing really happened, seemed absurd. As a result, the book was partially withdrawn from circulation.

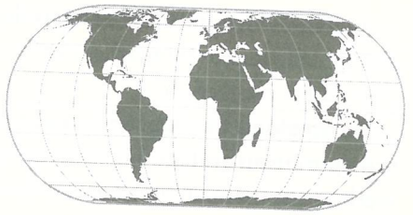
It is ironic that Peters should develop his subsequent geographical projection as a result of working on a history of the world (as he later acknowledged), in much the same way that his *bête noire* Gerard Mercator had compiled an innovative chronology of world history as he completed his famous map projection. Their intellectual and ideological influences were of course very different, but both produced their histories in accordance with deeply held personal convictions. For Mercator, this was the righteousness of biblical scripture; for Peters, it was the

equality of all nations and races. Both men produced books that required a different spatial approach to world history through the use of columns and tables, and both realized that their universal histories led them to a reconsideration of how to portray global geography. Mercator's preoccupations were shaped by the theological and commercial imperatives of his time, which led him to create a map that allowed people to navigate (practically and even spiritually) across the world. In contrast, Peters appreciated that accurate navigation was no longer the aim of a global projection. For him, living in an age he called 'the post-colonial period', defined by global warfare, nationalism and decolonization, questions of land distribution, population control and economic inequality were central to the study of geography and the practice of mapmaking.

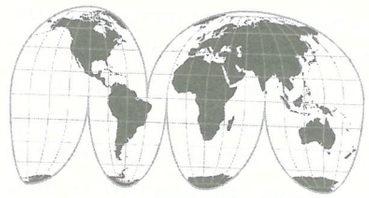
Following the publication (and subsequent withdrawal) of his 'World History', Peters spent the late 1950s and 1960s editing the German Socialist magazine *Periodikum*, as his interests became more focused on space and cartography. 'During the preparation of an atlas volume to accompany my synchronoptic world history,' he wrote, 'it became clear to me that existing global maps were worthless for an objective representation of historical situations and events.' He went on, 'the quest for the causes of arrogance and xenophobia has led me repeatedly back to the global map as being primarily responsible for forming people's impression of the world seen from their standpoint.'[32] It was a compelling statement about the power of maps, and its ramifications would come to dominate the rest of Peters's career. When he disseminated his new map within the academic community, Peters's projection was just one among a bewildering variety of others; by turning to the world's media and announcing a 'new map of the world' at his press conference in Bonn, Peters changed dramatically the terms on which both the public and academia understood the role of world maps.

There is an immediate difficulty in providing an objective account of Peters's aims, because his own arguments were so steeped in the kind of myths, ideological presumptions, scientific errors and self-aggrandizement that he was quick to identify in earlier cartographers. It is also difficult to distinguish his claims of cartographic accuracy from his reactions to the prejudicial and often highly personal criticism that quickly followed, and which often led him to change the terms of the debate. We can, however, now piece together his published statements

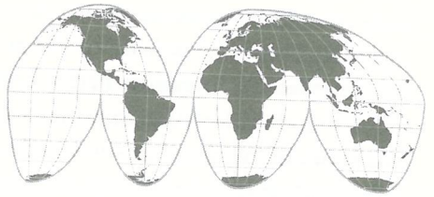
Van der Grinten I 1904



Eckert IV (Pseudocylindrical) 1906

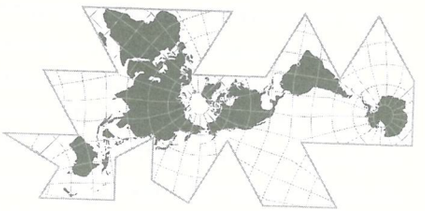


Mollweide (Homolographic) *c.* 1800
Goode (Interrupted) 1916

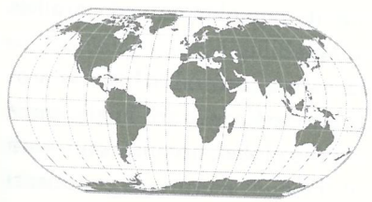


Goode Homolosine (Interrupted) 1923

Miller Cylindrical 1942



Fuller Dymaxaion 1943



Robinson (Pseudocylindrical) 1963

Perspective (Orthographic) 1988
as seen by GOES

Fig. 36 Diagrams of twentieth-century map projections.

and lectures over two decades to describe what Peters thought he was doing, before assessing the avalanche of argument and debate that greeted his projection.

Throughout the twentieth century, developments in communications, transportation and global strategy and related innovations in surveying methods, statistical analysis and aerial photography produced new uses for maps. This led to a proliferation of new projections and revisions to established ones based on the appropriateness of particular mapping methods for specific practical applications. For example, as Mercator's projection became increasingly questioned as a way of representing the globe, it gained a new lease of life as a method of regional surveying.[33] In *The New Cartography*, Peters both described and responded to the increasing diversity of map projections by explaining what he regarded as a series of 'myths' that sustained traditional cartography, or what he called 'half truths, irrelevancies and distortions'. He summarized these as the myth 'that Europe dominates the world from a central position on the globe'.[34] He then went on to offer 'the five decisive mathematical qualities and the five most vital utilitarian aesthetic qualities' which he believed were necessary for an accurate modern map of the world. The five decisive qualities were fidelity of area, axis, position, scale and proportionality; the five 'vital' qualities were universality, totality, supplementability, clarity and adaptability.[35] In providing an overview of eight historical map projections from Mercator's to his own, Peters scored his map ten out of ten, while the 1569 Mercator projection, Ernst Hammer's 1892 equal-area projection, and J. Paul Goode's elaborate 1923 projection that split the world into six lobes, all lagged well behind with a poor four out of ten. Peters's nearest rival, Hammer's equal-area projection, was dismissed for its complex curved parallels and apparent lack of universality and adaptability.

For Peters, what he called 'fidelity of area' was central to his new projection: it should ensure that 'any two selected areas are in the same proportion to one another as they are on the globe', because 'only with this property can the real proportion of the sizes of various continents of the earth be achieved'. Cartographers call this particular method an equal-area projection as it retains the equivalence in size of territorial areas. Like Mercator's map, it is based on wrapping a flat map around a cylinder, but the crucial difference is that whereas Mercator's projection retains conformality, the correct shape around a particular point,

an equal-area projection retains equivalence according to relative area. To achieve this, Peters had to find a different way of spacing his parallels and meridians.

Based on established measurements of the globe's circumference, Peters drew standard parallels at 45° N and 45° S, where minimal distortion occurred in transferring the globe onto a flat map. He plotted parallels of latitude which are all the same length as the equator. He then halved the scale from east to west running along the equatorial line, while doubling the scale running north to south at the equator to create a rectangular frame. It is no surprise that, whereas Mercator was influenced by the need to move across the sixteenth-century globe according to the exigencies of trade from east to west, Peters plotted a projection according to the north–south economic and political preoccupations of the second half of the twentieth century. The result of this north–south elongation and east–west compression is quite obvious on Peters's map: tropical areas in the southern hemisphere such as Africa and South America are long and thin, while the increasing compression towards the poles makes regions like Canada and Asia appear squat and fat. Even though the particular shapes of these areas were distorted through relative compression or elongation, such distortions allowed Peters to transfer relative surface area from the globe onto the map more accurately.[36]

The concern with area was central to Peters's political argument over the significance of map projections. For Peters, the relative failure to represent the world according to area, culminating in Mercator's conformal projection, was a basic act of political inequality. Looking only at the representation of territorial areas, Peters had a point: on the Mercator projection, Europe, at 9.7 million square kilometres, appears considerably larger than South America, which is nearly twice the size, 17.8 square kilometres; at 19 million square kilometres, North America is represented as considerably larger than Africa, 30 million square kilometres. Although China covers 9.5 million square kilometres, on the Mercator map it is dwarfed by Greenland, which is just 2.1 million square kilometres. A similar point can be made by looking at most atlases published prior to Peters's projection. The geographer Jeremy Crampton surveyed a range of twentieth-century atlases and found that, despite covering 20 per cent of the earth's land area, Africa was usually represented by just three maps on a scale of 1:8,250,000. In

contrast the United Kingdom, covering just 0.16 per cent of the earth's land area, is shown on three maps using a more detailed scale of at least 1:1,250,000.[37] Such inequalities were summarized in the Brandt Report (1980), which divided the world between the developed northern hemisphere, covering just over 30 million square kilometres, and the developing southern hemisphere, covering over 62 million square kilometres.

Although the calculation of equal-area was central to the political and mathematical definition of Peters's projection, his *New Cartography* also laid out what he regarded as further requirements of any new map of the world. He dismissed any global projection that adopted curved meridians (of which there were many, both before and after Mercator) by invoking his second decisive quality: fidelity of axis. 'A map has this quality', Peters claimed, 'if all points, which on the globe lie north of any selected reference point, lie exactly vertically above it and all points to its south lie exactly vertically below it.' According to Peters, this quality aids 'orientation' and the accurate imposition of international time zones across its surface. In effect, it meant imposing a uniform rectangular grid of parallels and meridians across the earth's surface, like Mercator's – or his own.

Next came fidelity of position. This, according to Peters, is achieved when 'all points which exist at an equal distance from the equator are portrayed as lying on a line parallel to the equator', a quality that again can only be achieved through a graticule of right-angled parallels and meridians. Fidelity of scale 'reproduces the original (the surface of the globe) with quantifiable accuracy'. Because of his concern with 'absolute fidelity of area', Peters rejected the usual scales (for example, 1:75,000,000), and adopted a scale which, in the case of his projection, was 1 square centimetre to 123,000 square kilometres.[38] Finally came what Peters called 'proportionality'. Any map 'on which the longitudinal distortion along its upper edge is as great (or as small) as along its lower edge' is proportional. His projection certainly complied with this principle, but Peters also admitted that proportionality was required to minimize what was still an inevitable 'degree of distortion', in the transfer of the globe onto any flat map projection of the world. At least, he added with deft understatement, the apparent proportionality of his own map ensured 'an even distribution of errors'.

Each of Peters's other five 'vital' qualities ultimately denigrated rival

projections at the expense of his own. Universality, totality and adaptability emphasize the need for one uninterrupted projection of the world that can be used for a variety of geographical purposes, while 'supplementability' and 'clarity' allowed for a comprehensive perspective of the earth. Most of these categories were aimed at dismissing another group of equal-area world maps, constructed along the lines of so-called 'interrupted' projections. As their name suggests, these maps attempted to minimize distortion by 'interrupting' or dividing the globe up into discrete sections. Peters took as his example J. Paul Goode's equal-area projection, invented in 1923. Goode fused various projections to come up with a map that divided the earth into six peculiarly shaped lobes, which looked like a peeled and flattened orange. It was a sign of the impossibility of achieving both conformality and equivalence of the globe on a flat map that Goode needed to resort to such a contorted and discontinuous shape to come to a closer approximation of the spherical earth in two dimensions.

Peters was quick to point out that such 'interrupted' maps lacked universality, totality or clarity at either a technical or even aesthetic level. Nor could they be easily adapted for more detailed mapping of local regions. For Peters, these projections came closest to challenging Mercator's cartographic dominance because 'they have fidelity of area, but they bought this quality at the price of abandoning important qualities of Mercator's map' such as clarity and supplementability, 'and could therefore not supplant it'. In one deft move, Peters dismissed all earlier map projections, apart from Mercator's, which was ideologically partial in its apparent 'Eurocentrism', and motivated by its inventor 'following the old, naïve practice of placing his homeland in the centre of the map'. Ultimately, the only world map able to achieve what Peters called 'the objectivity necessary in this scientific era'[39] was his own.

Despite these claims about the originality and accuracy of his map, Peters's critics quickly spotted what they regarded as another example of his opportunism and unreliability: his projection was not new at all. It had been invented over a century earlier, by a Scottish evangelical minister, the Reverend James Gall (1808–95), who presented his new map at an address to the British Association for the Advancement of Science (BAAS) in 1855, and labelled it 'Gall's Orthographic Projection'. To all intents and purposes it is identical to Peters's projection, so much so that many cartographers now refer to it as the 'Gall–Peters

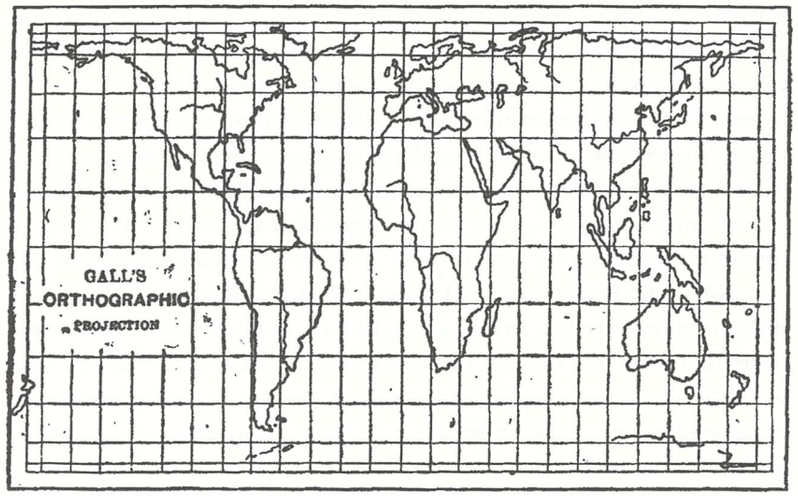


Fig. 37 James Gall, 'Gall's Orthographic Projection', 1885.

Projection'. In fact Gall's projection itself had been previously attributed to Marinus of Tyre (*c.* AD 100) by Ptolemy.

Peters always denied that he knew of Gall's projection, which is surprising considering his immersion in the history of map projections. Gall and Peters had much in common, although the contrasting response to their 'new' projections reveals a great deal about the state of geography in their respective eras. Like Peters, Gall was an amateur cartographer, and a prolific writer. He was a classic Victorian gentleman-scholar: deeply religious, highly learned, passionate about social welfare and slightly eccentric. His publications ranged from religion to education and social welfare; they included books on a triangular alphabet for the blind and *The Primeval Man Unveiled* (1871), in which he claimed that Satan and his demons were a pre-Adamic race of men who lived on the earth prior to Creation. His books on astronomy were particularly popular, and included the *People's Atlas of the Stars*, and *An Easy Guide to the Constellations* (1866).

It was this last book that led Gall to invent his new map projection. In trying to find a suitable method for depicting the stars, Gall realized that by 'representing only one constellation in each diagram', he was 'able to present it on a large scale, and without appreciable distortion, which could not be done if a large portion of the heavens were mapped on the

same sheet'.[40] In a move that was strikingly reminiscent of the great Renaissance cosmographers, Gall later explained how he transferred his astronomical projection onto a comprehensive vision of the earth below. 'It then occurred to me', he wrote in 1885, 'that the same, or a similar projection, would give a complete map of the world, which had never been done before; and, on drawing a projection with the latitudes rectified at the 45th parallel, I found that the geographical features and comparative areas were conserved to a degree that was very satisfactory.'[41]

Gall's presentation to the BAAS meeting held in Glasgow in September 1855 was entitled 'On Improved Monographic Projections of the World'. Arguing that only cylindrical projections 'can represent the whole world in one diagram', Gall explained that such projections, including Mercator's, inevitably sacrificed some qualities (such as area and orientation) in favour of others. 'The best projection', he concluded, 'is that which will divide the errors, and combine the advantages' of a range of different qualities.[42] With this aim, he proceeded to offer not one but three different world projections – not just the orthographic, but also a stereographic and isographic projection (a variation on the equirectangular projection). Ironically, considering Peters's later adoption of the orthographic projection, Gall concluded that 'the Stereographic is best of all; for although it has none of the perfections of the others, it has fewer faults, and combines all the advantages of the others in harmonious proportions'. However, he still believed that there was a limited place for the orthographic projection. It was, he argued, 'a valuable map for showing the comparative area occupied by different subjects, such as land and water, as well as many other scientific and statistical facts'. He conceded that 'the geographical features are more distorted on this than on any of the others, but they are not distorted so as to be unrecognisable; and so long as that is the case, its advantages are not too dearly bought'.[43]

Even Gall's map was not the first of its kind. The very first equal-area map of the world on a rectangular projection and based on reproducible mathematical calculations was invented as early as 1772 by the Swiss mathematician Johann Heinrich Lambert. By using the equator as his standard parallel, Lambert produced a map which retained equal-area properties, but suffered serious distortion north and south. Like Gall, Lambert acknowledged the impossibility of producing a world map that was both conformal and equal-area, and went on to produce

a conformal map on a conical projection, to demonstrate the options available between the two methods. Gall appears not to have known of Lambert's projection, but effectively reproduced it with the important modification of two standard parallels either side of the poles.[44]

Unlike Peters, Gall did not receive immediate condemnation for the unreliability or duplication of his new projection. There were several reasons for this. Gall disseminated his findings within a Victorian institution that was amenable to his goals and philosophy. The BAAS was founded in the same year as the Royal Geographical Society, but with a different purpose. It was a more peripatetic organization, which held meetings in provincial cities across the country which were designed to educate and enlighten middle-class laymen in the practical application of science for the betterment of Victorian society.[45] Queen Victoria's husband, Albert, the Prince Consort, was an honorary member, and its speakers included such luminaries as Charles Darwin, Charles Babbage and David Livingstone. Rather than challenging the moral and intellectual ethos of Victorian society, Gall was energetically involved in delineating it by his talks and publications on religion, education and science. He acknowledged that his projections were limited, and never claimed they could play a part in anyone's moral improvement. Reflecting on their impact in an article written thirty years later, Gall could have been addressing Peters when he observed that 'it is always difficult to introduce changes when long established custom has created a rut'. He also confessed sadly that over the subsequent twenty years 'I was the only person that used them'.[46] This, of course, was not a fate which befell Peters's projection.

For many of Peters's critics, the fact that his 'new' projection was almost identical to Gall's was at best poor scholarship; at worst it betrayed an opportunistic plagiarism. Placed alongside Gall's more modest claims for the significance of his orthographic projection, and his wider understanding of the partiality of all projections, Peters's claims for the radical and universal status of his projection look ridiculously inflated. But it also revealed the gulf that had opened up between professional and public perceptions of mapmaking between the 1850s and the 1970s. While Gall was broadly in step with the aims of the Victorian institutions that disseminated his ideas, Peters represented a direct challenge to the late twentieth-century cartographic profession and the ideological imperatives which he believed underpinned it.

By the end of the 1970s, the battle lines were clearly drawn. On one side, the cartographic profession and its institutions closed ranks to condemn Peters's projection at a technical level, according to its own rules and methods of mapmaking. On the other, political and aid organizations embraced the projection's explicitly social and ideological aims. While these organizations were understandably reluctant to engage in the debate over the projection's technical mistakes, the cartographic profession was equally unwilling to acknowledge Peters's insistence that all world maps (apart from his own) are partial and predisposed to subjective, ideological interests. The problem was compounded by the silence of many of Peters's critics about their own vested institutional interests. Although Arthur Robinson's technical criticisms of Peters's projection were widely accepted, he failed to acknowledge that Peters's world map posed the first serious challenge to his own projection, which in the 1970s was being distributed in atlases worldwide, thanks to US publishers. At the same time, as professional cartographers continued to attack Peters, they began to sound increasingly patrician, portraying the general public as a gullible mass, unable to read maps and see how Peters was deceiving them.

The gulf between Peters's supporters and his detractors was caused by more than just an argument over the mathematical accuracy of map projections. The changing political climate of the 1960s, exemplified by the political protests that took place in France in May 1968, represented among many other things a radical reassessment of the status of the humanities and social sciences within society. While subjects like history and philosophy were leading the way in criticizing established political orthodoxy, others that were deeply embedded in social policy and state organization, like geography, were understandably more reluctant to react to such changes. Standing on the margins of geography, politically active individuals like Peters were able to provide a version of cartography in step with the times, more radical than its leading practitioners, many of whom had vested political and institutional interests in upholding the political status quo.

Peters's rhetoric also chimed with the political debates of the early 1970s. There was a growing political awareness of the need to address inequality in response to the widening economic and political gap between the developed Western world and the developing southern world. In the early 1970s the World Bank estimated that 800 million

people in the developing world were living in absolute poverty, with only 40 per cent in the same region able to secure the most basic necessities of life. The Brandt Report highlighted the gulf between the developed north and the developing south: it demanded that an 'action programme must be launched comprising of emergency and longer-term measures, to assist the poverty belts of Africa and Asia and particularly the least developed countries'. The report's authors had a vested interest in addressing the problem, arguing that 'whatever their differences and however profound, there is a mutuality of interests between North and South. The fate of both is intimately connected.' It called for a wholescale transfer of funds from the former to the latter, representing 0.7 per cent of the GDP of the countries involved, rising to 1 per cent by 2000 (neither figure was met).[47]

The developed north was not without its own problems: the 1970s witnessed a fall in economic growth of nearly 50 per cent from the 1960s, and by the end of the decade the thirty-four developed countries that made up the Organization for Economic Co-operation and Development (OECD) were experiencing inflation, recession and cumulative unemployment of 18 million people. The United States was also experiencing what the economist Paul Krugman has called 'the great divergence' in economic and political inequality. Although average American workers began to double their output, they suffered a simultaneous decline in wages, while the top 0.1 per cent of American society became seven times richer during the course of the second half of the twentieth century. This led to income inequality higher than at any time since the 1920s, which, according to Krugman, has been responsible for the subsequent polarization of American political culture.[48]

Few geographers were equipped to acknowledge these complex but profound levels of global inequality, but Peters was different. Having lived under the iniquities of both Nazism and the Stalinist regime of the German Democratic Republic, he was well placed to voice the rhetoric of inequality, and to propose equality as a virtue. Geography could play a role in tackling inequality, and even expressing its opposite on a map.

The late 1970s also saw a shift in the study of geography and the history of cartography. Philosophers like Gaston Bachelard and Henri Lefebvre had already started to ask basic questions about how we understand and live within space. Bachelard's *Poetics of Space* (first published in French in 1958) alerted readers to how the most intimate phenomena

of spaces – attics, cellars – shaped our lives (as well as our dreams); Lefebvre's *The Production of Space* (1974) took a more Marxist approach to explain how the creation of our public environments helped to enable (or constrain) personal identity. Others soon followed in arguing that space had a history. Within geography and the history of cartography, one of the most important advocates of this new approach was the English scholar J. B. Harley. Having trained in the traditional, positivist approach to mapmaking, and published extensively on the history of the English Ordnance Survey throughout the 1970s, Harley performed a remarkable volte-face in the early 1980s. Having digested the work of Bachelard, Lefebvre and other influential French thinkers including Michel Foucault and Jacques Derrida, Harley published a series of ground-breaking articles which called for a complete reconsideration of the historical role of maps. In one of his most influential articles, published in 1989, entitled 'Deconstructing the Map', Harley voiced his 'frustration with many of the academic cartographers of today, who operate in a tunnel created by their own technologies without reference to the social world'. Claiming that 'maps are too important to be left to cartographers alone', he argued that 'we should encourage an epistemological shift in the way we interpret the nature of cartography'.[49]

Harley claimed that 'from at least the seventeenth century onward, European map-makers and map users have increasingly promoted a standard scientific model of knowledge and cognition'. He went on:

> The object of mapping is to produce a 'correct' relational model of the terrain. Its assumptions are that the objects in the world to be mapped are real and objective, and that they enjoy an existence independent of the cartographer; that their reality can be expressed in mathematical terms; that systematic observation and measurement offer the only route to cartographic truth; and that this truth can be independently verified.

This was indeed the prevailing view of mapmaking, an Enlightenment belief in the transparent, objective reality of the map. As a description of cartographic practice, Harley's account would undoubtedly have been accepted by both Arno Peters and his most vociferous critics.

But Harley went further. He invited his readers to 'pick a printed or manuscript map from the drawer almost at random'. What stands out 'is the unfailing way its text is as much a commentary on the social

structure of a particular nation or place as it is on its topography. The map-maker is often as busy recording the contours of feudalism, the shape of a religious hierarchy, or the steps in the tiers of social class, as the topography of the physical and human landscape.' Harley's contention was not, as many of his critics claimed, that all maps lie, but that they contained historical conventions and social pressures that produced what he called a 'subliminal geometry'.

Coming from such a respected member of the cartographic profession, Harley's arguments for what he would later call 'the new nature of maps' marked a sea-change in the understanding of cartography. The impact on geography's understanding of itself as an academic discipline was soon affected by Harley's work, as it began to reflect on its own historical involvement in the endorsement of the ideologies of nationalism and imperialism.[50] However, practising cartographers still remained sceptical about Harley's adoption of Alfred Korzybski's dictum that 'the map is not the territory'.[51]

Matters came to a head in 1991. Harley had just completed another important article developing his earlier work by asking the question 'Can there be a cartographic ethics?' If maps can never be neutral, and are always subject to power, political authority and ideology, then is it possible for academic and professional cartographers to develop and sustain an ethical position in relation to their work? It was almost inevitable that Harley would invoke the controversy over the Peters projection to prove his point, although the consequences of doing so in this particular article only emphasized the problem he was trying to address. 'The *cause célèbre* of the Peters projection', wrote Harley, 'led to an outburst of polemical righteousness in defence of "professional standards".' Nevertheless, as he went on:

> Ethics demand honesty. The real issue in the Peters case is power: there is no doubt that Peters' agenda was the empowerment of those nations of the world he felt had suffered an historic cartographic discrimination. But equally, for the cartographers, it was their power and 'truth claims' that were at stake. We can see them in a phenomenon well-known to sociologists of science, scrambling to close ranks to defend their established way of representing the world.

What followed was a startling accusation: 'They are still closing ranks. I was invited to publish a version of this paper in the ACSM [American

Congress on Surveying and Mapping] *Bulletin*. After submission I was informed by the editor that my remarks about the Peters projection were at variance with an official ACSM pronouncement on the subject and that it had been decided not to publish my essay!'[52] Nearly two decades after the map's release, the ACSM was still fighting a rearguard action by forbidding discussion of Peters's world map that was anything other than negative.

But Harley was as much concerned with the question of institutional power as with competing claims over cartographic 'accuracy'. The Peters projection *was* inaccurate by any standards: even its own author's account of the history of cartography was highly selective and its claims to objectivity seriously exaggerated. As a cartographic historian Harley understood this, and knew that its longevity was limited. The broader problem that the controversy inspired was how to produce an ethical cartography once the profession accepted that *all* maps were partial and ideological representations of the space they purported to depict.

It is a telling sign of the nature of these debates over Peters that virtually none of those involved seriously discussed the ways in which his world map was understood or used by the many organizations that enthusiastically adopted it throughout the 1970s and 1980s. In a survey in 1987 of forty-two of the United Kingdom's leading national non-governmental organizations (NGOs) working primarily in Third World development issues, the geographer Peter Vujakovic found that twenty-five had adopted the Peters world map. Of this group, fourteen organizations admitted previously using world maps based on Mercator's projection. When asked a series of questions about the use of world maps, nearly 90 per cent of the NGOs who responded agreed that map-making played a vital role in informing the public about Third World issues.[53] Peters's marketing campaign and the political arguments put forward for adopting his world map had apparently achieved remarkable success.

When the fourteen NGOs who adopted the Peters map were questioned more closely on the reasons for their choice, the results were more mixed. Asked to explain what they saw as the map's advantages over others, 48 per cent cited its equal area projection; 36 per cent cited its distinctive appearance, believing that it 'provokes reaction and thought'; 32 per cent cited its rejection of a 'Eurocentric' world view; 24 per cent claimed it provided 'a better representation of the relative

importance of the Third World countries'; and just 4 per cent thought the map was 'a political statement in itself'. When questioned about the map's disadvantages, the responses overwhelmingly fell into two categories: the public's unfamiliarity with the map (32 per cent), and its distortion (32 per cent). It is noticeable that, apart from the map's claims to equal-area representation and a non-Eurocentric perspective, none of Peters's claims for it being a superior map projection are even mentioned. Nobody cited accuracy or objectivity as their reasons for adopting the map.

How then was the map used? Of the NGOs consulted, most admitted to using it as a logo for design purposes in published reports, documents and pamphlets, intending that the image's unfamiliarity would provoke surprise and debate. Others used it for educating people about development issues. This involved using the map to identify the location of overseas projects by selecting limited areas from the larger global projection to create regional maps. In most of these cases, the graticule was removed, making any discussion of scale or proportion (central to Peters's argument) irrelevant. Although such surveys are inevitably selective, they do reflect at least some understanding of Peters's world map by the agencies involved in disseminating it in such vast numbers, but their responses suggest a limited level of cartographic literacy. The Peters world map's ideological claims to enhance the geographical representation of developing countries simply offered a more attractive symbol of the political issues at stake for development agencies than any other cartographic projection currently available. The survey raises a question about the use of world maps, not just today, but throughout history: if mathematical accuracy and cartographic issues such as conformality or equal-area representation are of little interest to groups who use a world map, does anyone within the general public consider such questions in the world maps they use in their everyday lives?

The applications of the Peters projection throw into stark relief the fact that, ever since Ptolemy, individuals and organizations have used world maps for their own symbolic and political ends, regardless of the cartographer's claims to comprehensiveness and objectivity. Such claims have also been subject to appropriation, and used to further the ideological agenda of the map's users, rather than representing an end in their own right. Although modern cartographers may have a better

understanding of the mathematical impossibility of comprehensively projecting the globe onto a flat map, such knowledge continues to make little difference to how people understand and use world maps today.

The release of the Peters projection in 1973 sparked a controversy within the world of cartography that reached far beyond the map's purported accuracy. The projection *was* questionably executed, its claims to accuracy and objectivity were wildly exaggerated, the championing of 'Third World' countries laudable in many ways but ultimately limited, and its attack on Mercator's projection clumsy and misguided. But Peters captured a perceptible shift in Western intellectual culture's understanding of mapmaking, the realization that all maps of the world are inevitably selective, partial representations of the territory they claim to represent, and that such representations are always subject to personal prejudice and political manipulation. The eighteenth-century belief in the ability of mapmaking to offer transparent, rational and scientifically objective images of the world, exemplified by the Cassini surveys, had slowly unravelled from the late nineteenth century onwards, as the political dictates of nationalism, imperialism and a range of ideologies appropriated cartography to produce persuasive but selective maps designed to legitimate their particular political versions of the world. Once dissident thinkers and political activists began to question such maps, it was almost inevitable that a figure like Peters would challenge the established cartographic hegemony. The resulting controversy unwittingly revealed the terminal limits of traditional world mapping and took cartography right to the brink of its next great evolution: the virtual world of online mapping.

Today, the Peters projection is no longer used, but the thematic sections in the *Peters Atlas of the World* (1989) which addressed social and economic issues such as population, economic growth and social issues have been absorbed into most early twenty-first century atlases. In the provocatively entitled *Atlas of the Real World: Mapping the Way We Live* (2008), Daniel Dorling, Mark Newman and Anna Barford dispensed altogether with maps according to physical size, and produced 366 world maps drawn according to demographic issues ranging from population growth to military spending, immigration, infant mortality, endangered species, and deaths from war. Their *Atlas* uses computer software to represent statistical data according to its geographical

distribution on a world map. The cartogram of the world's population in 1500, for example, shows the relative insignificance of the Americas. These cartograms represent many of the issues of today's global world – population, environmentalism, poverty, inequality and conflict – but not one of them attempts to show the world according to either equal area or conformal principles.

The problem with Peters's world map lay not in his technical limitations in drawing a map, but in persisting with the belief that it was still possible to create a more 'accurate' and scientifically objective map of the world. Having convincingly argued that the history of cartography has always explicitly or implicitly reproduced the prevailing cultural values of its time, Peters still clung to the Enlightenment belief that his own world map could transcend such conditions, and be truly objective. In being so wrong, both technically and intellectually, Peters and the controversy that surrounded his projection inadvertently illustrated a deeper truth about mapping the world, that any map of the world is always partial and inherently selective, and that as a result it is inevitably prey to political appropriation. Cartography is still digesting these lessons, not in spite of Arno Peters, but to some extent because of him.

12

Information

Google Earth, 2012

Virtual Orbital Space, 11,000 kilometres above the earth's surface, 2012

From 11,000 kilometres above its surface, the planet earth spins into view out of the black void of deep space. The sun's rays illuminate its surface, which appears free of clouds and water, although its ocean floors still sparkle ultramarine blue, the continents a beguiling patchwork of greens, browns and pinks. North Africa, Europe, the Middle East and central Asia curve round in a crescent through the right-hand half of the globe. The Atlantic Ocean dominates the bottom left, giving way to the tip of North America, with the brilliant white sheet of Greenland nearly crowning the planet's apex, looming over the North Pole. This is a vision of the world as Plato imagined it nearly two and a half thousand years ago in the *Phaedo*, a gleaming, perfect sphere, 'marvellous for its beauty'. It is the *oikoumenē* that Ptolemy projected on his geometrical grid in the second century AD, the globe that Mercator plotted onto a rectangle nearly 500 years ago, and the earth that NASA captured in the first extraterrestrial photograph of the whole planet taken in the last decades of the twentieth century. This is the geographer's ultimate object of study, an image of the whole earth.

But this is not an omniscient fantasy of the earth imagined from some god-like perspective. It is an image of the earth as seen from the home page of Google Earth.[1] Launched in 2005, the application, alongside Google's Maps, is now the world's most popular geospatial application (a combination of geographical data and computer software). In April 2009 Google edged past its mail rival MapQuest.com with just under 40 per cent of the market share of online visits to mapping websites.[2]

Notes

INTRODUCTION

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