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MAPS ARE TERRITORIES

SCIENCE IS AN ATLAS

David Turnbull



Richard Frye

MAPS ARE TERRITORIES

SCIENCE IS AN ATLAS

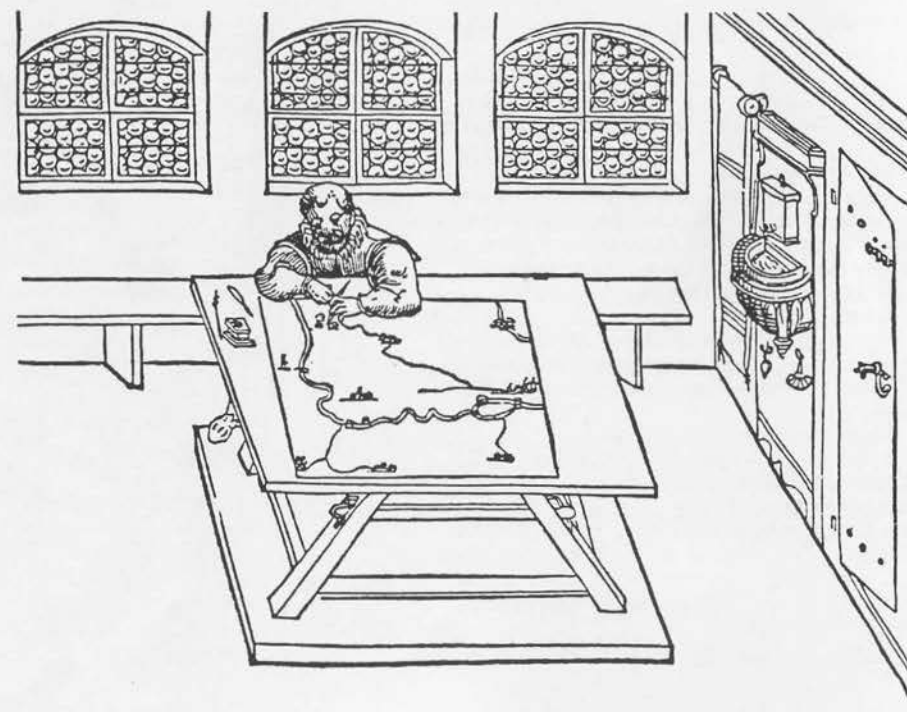
A portfolio of exhibits

David Turnbull

with a contribution
by Helen Watson
with the Yolngu
Community at
Yirrkala

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The University of Chicago Press

This book forms part of the HUS203/204 *Nature and human nature* course offered by the School of Humanities in Deakin University's Open Campus Program. It has been prepared by the HUS203/204 *Nature and human nature* course team.

The course includes:

Imagining nature (Study guide)

Imagining nature, Portfolio 1: *Putting nature in order*

Imagining nature, Portfolio 2: *Imagining landscapes*

Imagining nature, Portfolio 3: *Is seeing believing?*

Imagining nature, Portfolio 4: *Beasts and other illusions*

Imagining nature, Portfolio 5: *Maps are territories:*

science is an atlas

Imagining nature, Portfolio 6: *Singing the land, signing the land*

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Title page

Possibly the earliest woodcut picture of a cartographer at work (Paul Pfintzing, *Methodus geometrica*, Nürnberg, 1598)

LEVANTE.





Geography

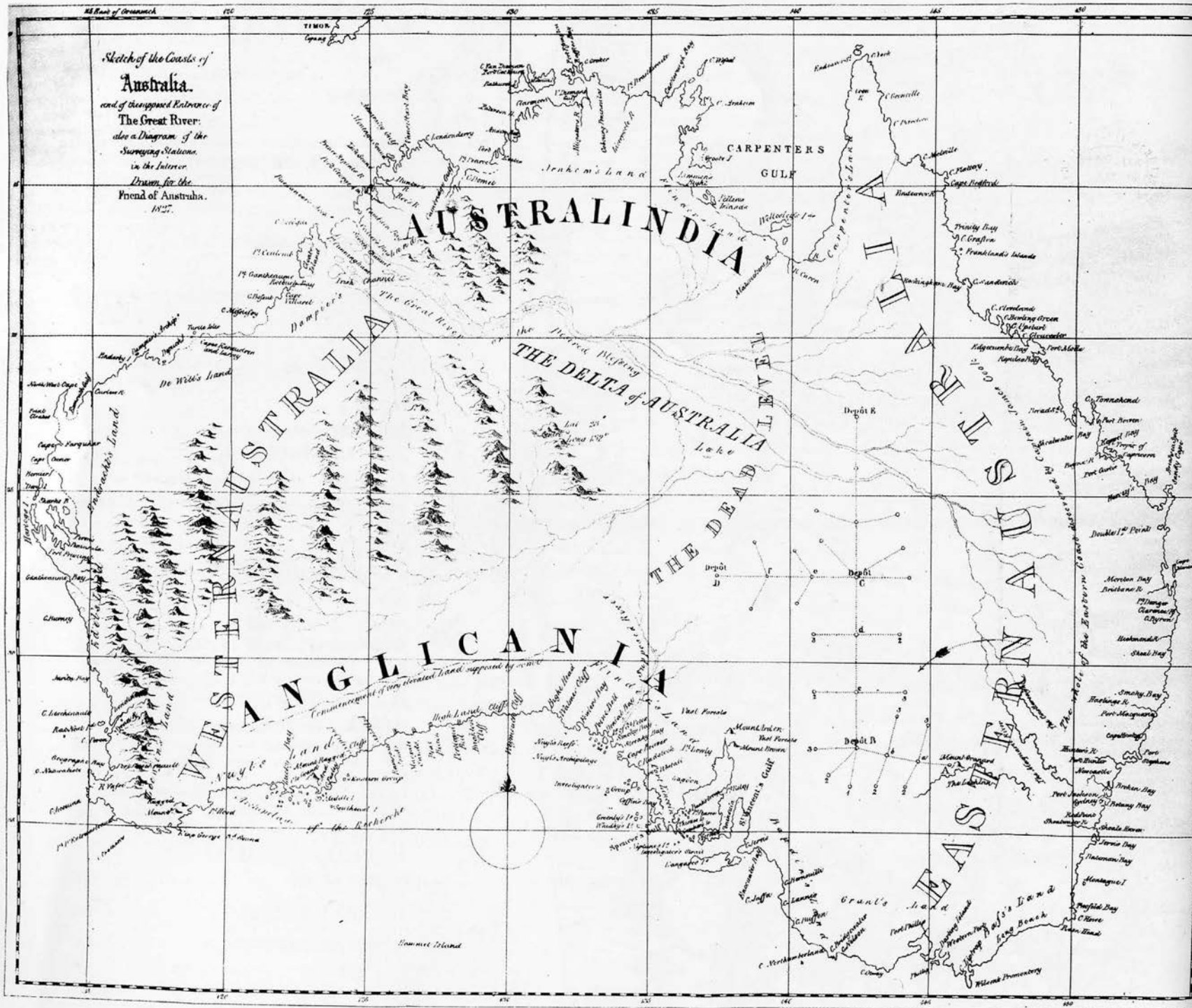
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CONTENTS

PREFACE	v
Exhibit 1 MAPS AND THEORIES	1
Exhibit 2 THE CONVENTIONAL NATURE OF MAPS	5
Exhibit 3 MAPS AND PICTURES	13
Exhibit 4 BRINGING THE WORLD BACK HOME	19
Exhibit 5 ABORIGINAL- AUSTRALIAN MAPS	28
Exhibit 6 THE STORY SO FAR	37
Exhibit 7 THE FUNCTION OF MAPS	41
Exhibit 8 MAPS-A WAY OF ORDERING KNOWLEDGE	48
Exhibit 9 MAPS-A WAY OF ORDERING OUR ENVIRONMENT	50
Exhibit 10 MAPS AND POWER	54
Exhibit 11 MAPS AND THEORIES CONCLUDED	61
FURTHER READING	63
ACKNOWLEDGMENTS	66

◀ Africa with southward orientation. This map, published in Venice in 1556, shows the continent as it would be seen by a seafarer travelling south from

Sketch of the Coasts of
Australia.
and of the supposed Entrance of
The Great River:
also a Diagram of the
Surveying Stations
in the Interior
Drawn for the
Friend of Australia.
1827.



PREFACE

Two years ago, a team of three people—Wade Chambers, David Turnbull and Helen Watson—began a systematic review and critique of the cross-cultural content of the Deakin University Social Studies of Science course materials. In this book, the first of several publications resulting from that collaboration, David Turnbull analyses maps both as a metaphor for knowledge and also as a major means of knowledge representation in a wide array of cultures.

Many of the ideas presented in *Maps are territories* relate directly to other books in the *Imagining nature* series, a list of which may be found on the imprint page. Underlying all books in this series is the conviction that the great nature–culture divide is an illusion, one might almost say, a figment of the Western imagination. In attempting to define our place in the world of nature, we deal not with nature on the one hand and culture on the other but rather with many and various cultural constructions of the natural world. This is really to suggest that nature, in the experience of humanity, is not singular but manifold. Understanding nature, in this larger and more intricate sense, involves close knowledge of relevant cultural traditions.

Like the other books in this series, *Maps are territories* is conceived and structured not as a linear verbal narrative but as a progression of museum or gallery exhibits designed to exercise the skills of visualisation and visual analysis, so essential to any understanding of the basic theoretical issues of perception and cognition. A portfolio rather than a written text, each book stands alone and may be read without reference to the others. However, the full scope of the argument relating to the cultural dimensions of human perception of the natural environment will become clear only if the books are read in close conjunction.

The analysis of the interaction of European and Aboriginal knowledge systems was first articulated by Helen Watson, working as part of a group of Yolngu and non-Aboriginal Australians at Yirrkala in Arnhemland. Throughout this period of course re-evaluation, discussions were held with representatives of the Deakin University Koori Teacher Education Project, who provided funds to help keep the course development project afloat. Both the Koori Teacher Education Project and the Social Studies of Science course team supported the undertaking, with the aim of ensuring that Aboriginal knowledge receive more substantive and serious treatment in the University's curriculum as well as within the general forum of intellectual discussion.

The course team also wishes to thank several people who read and made substantive and useful comments on sections of the *Imagining nature* series: Bruno Latour, John Ziman, Nancy Williams, Barry Butcher, Chris Ryan, John Clendinnen, Kingsley Palmer, Maggie Brady and Andrew Turk.

David Wade Chambers
1989

◀ This map of Australia (1827), relatively accurate in its coastal profile, is filled with imaginary mountain ranges, rivers and deltas. Its place names, grid and topographical assumptions derive from European cultural conventions unrelated to the landscape depicted, a landscape which the Aborigines had already mapped in minute and reliable detail.

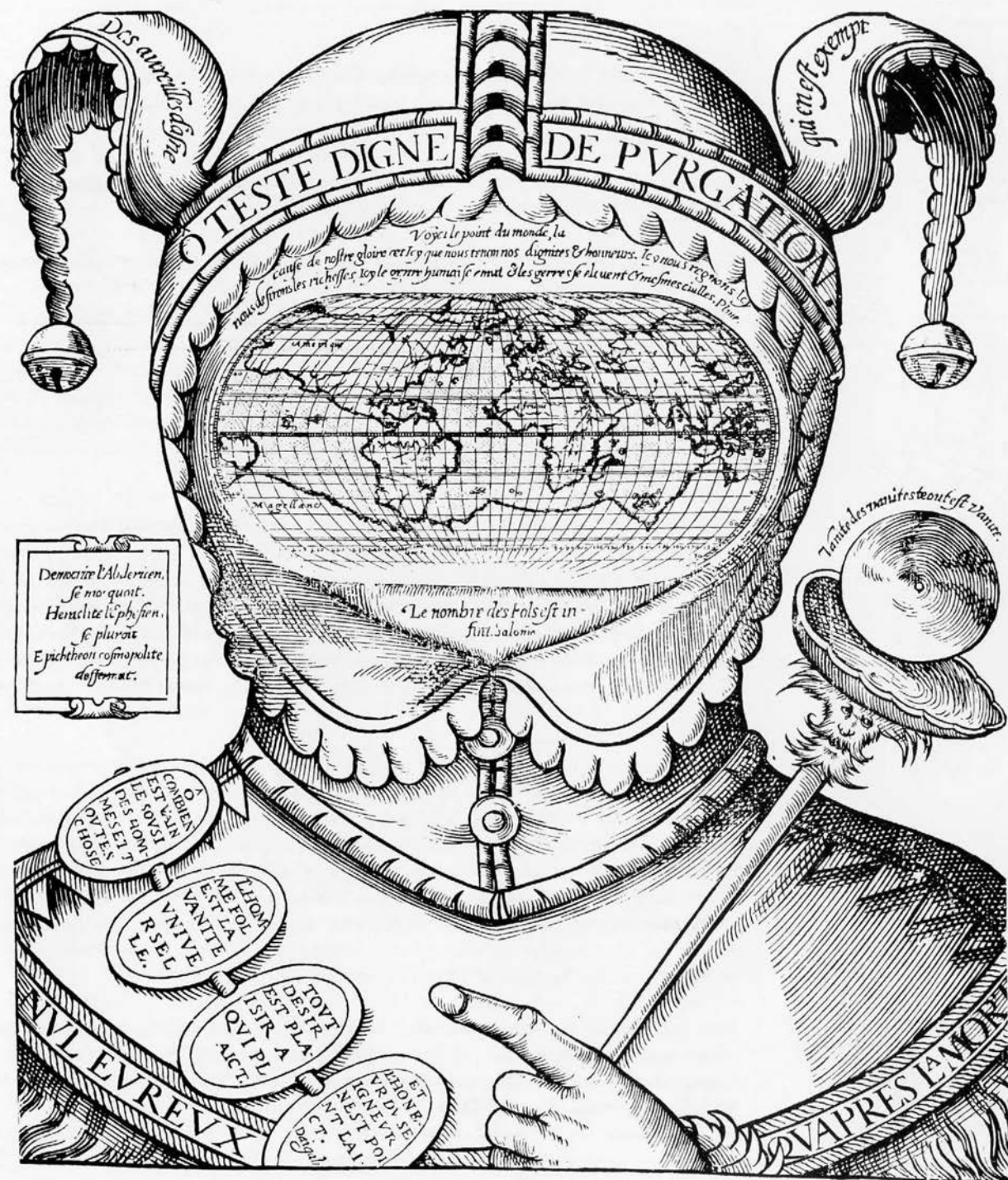


Exhibit 1

MAPS AND THEORIES

... all theory may be regarded as a kind of map extended over space and time.

Michael Polanyi, *Personal knowledge: towards a post-critical philosophy*, 1958, p. 4

[In its role] as a vehicle for scientific theory, [the paradigm] functions by telling the scientist about the entities that nature does and does not contain and about the ways in which those entities behave. That information provides a map whose details are elucidated by mature scientific research. And since nature is too complex and varied to be explored at random, that map is as essential as observation and experiment to science's continuing development. Through the theories they embody, paradigms prove to be constitutive of the research activity. They are also, however, constitutive of science in other respects ... paradigms provide scientists not only with a map but also with some of the directions essential for map-making. In learning a paradigm, the scientist acquires theory, methods, and standards together, usually in an inextricable mixture.

T. S. Kuhn, *Structure of scientific revolutions*, 2nd edn, 1970, p. 109

In these two passages Michael Polanyi and Thomas S. Kuhn equate theories with maps, and they take it for granted that the metaphor is self-explanatory. Indeed, the map metaphor is not only used to describe scientific theories, but is so pervasive that it is also commonly employed to illuminate other basic but ill-defined terms such as 'culture', 'language' and 'the mind' (see ITEM 1.1). Since metaphors play a very important role in science and in all our thinking about the world, we should be alert to the depths of constructed and construable meaning contained within them (see *Putting nature in order*, pp. 54-7). It is particularly important in this instance because there is no clear understanding amongst scientists, philosophers or cartographers as to what either a theory or a map is.

In the exhibits that follow, we shall explore the 'theory as map' metaphor by looking at maps from a range of times, places and cultures. These maps were chosen because they raise, and shed light on, a number of fundamental questions about how humans see and depict the natural world. What are maps and what is their function? What is the difference between a map and a picture? What is the relationship of the map to the landscape it represents? How do you 'read' a map?

But first let us go back to the two quotations above and ask why the map metaphor should be so persuasive and pervasive. According to the Swiss educational psychologist Jean Piaget, spatiality is fundamental to our consciousness and our understanding of experience (J. Piaget & B. Inhelder, *The child's conception of space*, 1967, p. 6ff). Most certainly, spatiality is a central element in almost all our representations of the world. Geographers Arthur H. Robinson and Barbara Bartz Petchenik explain, in the following way, this fundamental role of space in ordering our knowledge of the world:

Books in the *Imagining nature* series are referred to throughout by their titles only.

1.2

Of exactitude in science

... In that Empire, the craft of Cartography attained such Perfection that the Map of a Single province covered the space of an entire City, and the Map of the Empire itself an entire Province. In the course of Time, these Extensive maps were found somehow wanting, and so the College of Cartographers evolved a Map of the Empire that was of the same Scale as the Empire and that coincided with it point for point. Less attentive to the Study of Cartography, succeeding Generations came to judge a map of such Magnitude cumbersome, and, not without Irreverence, they abandoned it to the Rigours of sun and Rain. In the western Deserts, tattered fragments of the Map are still to be found, Sheltering an occasional Beast or beggar; in the whole Nation, no other relic is left of the Discipline of Geography.

From *Travels of praiseworthy men* (1658)
by J. A. Suárez Miranda

(Jorge Luis Borges, *A universal history of infamy*, 1975, p. 131)

As we experience space, and construct representations of it, we know that it will be continuous. Everything is somewhere, and no matter what other characteristics objects do not share, they always share relative location, that is, spatiality; hence the desirability of equating knowledge with space, an intellectual space. This assures an organization and a basis for predictability, which are shared by absolutely everyone. This proposition appears to be so fundamental that apparently it is simply adopted a priori.

A. H. Robinson & B. B. Petchenik, *The nature of maps: essays towards understanding maps and mapping*, 1976, p. 4

Malcolm Lewis, a historical geographer, has made some interesting suggestions about the relationship between language and spatial consciousness:

Unlike the 'here and now' language of the other higher primates, human language began to bind 'events in space and time within a web of logical relations governed by grammar and metaphor'.* Wittgenstein's proposition that 'the limits of my language mean the limits of my world' remains valid.† One could go further and say that the origins of language and the growth of spatial consciousness in man are closely interrelated. The cognitive schema that underlay primitive speech must have had a strong spatial component. Not all messages were spatial in content or manifestation, but many would have been, and these would have helped to provide the structural as well as the functional foundations of language. It has been argued that these foundations helped to promote

the ability to construct with ease sequences of representations of routes and location . . . Once hominids had developed names (or other symbols) for places, individuals, and actions, cognitive maps and strategies would provide a basis for production and comprehension of sequences of these symbols . . . Shared network-like or hierarchical structures, when externalized by sequences of vocalizations or gestures, may thus have provided the structural foundations of language . . . In this way, cognitive maps may have been a major factor in the intellectual evolution of hominids . . . cognitive maps provided the structure necessary to form complex sequences of utterances. Names and plans for their combination then allowed the transmission of symbolic information not only from individual to individual, but also from generation to generation.††

M. Lewis, 'The origins of cartography', 1987, pp. 51-2.

This apparently fundamental role of space in ordering our knowledge and experience raises two different, but related, kinds of difficulties in exploring the nature of maps. Firstly it is difficult to explain the nature of maps without resorting to map-like structures in the explanation. This difficulty is a consequence of the inherent spatiality of maps, the very reason that they are so often employed as a base metaphor for language, frameworks, minds, theories, culture and knowledge. The second difficulty is that while spatiality may indeed be fundamental to all cultures, what actually counts as the 'relative location' of particular objects may not be quite so basic and may constitute one of the variables that differentiate the way cultures experience the world. That is to say, in any culture, what counts as a natural object and its spatial relations, rather than being an invariant characteristic of the world, may instead form part of that culture's world view, episteme, cognitive schema, ontology, call it what you will.

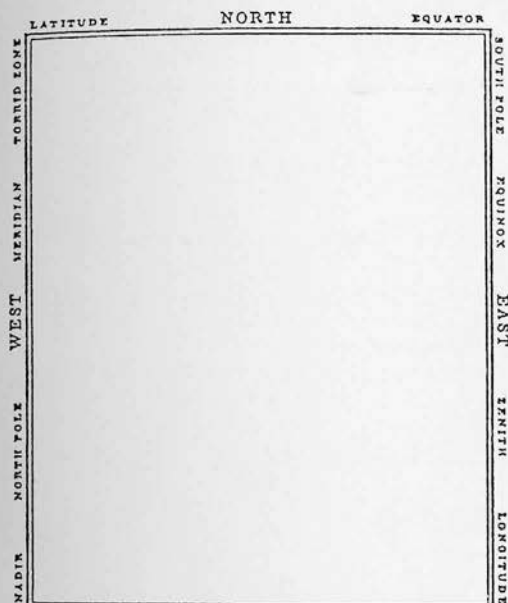
* J. H. Crook, *The evolution of human consciousness*, Clarendon Press, Oxford, 1980, p. 148 (note 8).

† L. Wittgenstein, *Tractatus logico-philosophicus*, tr. D. F. Pears & B. F. McGuinness, Routledge & Kegan Paul, London, 1961, para. 5.6).

†† R. Peters, 'Communication, cognitive mapping and strategy in wolves and hominids', in R. L. Hall & H. S. Sharp, *Wolf and man: evolution in parallel*, Academic Press, New York, 1978, pp. 95-107.

1.3

The Bellman's blank Ocean Chart from Lewis Carroll's *The hunting of the snark*.



Scale of Miles - - - - Ocean chart

The Bellman himself they all praised to the Skies—
Such a carriage, such ease and such grace!
Such solemnity too! One could see he was wise,
The moment one looked in his face!

He had brought a large map representing the sea,
Without the least vestige of land:
And the crew were much pleased when they found
it to be
A map they could all understand.

'What's the good of Mercator's North Poles and
Equators,
Tropics, Zones and Meridian lines?'
So the Bellman would cry; and the crew would
reply,

'They are merely conventional signs!

'Other maps are such shapes, with their islands and
capes!
But we've got our brave captain to thank'
(So the crew would protest) 'that he's brought us the
best—
A perfect and absolute blank!'

Those who are imbued with what is sometimes called 'the Western world view' think of objects as having fixed characteristics and defined boundaries (see *Putting nature in order*, pp. 48–53) and as having a position specifiable by spatial co-ordinates (see *Imagining landscapes*, p. 60). It may well be that Western ontology is in part reinforced by the centrality of maps in Western thinking and culture. Therefore, because of this possible circularity, one must be careful not to take one's own view as definitive of all maps.

There are many notoriously problematic issues, as well as some unexplored ones, bound up in such questions as 'What is the relationship between the map and the territory?' and 'When is a map not a map but a picture?'. Many of these problems are reflected in the apparent cogency of Korzybski's dictum 'The map is not the territory' (*Science and sanity*, 1941, p. 58). After all, if the map were identical with the territory it would literally be the territory. It would have a scale of an inch to the inch and, apart from anything else, it would be unworkable as a map since you would have to be standing on it or in it. Lewis Carroll described such a map in *Sylvie and Bruno concluded*. In this fantasy, a Professor explains how his country's cartographers experimented with ever larger maps until they finally made one with a scale of a mile to a mile. 'It has never been spread out, yet', he says. 'The farmers objected: they said it would cover the whole country, and shut out the sunlight! So now we use the country itself, as its own map, and I assure you it does nearly as well.'

Two general characteristics of maps emerge from such seemingly whimsical examples as Jorge Luis Borges's cartographic empire (see ITEM 1.2) and the Bellman's blank chart (see ITEM 1.3). Firstly, maps are selective: they do not, and cannot, display all there is to know about any given piece of the environment. Secondly, if they are to be maps at all they must directly represent at least some aspects of the landscape.

We may divide the types of representation in maps into two different types: iconic representation (which attempts to directly portray certain visual aspects of the piece of territory in question) and symbolic representation (which utilises purely conventional signs and symbols, like letters, numbers or graphic devices). For example, look at ITEM 6.1 and try to distinguish those elements of the map which are representational (iconic) from those which are entirely reliant on arbitrary convention (symbolic).

J. B. Harley and David Woodward have recently proposed an all-embracing definition of maps: 'Maps are graphic representations that facilitate a spatial understanding of things, concepts, conditions, processes, or events in the human world' (J. B. Harley & D. Woodward (eds), *The history of cartography*, vol. 1, 1987, p. xvi). For our purposes we can take a working definition of a map as a graphic representation of the milieu, containing both pictorial (or iconic) and non-pictorial elements. Such representations may include anything from a few simple lines to highly complex and detailed diagrams.

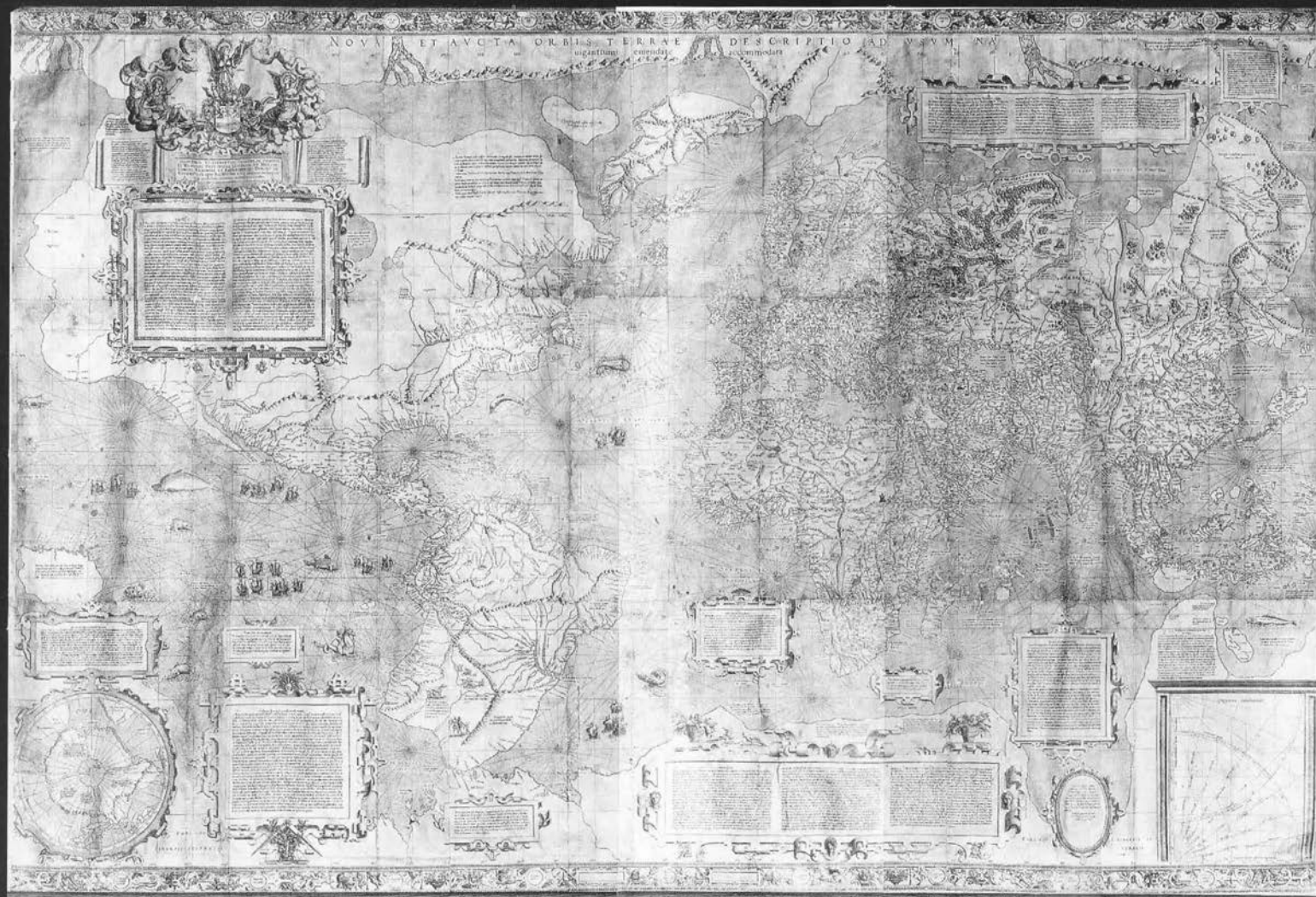


Exhibit 2

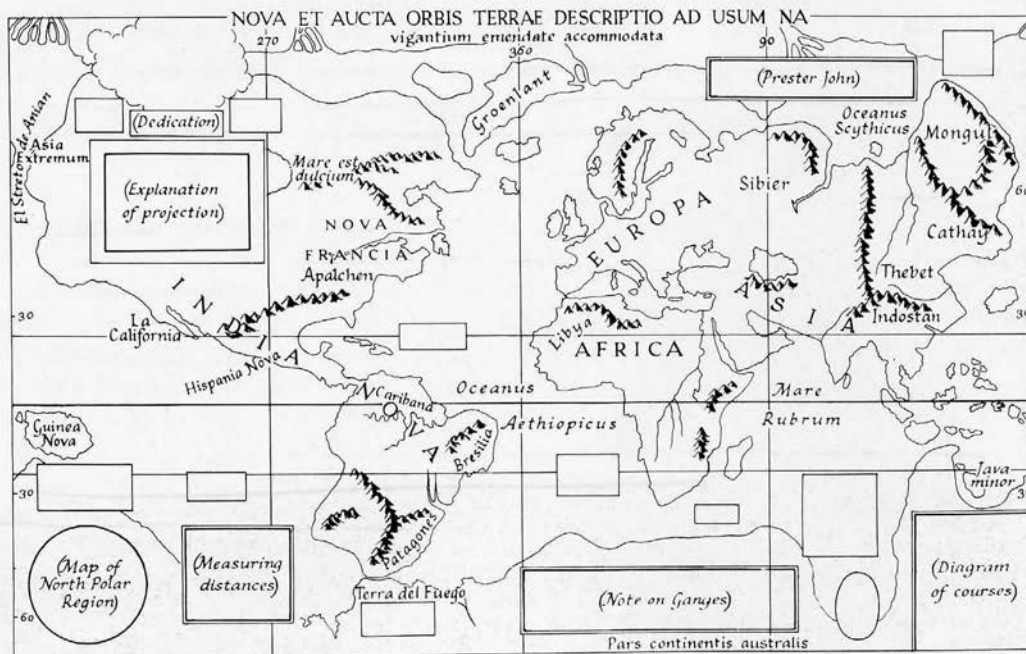
THE CONVENTIONAL NATURE OF MAPS

We said in Exhibit 1 that a map is always selective. In other words, the mapmaker determines what *is*, and equally importantly, what *is not* included in the representation. This is the first important sense in which maps are *conventional*. What is on the map is determined not simply by what is in the environment but also by the human agent that produced it. Furthermore, we saw in Exhibit 1 that maps employ non-iconic signs and symbols. These are as arbitrary as the letters of the alphabet and are therefore largely conventional. Of course, many elements of maps are at least partly iconic, portraying certain visual features of the landscape represented, but even these images partake to a significant degree of the conventions of the artist (see *Imagining nature*, pp. 35–8, and *Beasts and other illusions*, pp. 24–39).

The historian of geology Martin Rudwick has discussed the inherent conventionality of maps in the context of his argument that geology could not become a fully developed science before the development of visual diagrams:

... a geological map ... is a document presented in a visual language; and like any ordinary verbal language this embodies a complex set of tacit rules and conventions that have to be learned by practice. ... [Therefore there also has to be] a social community which tacitly accepts these rules and shares an understanding of these conventions.

Martin Rudwick, 'The emergence of a visual language for geological science, 1760–1840', 1976, p. 151

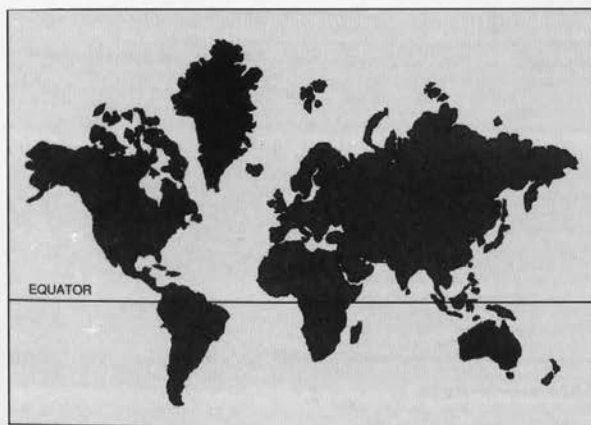
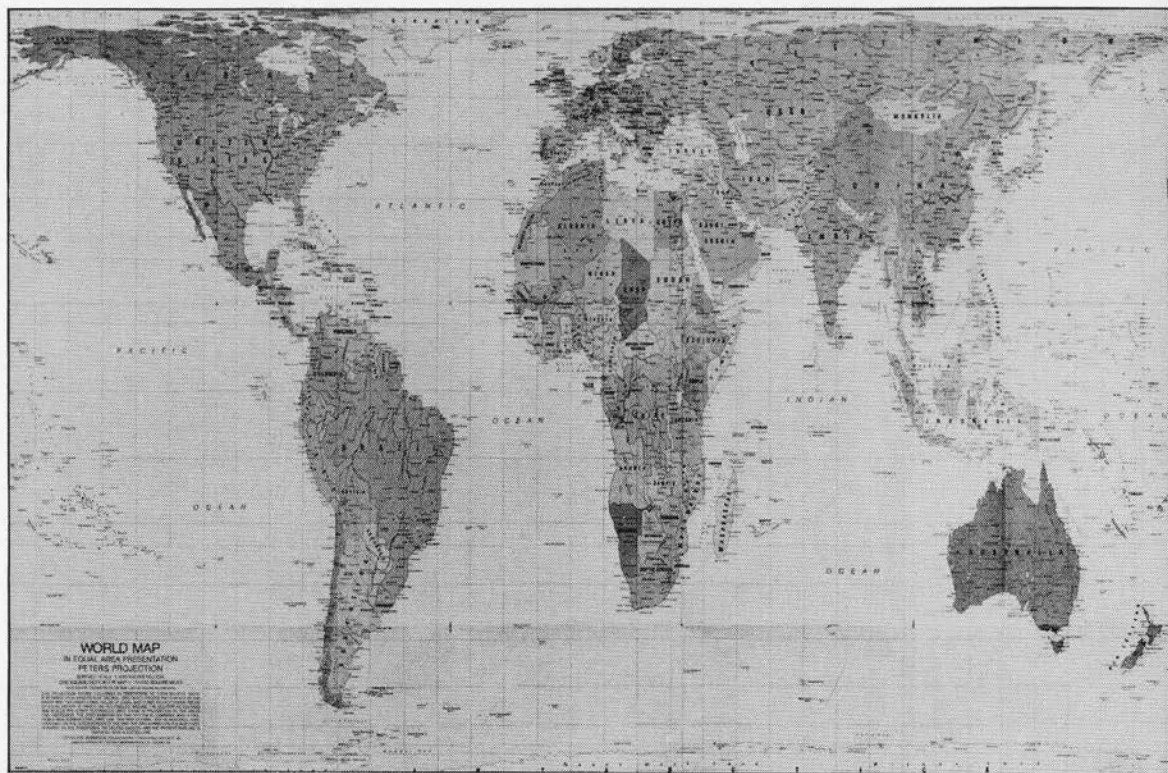


2.1

Mercator's projection maintains compass directions between places as straight lines. This is achieved by making the distance between lines of latitude greater towards the poles and thus introducing considerable distortion of area and shape. The boxed areas indicate that Mercator had an understanding of the epistemological status of a map that differs from our own. Some of the boxes contain more information about how to use the map than we now deem necessary: how to measure distances, for example; and the box in the north-east corner of the map is about Prester John, the mythical king of Africa.

2.2

The Peters projection maintains north-south and east-west directions and preserves the relative size of countries at the expense of shape.



2.3

The distorted area effect of Mercator's projection. The area of Greenland is 2 176 000 square kilometres; the area of Australia is 7 690 000 square kilometres.

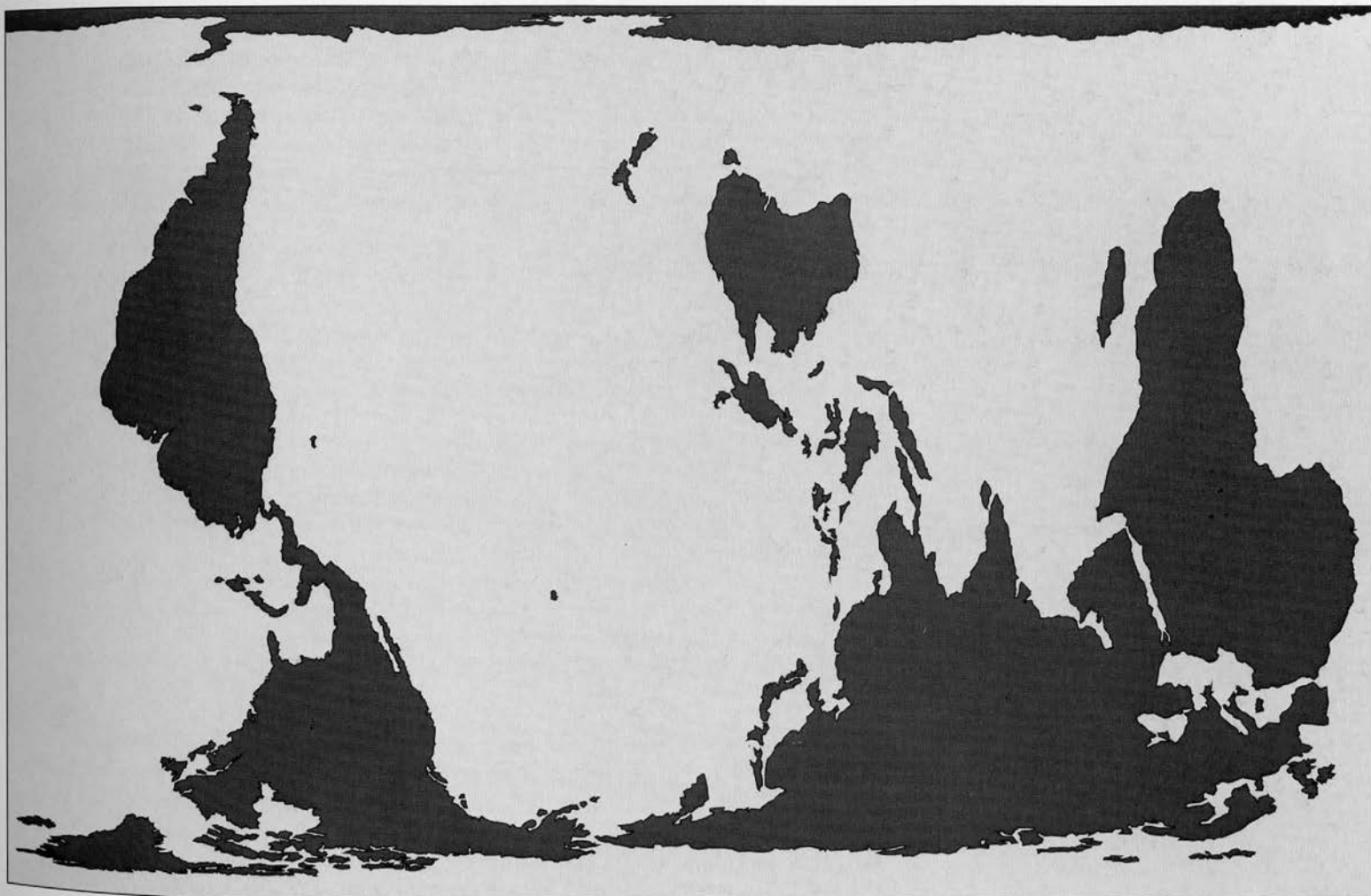
Another obvious way in which maps are conventional is in their use of 'projection'. No curved surface like that of the Earth can be projected in two dimensions without some distortion. Over the years many different modes of projection have been developed: some are better for conveying such elements as shape or size; some, for compass direction or relative position; some are more distorted toward the poles; some, towards the equator. No one projection is the best or the most accurate. A particular projection is selected by the mapmaker on the basis of functional and perhaps aesthetic criteria, or because of a specification or convention.

The projection developed by Gerhard Mercator, a Flemish cartographer, in 1569 became the most commonly used projection because it portrayed compass directions as straight lines. However, this was achieved at the expense of distortion of relative size, especially towards the poles. Mercator's Greenland appears much larger than Australia, which is in reality more than three times the size of that North Atlantic island. But other more

subtle effects result from Mercator's view of the world. If you compare the Mercator projection (ITEM 2.1) with the Peters projection (ITEM 2.2), a map which endeavours to preserve relative size, what differences do you discover which might have cultural or political significance? You may wish to ask yourself what interests are served in a Mercator projection. Is it a coincidence that a map which preserves compass direction (a boon for ocean navigation) shows Britain and Europe (the major sea-going and colonising powers of the past 400 years) as relatively large with respect to most of the colonised nations? (See ITEM 2.3.) What if we turn the Peters projection upside down and centre it on the Pacific? (See ITEM 2.4.) A profoundly altered view of the world is obtained.

2.4

The Peters projection inverted and recentred.





2.5

Africa with south at the top, reflecting the perspective of the explorers of the day (Vesconte Maggiolo, 1512).

Of course, orientation is an arbitrary convention (see ITEM 2.5 and Contents page). Indeed, the very word *orient*-ation comes from 'East' being the direction of the rising sun and hence it was once common practice to put it at the top of the map. North, whilst being one end of the Earth's axis of rotation, is not a privileged direction in space, which after all has no 'up' or 'down'. That North is traditionally 'up' on maps is the result of a historical process, closely connected with the global rise and economic dominance of northern Europe.

Another early example of map orientation reveals several interesting points (see ITEM 2.6). This map, produced less than 100 years after the Spanish conquest of the Inca, was drawn by the Quechua writer Hawk Puma (Guaman Poma) to illustrate his moving account of Spanish misrule of Peru. Because his manuscript was part of a petition to the Spanish monarch, Hawk Puma employed a number of *European* conventions: he called it *Mappamundi*; he put 'North' at the top; he added pictorial elements such as the sun, ships, mountains, buildings in the towns and cartographically familiar sea creatures. The map shows little connection with the sophisticated relief maps which the 17th-century historian Garcilaso de la Vega attributes to the Inca, and it thus appears to avoid Incan cartographic conventions in favour of the European.

To modern eyes, the Hawk Puma map may at first seem fairly 'primitive', bearing, as commentators have suggested, only limited relation to the actual landscape depicted. For example, neighbouring countries seem to be wrongly placed, with the Pacific to the south instead of the west. But what happens if we rotate the map? Suddenly all the geographical relations fall into place. Even the rivers, the Marañon, Amazon and Pilcomayo begin to flow in the right directions again.

The significance of this rotation is much more interesting than a simple factual error. We now see that Hawk Puma's map follows long-standing *Incan* conventions after all. The explanation is historical. When the Inca expanded into Chile, a mountain pass had taken them by way of the great 'Eastern' society of the Collasuyu. Thus, Chile, to the south, came to be considered by the Inca as an *eastern* extension of their empire. Colombia, to the north, for similar reasons was considered a *western* extension. Furthermore, the map centres on Cuzco, the Inca capital, rather than on Lima, the Spanish capital; and its extent approximates the geographical limits of the Incan empire in South America, not the limits of the Spanish Indies, which the map purports to depict.

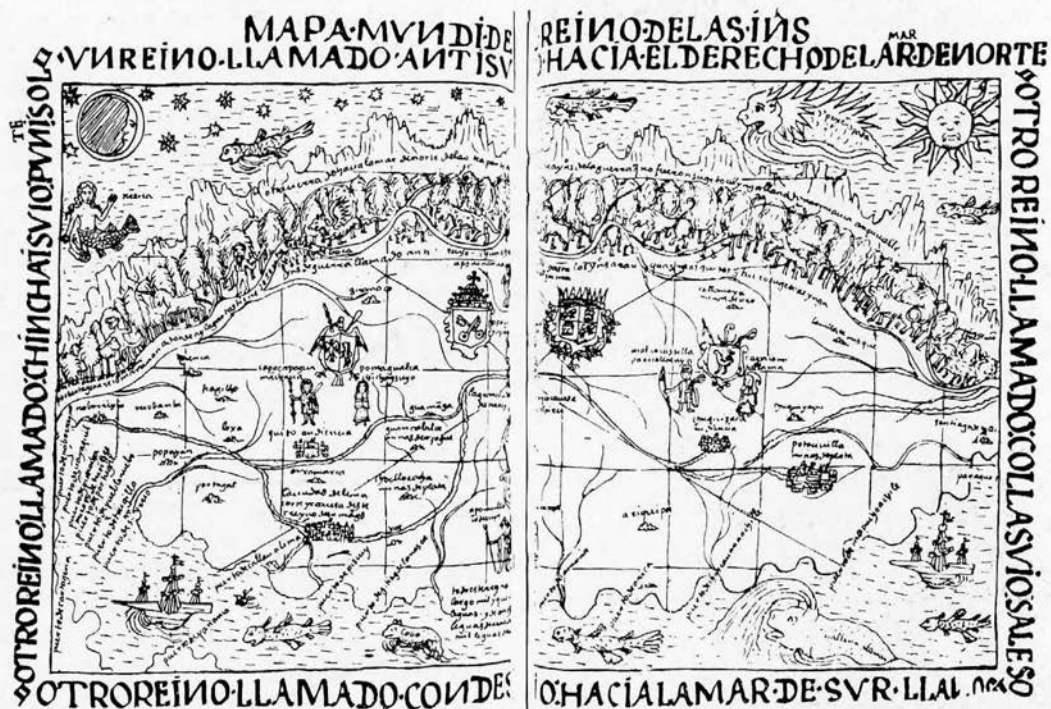
Thus, the story of the Hawk Puma map teaches us that conventions often follow cultural, political and even ideological interests, but that if conventions are to function properly they must be so well accepted as to be almost invisible. The map, if it is to have authority in Western society, must have the appearance of 'artless-ness'; that is, it must appear simply to exhibit the landscape, rather than to describe it with artifice or in accordance with the perceived interests of the mapmaker. For a map to be useful, it

2.6

Hawk Puma's map (1613)



Sketch map of the west coast of South America showing the extent of the Inca empire before the arrival of the Spanish. Also shown are the approximate relations to Cuzco of the four neighbouring cultural groups which are identified on the four sides of Hawk Puma's map. Note that when rotated counterclockwise until the Condesuyu are south of Cuzco, this map approximates Hawk Puma's orientation.

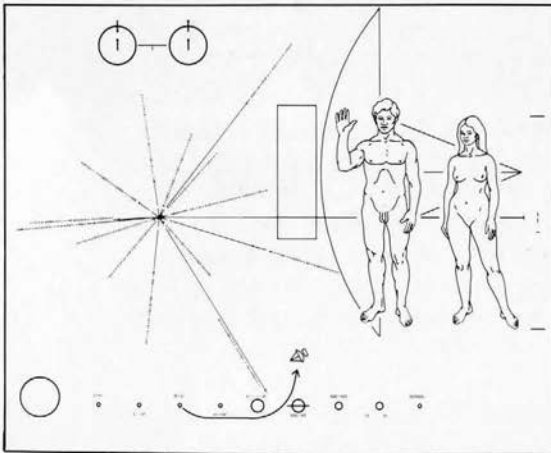


must of course offer information about the real world, but if this 'real world information' is to be credible, it must be transmitted in a code that by Western standards appears neutral, objective and impersonal, unadorned by stylistic device and unmediated by the arbitrary interests of individuals or social groups. (We frequently use maps that are highly stylised though: for example, guide maps to places and institutions.) Hawk Puma's map was almost certainly never seen by the King of Spain, and his petition never read. It may be that this failure resulted at least in part from the visibility of the Incan conventions, which would have been read by the Spanish eye as inaccuracies, thus calling the map's credibility into doubt.

In this regard, maps prove once again an apt metaphor for scientific discourse. Scientific representations of the phenomenal world are, like maps, laden with conventions, which are kept as transparent, as inconspicuous, as possible. This has, in the past generation, been brought home to us through the work of many commentators. Scientists, such as Peter Medawar, have described how scientific papers systematically conceal actual scientific practice ('Is the scientific paper a fraud?', 1963). Philosophers and sociologists of science have pointed out that though we may grant that there is an external material

world, we can gain no direct, unmediated experience of it. This obviously makes for a considerable difficulty. If there is a material world, and we have no direct experience of it, what is the relationship of our representations of the world to that world? Philosophers and sociologists who have taken a constructivist approach hold that rather than accept a split between the world and our experience of it, we should consider our representations of the world as active constructions. On this view, our experience of the world and our representations of it are mutually interdependent, so there is a sense in which the two are inseparable. Or, to put it in its most contentious form, 'the map is the territory'.

An analytic device which may guide us in looking at these complex and contentious issues is Ludwig Wittgenstein's 'forms of life', by which he means that all language, communication and shared experience has to be based in doing, in practical action (L. Wittgenstein, *Philosophical investigations*, 1953, Book 2, xi, p. 226). Steven Shapin and Simon Schaffer define a 'form of life' as the existing scheme of things, the invisible, conventional and self-evident 'patterns of doing things and of organizing men to practical ends' (S. Shapin & S. Schaffer, *Leviathan and the air-pump*, 1985, p. 15), and it is in this sense that we will be using the term. A form of life can be taken as a set of conventional linguistic practices and social structures that are 'given', without which there can be no talk, knowledge or social relations. These 'givens' structure what it is possible to ask and what it is possible to answer. They lay down the criteria for what is to count as knowledge. From this constructivist perspective, knowledge can be seen as a practical, social and linguistic accomplishment, a consequence of the bringing of the material world into the social world by linguistic and practical action.



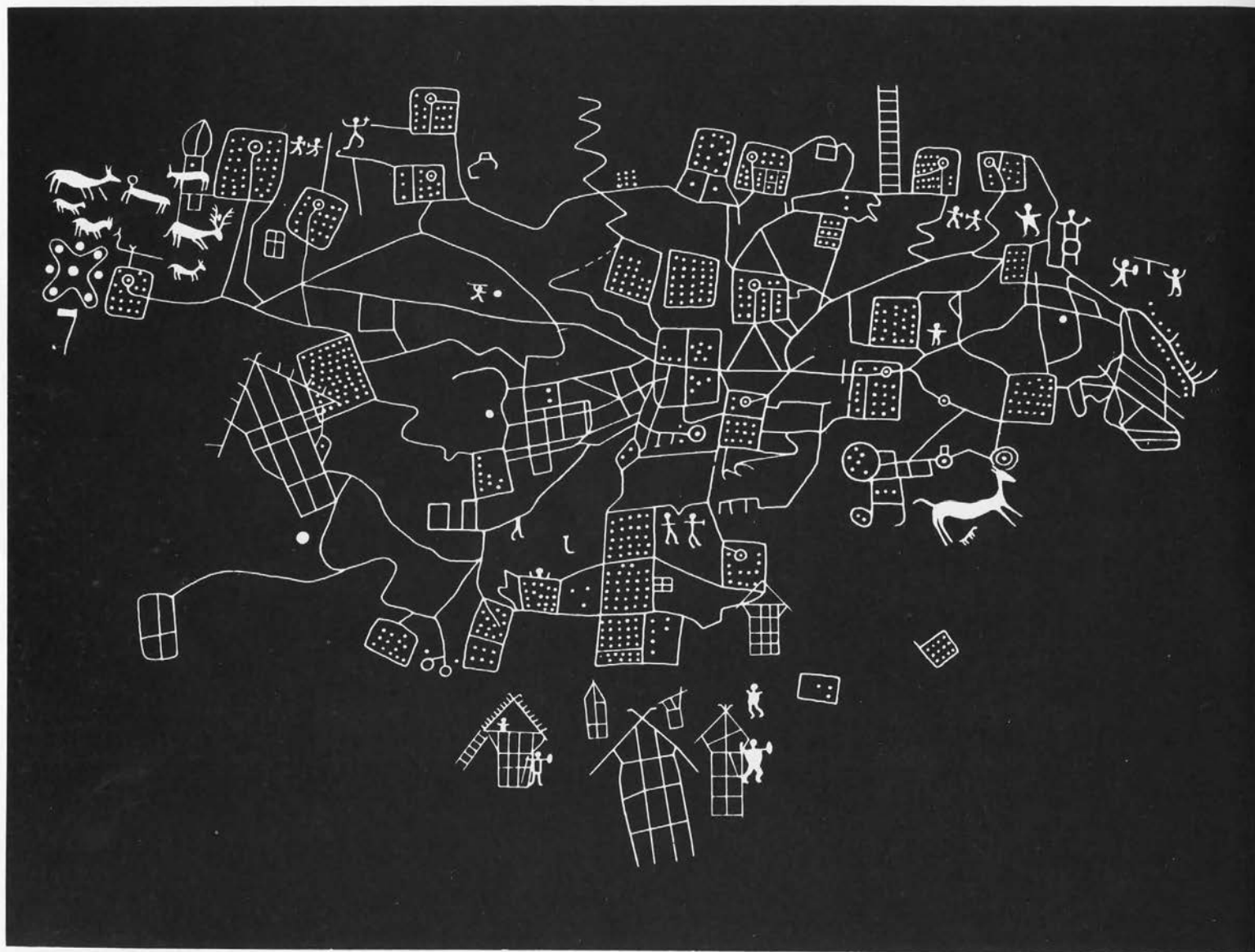
2.7

This metal plaque was designed by the American astronomer Carl Sagan and placed aboard the Pioneer 10 spacecraft currently on its way out of our solar system.

Look at ITEM 2.7, an intergalactic map, devised by the astronomer Carl Sagan, showing humans and their universe. Is the map as culture free as it was intended to be? Can we be sure that any intelligent being from another galaxy could read it? Can one find the 'forms of life' that reside in this representation? Similarly, consider ITEM 2.8, the map of the London Underground. This map varies scale and position in order to display the configuration and interconnections of the rail network. It is designed to be useful to all users of the Underground, including members of other than European cultures. Does it succeed in this? What 'forms of life' underlie this map? What does it sacrifice? Is there a sense in which it is art?

It is apparent from the above description of forms of life that they are closely related to what Kuhn described earlier as the map-like character of theories. In the words of a philosopher of science who brings maps and forms of life together:

To talk, in the philosophy of science, of theoretical physics falsifying by abstraction, and to ask for the facts and nothing but the facts, is to demand the impossible, like asking for a map to be drawn to no particular projection and having no particular



3.1
Bedolina petroglyph, Valcamonica.

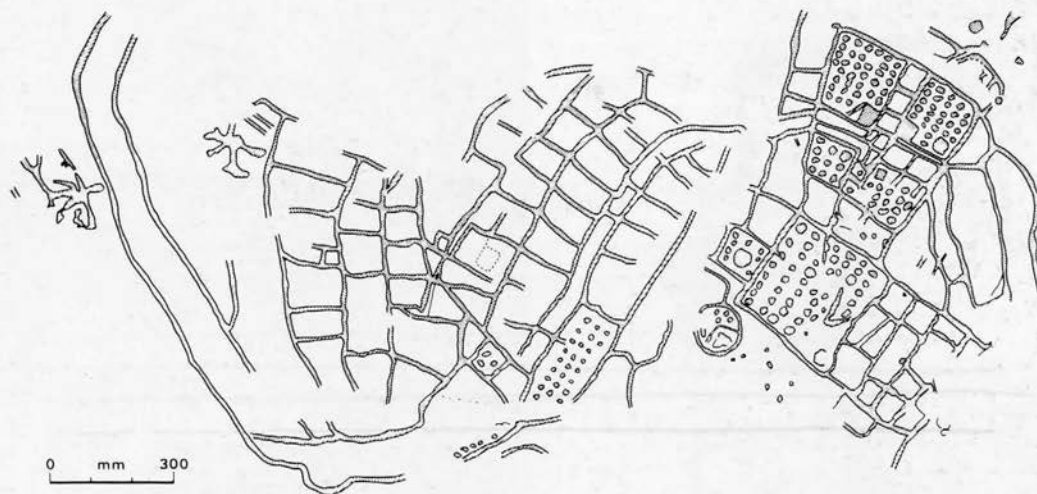
Exhibit 3 MAPS AND PICTURES

Before we attempt to discuss the difference between maps and pictures, we need to look again at the question 'What is a map?'. It is claimed that the Bedolina and Giadighe petroglyphs at Valcamonica (2500 BC) (ITEMS 3.1 and 3.2), and the wall painting at Çatal Hüyük (6200 BC) (ITEM 3.3) are amongst the oldest examples of maps. Exactly how old they are is really not important since they are old enough that we have no direct knowledge of the culture in which they were made. What is it that makes it reasonable to claim they are maps? What do we mean when we say they look like maps?

They appear to portray a particular landscape. They have a partly plan-like character, that is, they seem to have a bird's-eye viewpoint. They appear to be only partly iconic, having some symbolic elements with a degree of regularity. We can read the petroglyphs as showing paths, fields, houses and people. Beyond this it is difficult to speculate, since we have no clue as to the purposes of those who drew them. The question of purpose seems crucial, because we would be less willing to call them maps if they clearly had a pictorial, religious, ritual, symbolic or magical function. Yet these different functions need not be incompatible.

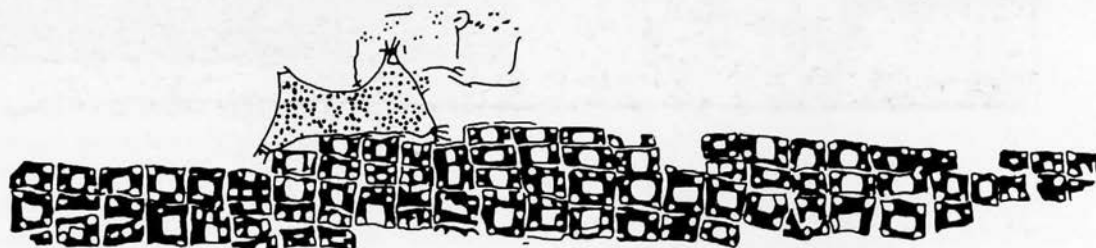
3.2

Giadighe petroglyph, Valcamonica.

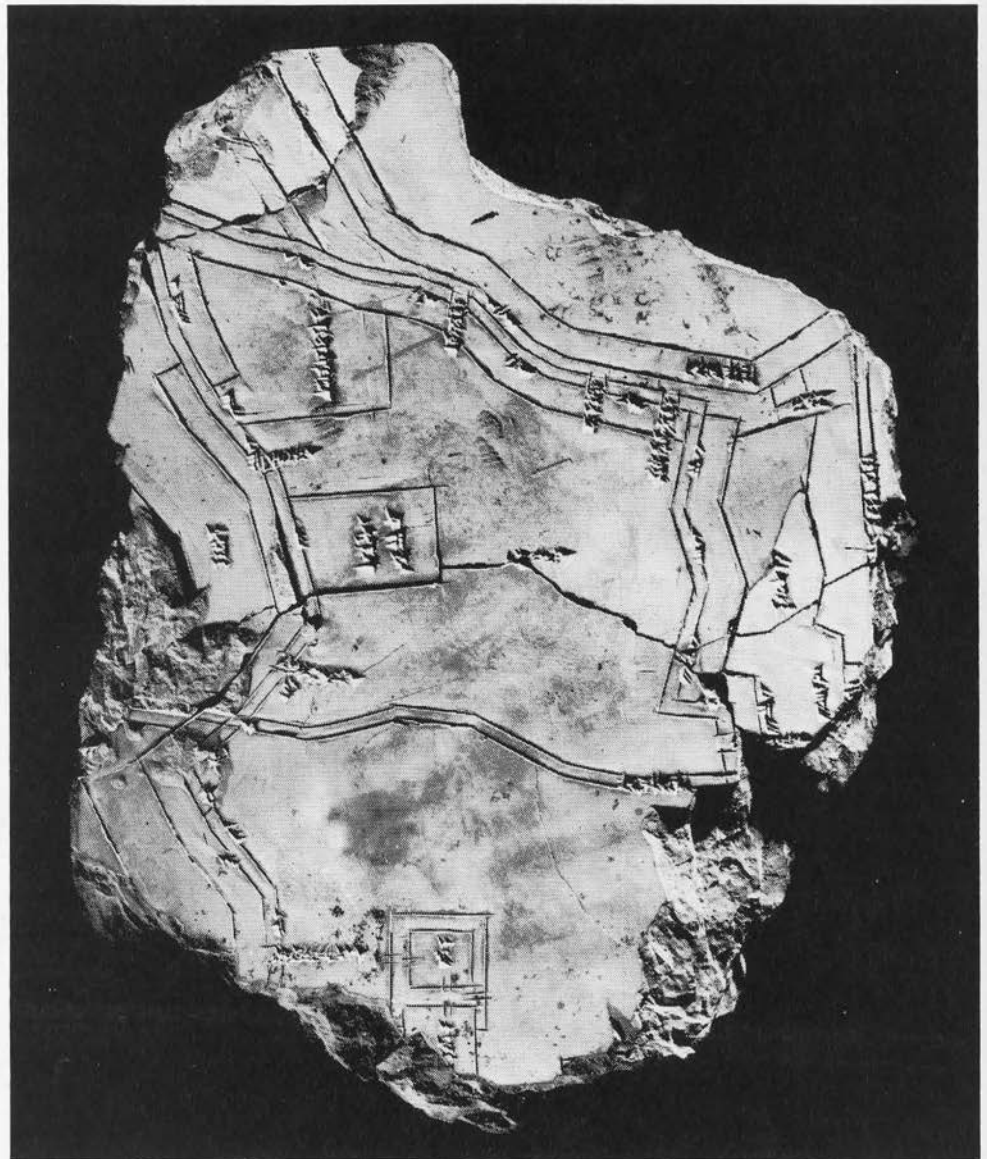
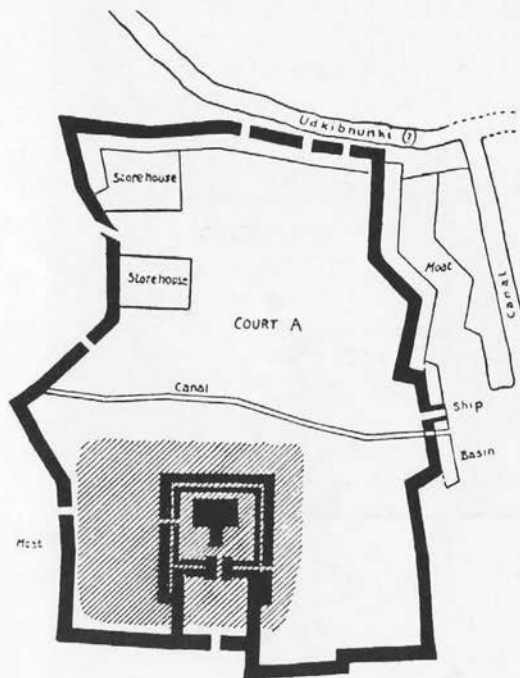


3.3

Wall painting at Çatal Hüyük.



3.4
Nippur plan (1500 BC)



In the case of the two clay tablets from Nippur (1500 BC) and Nuzi (2300 BC) (ITEMS 3.4 and 3.5), though they are of great antiquity, we assume that the cultural continuity and similarities with our own notions of maps are sufficient to identify them as such. They appear to have the clear purpose of representing an identifiable piece of landscape. What features on the tablets would lead to this conclusion?

'What a picture is' is probably one of those deceptively simple questions that philosophy can never answer, but perhaps we can settle on a couple of points. Many pictures are presumably representations of a particular subject or part of the landscape from a particular point of view. The point of view is taken as having at least some significance and may indeed be the dominant aspect of the picture. Whereas maps, though they have a point of view in the sense that they are representations of parts of the landscape, deny or suppress that point of view. This is one of the conventions which we described in Exhibit 2 as 'transparent'. Maps have been thought to be objective in that they are independent of the view of a particular observer. This reveals another of the reasons that theories are held to be analogous to maps:

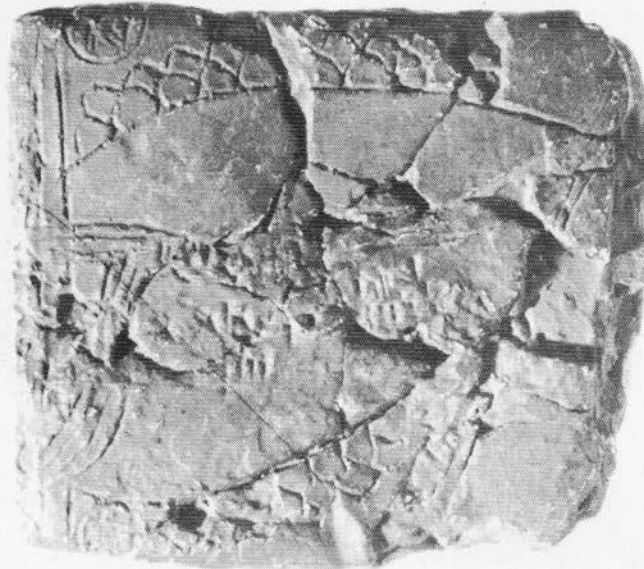
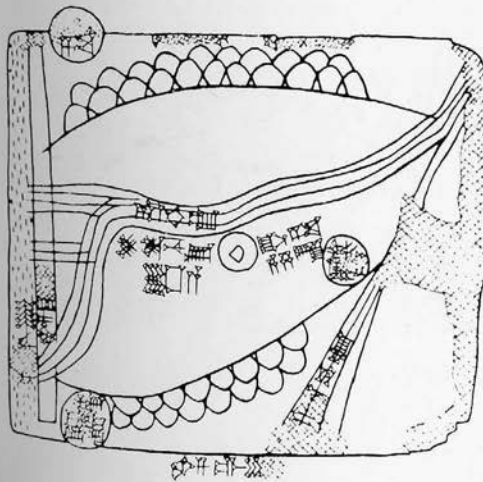
Theoretical understanding is supposed to disengage us. Theoretical understanding is nonperspectival and therefore treats all locations in space or time as theoretically equivalent (it allows no epistemological privilege to any spatiotemporal framework).

Joseph Rouse, *Knowledge and power: toward a political philosophy of science*, 1987, p. 70

However, as we shall see, this notion of maps as non-perspectival representations will not do. It is not just that maps do have a perspective, or that the perspective is taken for granted, it is rather that the disengagement hides the privileging of a particular conceptual scheme. Maps, in this sense, are pictures. They are pictures with different and additional functions and purposes to those of perspectival representation. Pictures may sometimes be entirely subjective, but maps, to be capable of transmitting information, have to be intersubjective.

3.5

Clay tablet from Nuzi (2300 BC)



Look now at three relatively contemporary examples (ITEMS 3.6, 3.7 and 3.8), which are not easily distinguished from pictures and clearly have aesthetic qualities as well as practical ones. What elements in ITEMS 3.6 and 3.7 would you say make them maps, and what elements give them the character of pictures? Is the Leonardo da Vinci example (ITEM 3.8) neither a map nor a picture? Why not? Is it a diagram? What is it about the Enniskillen map (ITEM 3.9) that makes it a rather doubtful example of a map by Western standards?

3.6
Verona, Lake Garda and the Adige valley (mid-15th century).



3.7
Kingsai province south-east China (18th century).

3.8
Plan by Leonardo da Vinci to regulate the river
Arno (1502).



3.9
Siege of Enniskillen (1594).



4.1

Chippewa Indian land claim presented to the US Congress in 1849.

This is the leading inscription, and symbolizes the petition to the President.

No. 1. It commences with the totem of the chief, called Oshcabawis, who headed the party, who is seen to be of the *Ad-ji-jauk*, or Crane clan. To the eye of the bird standing for this chief, the eyes of each of the other totemic animals are directed as denoted by lines, to symbolize *union of views*. The heart of each animal is also connected by lines with the heart of the Crane chief, to denote *unity of feeling and purpose*. If these symbols are successful, they denote that the whole forty-four persons both *see* and *feel* alike—*THAT THEY ARE ONE*.

No. 2, is a warrior, called *Wai-mit-tig-oazh*, of the totem of the Marten. The name signifies literally, He of the wooden Vessel, which is the common designation of a Frenchman, and is supposed to have reference to the first appearance of a ship in the waters of the St. Lawrence.

No. 3. *O-ge-ma-gee-zhig*, is also a warrior of the Marten clan. The name means literally, Sky-Chief.

No. 4, represents a third warrior of the Marten clan. The name of *Muk-o-misud-ains*, is a species of small land tortoise.

No. 5. *O-mush-kose*, or the little Elk, of the Bear totem.

No. 6, *Penai-see*, or the Little Bird of the totem of the *Ne-ban-a-baig*, or Man-fish. This clan represents a myth of the Chippewas, who believe in the existence of a class of animals in the Upper Lakes, called *Ne-ban-a-baig*, partaking of the double natures of a man and a fish—a notion which, except as to the sex, has its analogies in the superstitions of the nations of western Europe, respecting a mermaid.

No. 7. *Na-wa-je-wun*, or the Strong Stream, is a warrior of the *O-was-se-wug*, or Catfish totem.

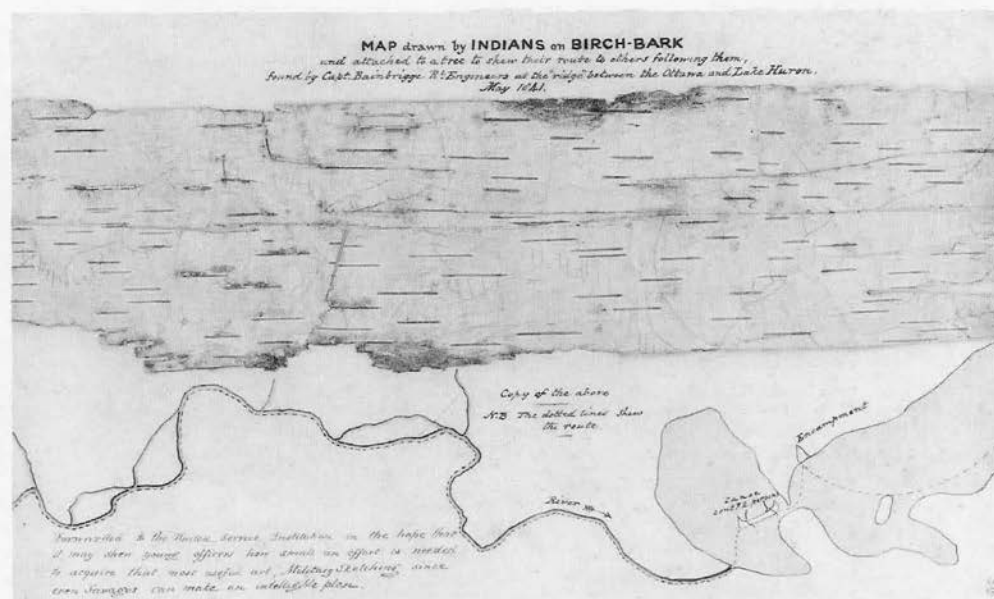
Beside the union of eye to eye, and heart to heart, above depicted, Osh-ca-bawis, as represented by his totem of the Crane, has a line drawn from his eye forward, to denote the course of his journey, and another line drawn backward to the series of small rice lakes, No. 8, the grant of which constitutes the object of the journey. The long parallel lines, No. 10, represent Lake Superior, and the small parallel lines, No. 9, a path leading from some central point on its southern shores to the villages and interior lakes, No. 8, at which place the Indians propose, if this plan be sanctioned, to commence cultivation and the arts of civilized life. The entire object is thus symbolized in a manner which is very clear to the tribes, and to all who have studied the simple elements of this mode of communicating ideas.

(H. R. Schoolcraft, *Historical and statistical information respecting the history, condition and prospects of the Indian tribes of the United States*, part 1, 1851, pp. 416-17)

Exhibit 4 BRINGING THE WORLD BACK HOME

The maps in this exhibit are from societies that were once called 'primitive', and as such they are supposed to stand in marked contrast with technically accurate maps of contemporary Western society. Malcolm Lewis, who has written extensively on American Indian maps, points out that they 'differed from post-Renaissance European maps in two fundamental respects: geometrical structure and the selection and ordering of information content'. European maps have a projective geometry based on a co-ordinate system. Indian maps are topologically structured 'conserving connectivity between the parts but distorting distance, angles and, hence, shape'. European maps have standardised representation, but Indian maps served specific functions in particular contexts (M. Lewis, 'Indian delimitations of primary biogeographic regions', 1987, p. 94).

It is often argued that maps are scientific and that what makes them so is that they embody, as does science, statements that are true, independent of the context in which they are made (for example, $E=MC^2$). Such statements are called non-indexical. Indexical statements are those that are dependent for their truth on their context. For example, the Chippewa Indian land claim presented to Congress in 1849 (ITEM 4.1) is recognisably a map, but the information it conveys can only be understood within the cultural specifics of the circumstances that it portrays and cannot be generalised beyond that context. That so-called 'primitive' maps serve specific functions in particular contexts clearly makes them indexical, though ITEM 4.2 rather ironically shows that context boundaries may be transgressed quite readily on occasions. The temptation is to assume that modern projective maps are non-indexical. This would mean both that the

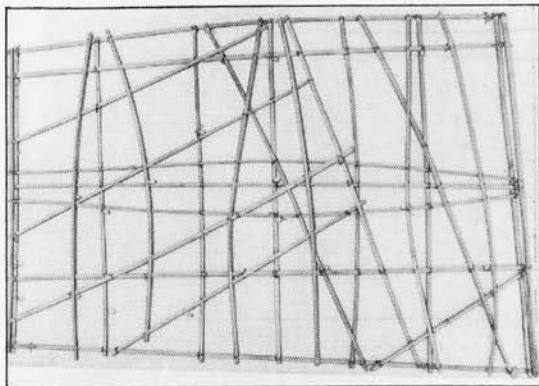


4.2

'Map drawn by Indians on Birch-Bark' (1841). Note the accompanying sketch and note. The note reads: 'Forwarded to the United Service Institution in the hope that it may shew young officers how small an effort is needed to acquire that most useful art, Military Sketching, since even Savages can make an intelligible plan.'

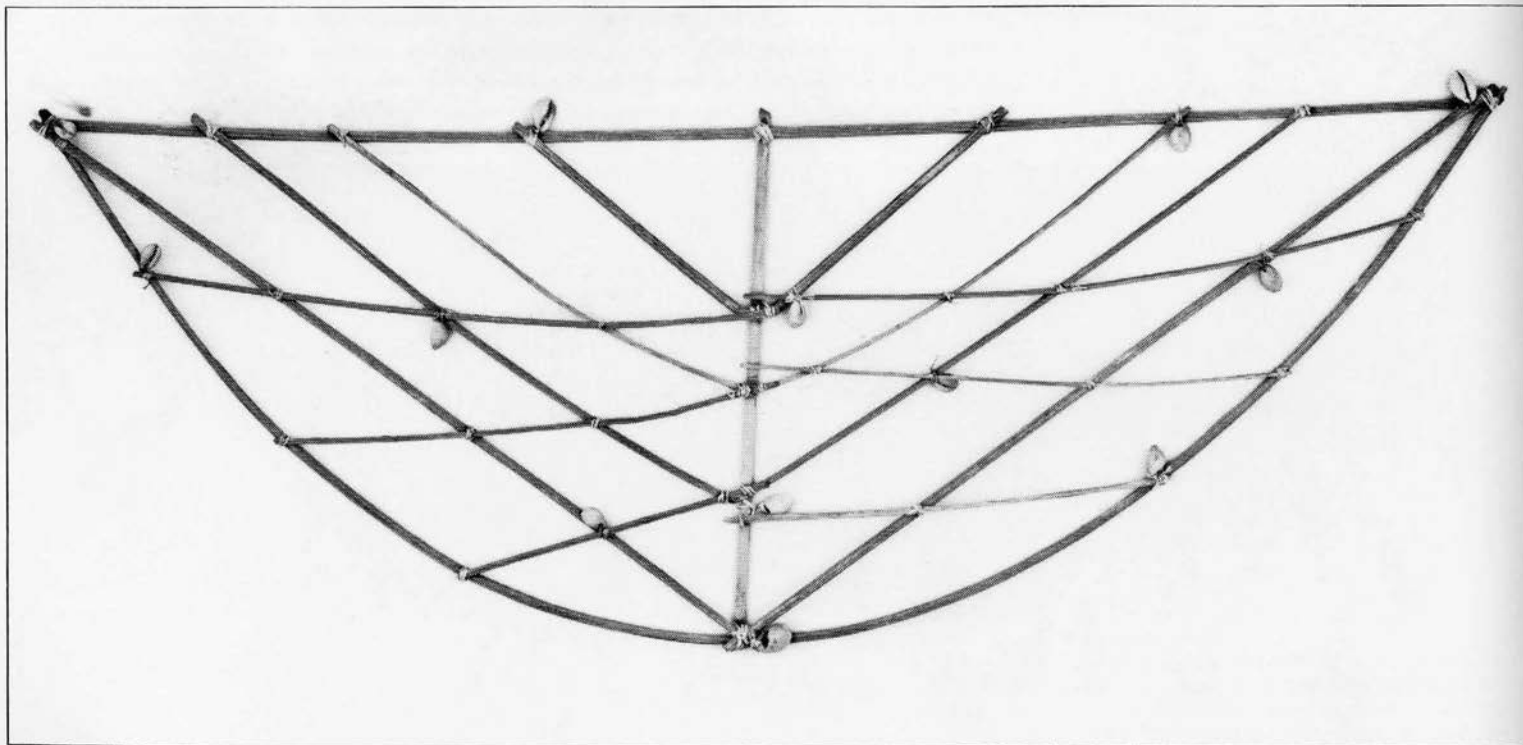
4.3

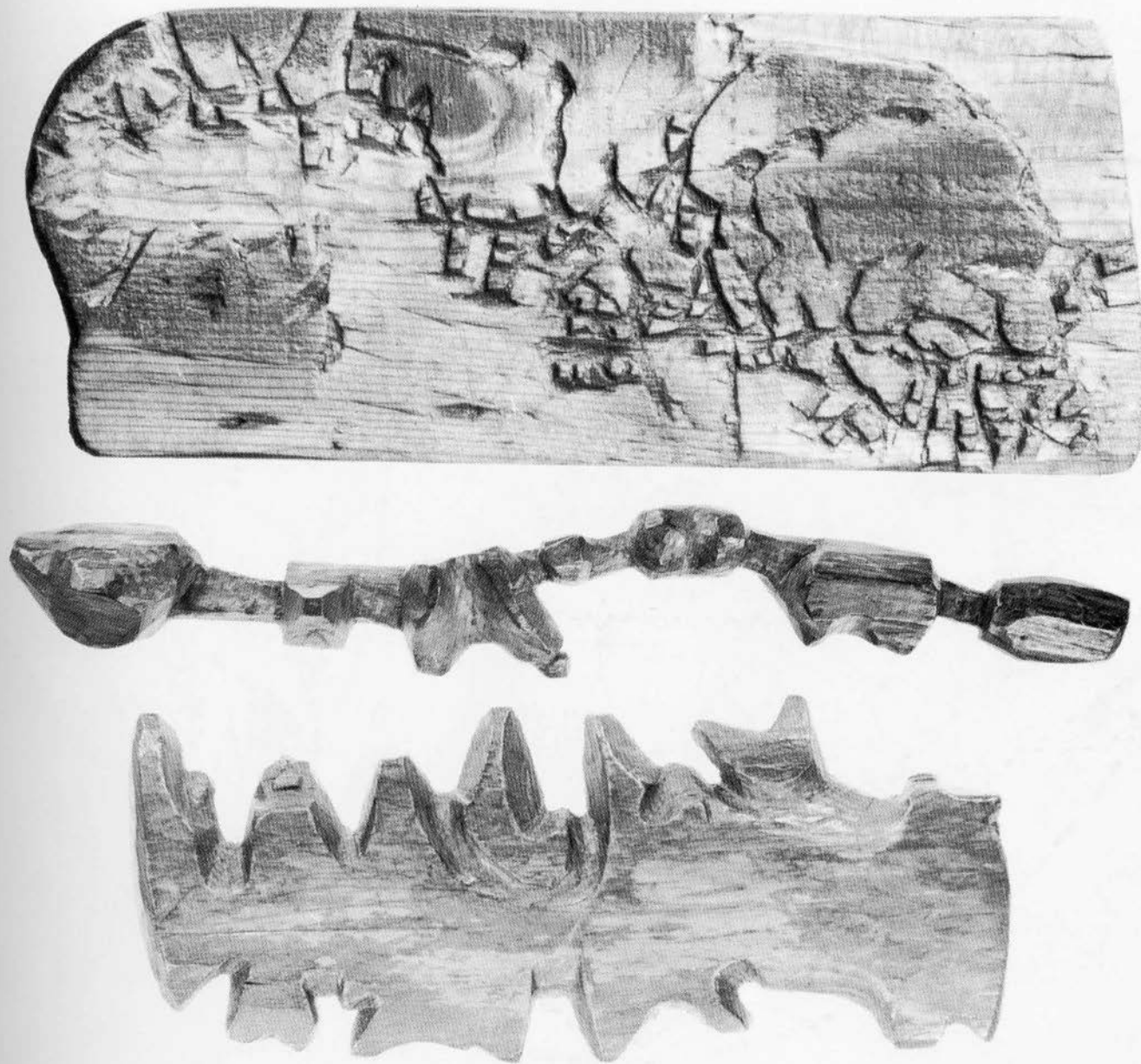
Stick-charts from the Marshall Islands. The shells represent islands, and the sticks represent currents and lines of swell. Such charts were used for instruction in learning to navigate rather than as navigational aids.



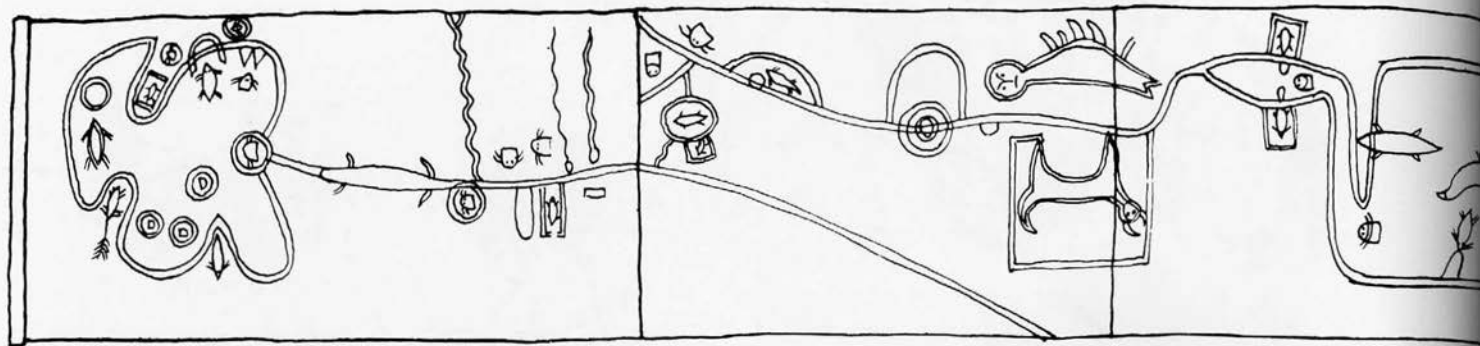
position of objects on such a map could be ascertained without reference to a point of view, and that statements about their position could be read directly off the map, without any exposure to the forms of life in which they are embedded. That is to claim that they could be understood independently of their context of use, the world view, cognitive schema or the culture of the mapmaker. In this exhibit, we suggest that this distinction is overdrawn, and that all maps are in some measure indexical, because no map, representation or theory can be independent of a form of life.

In order to understand why it is that all maps are indexical, let us first consider some examples of early maps: the Marshall Island stick-charts (ITEM 4.3) and the Inuit coastal chart (ITEM 4.4). Without a full understanding of the forms of life in which they are embedded, we cannot read them, though for their makers they provide useful information. Red Sky's migration chart (ITEM 4.5), though distorted and indexical, is clearly readable once we compare it with a Western map (ITEM 4.6). Non Chi Ning Ga's Missouri map (ITEM 4.7) is an American Indian map which differs from a modern map of the same area (ITEM 4.8) only in the details. These examples show that so-called 'primitive' maps are in fact comparable with modern Western maps in many respects.



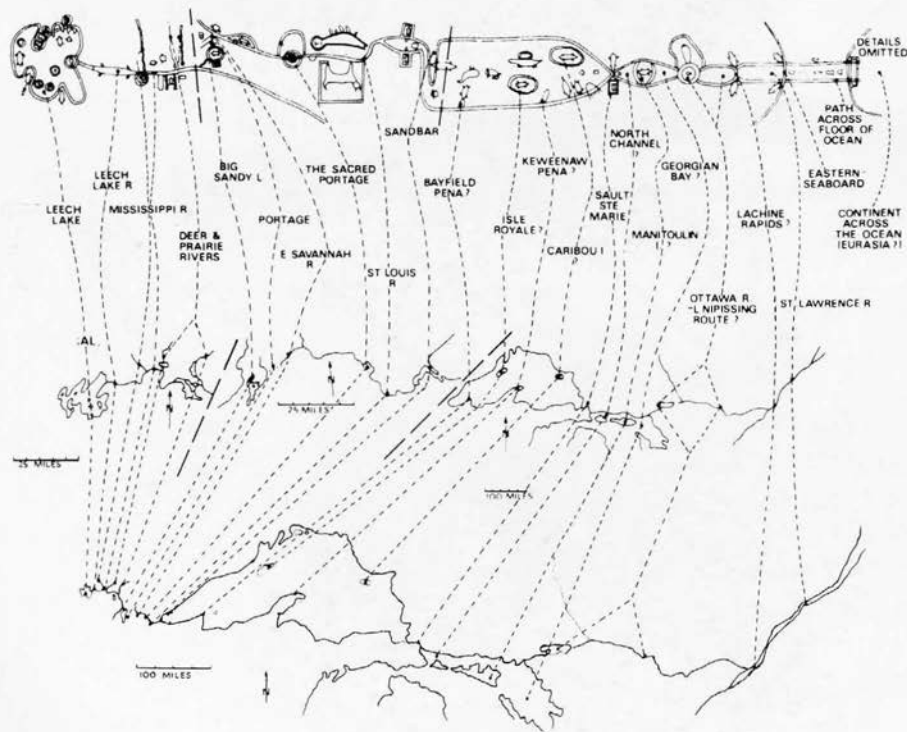
**4.4**

Carved wooden coastal charts carried in their kayaks by Greenland Inuit (Eskimo). The middle two form a single map: the shorter piece represents a stretch of coast and the larger, islands offshore. Both are read continuously along each side.



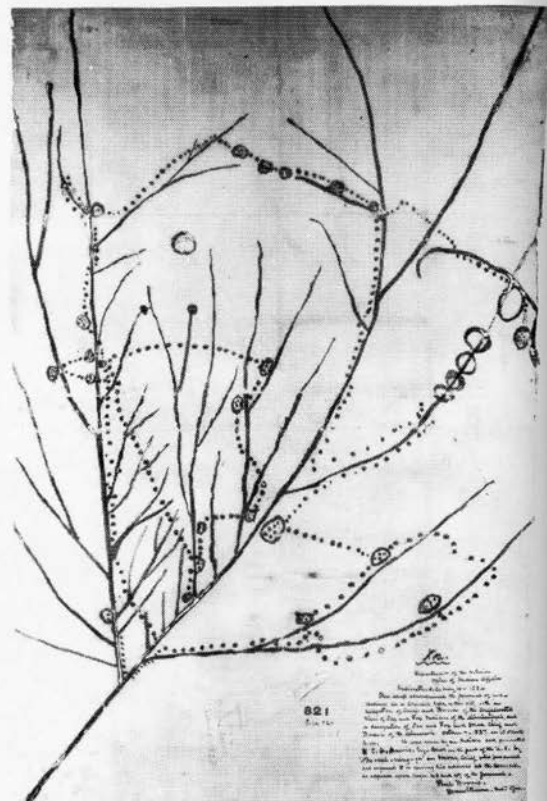
4.5

Red Sky's migration chart drawn on a birchbark scroll 2.6 m long. It portrays the migration of the southern Ojibway Indians in mythical times.



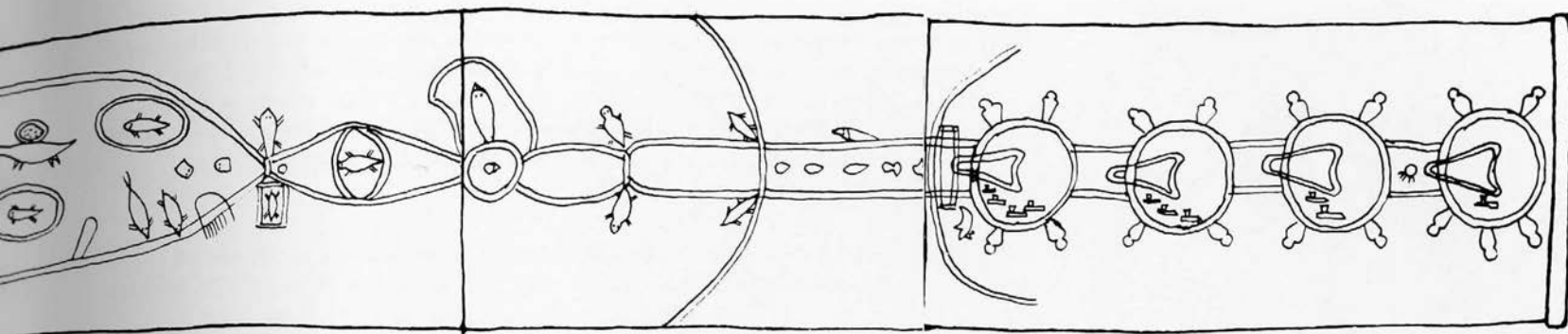
4.6

Contemporary Western geographical interpretation of Red Sky's chart.

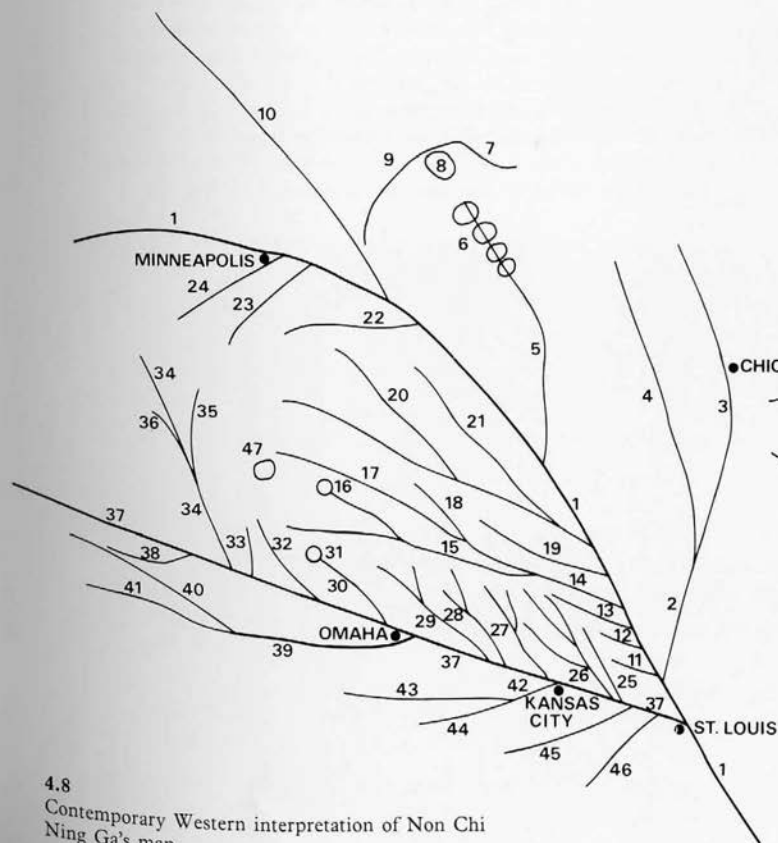


4.7

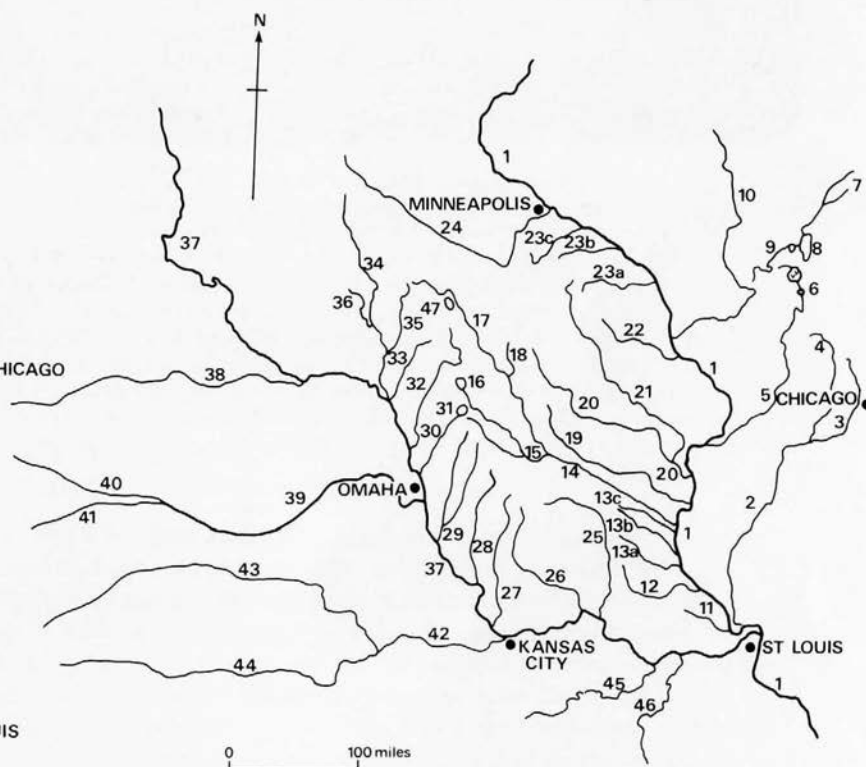
Manuscript map of the upper Mississippi and lower Missouri presented by Non Chi Ning Ga, an Iowa Indian chief, as part of a land claim in Washington, 1837.



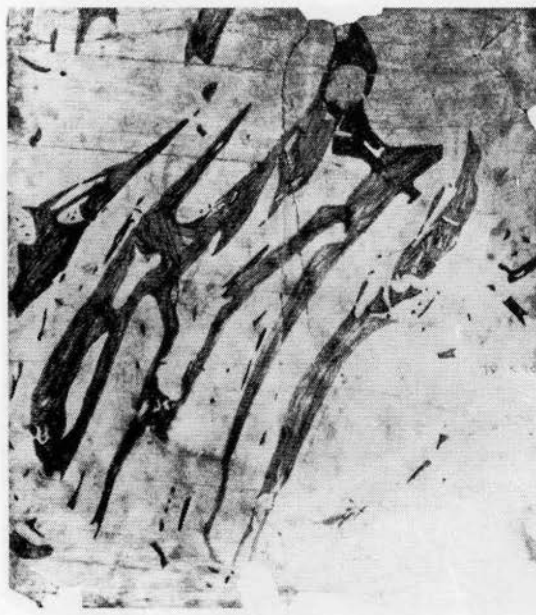
HYDROGRAPHY FROM NON CHI NING GA'S
'MAP' OF 1837



HYDROGRAPHY FROM A MODERN MAP



4.8
Contemporary Western interpretation of Non Chi
Ning Ga's map.

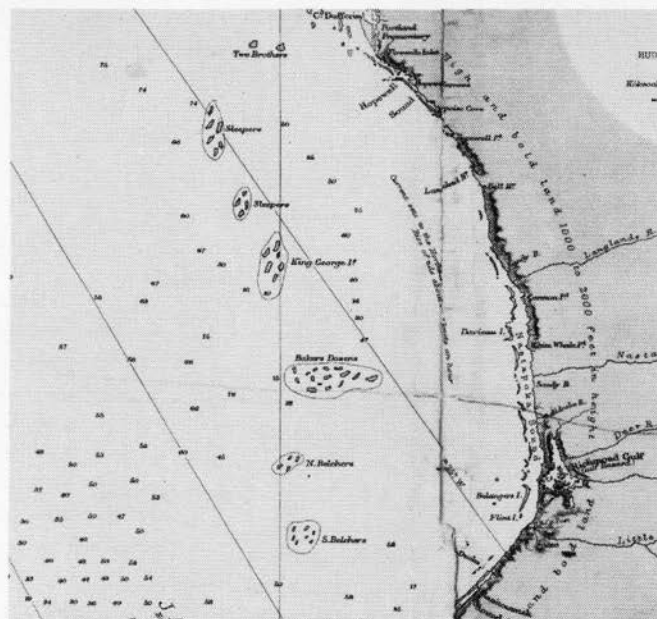


4.9
Pencil drawing of the Belcher Islands by the Inuit
Wetalltok.

The ability of indigenous peoples to draw accurate maps is also shown in the example of Wetalltok's map of the Belcher Islands (ITEM 4.9). White explorers of Hudson's Bay were unsure of the existence of the Belcher Islands and were somewhat sceptical of the Inuit claims about them (see ITEM 4.10). They were put on Western maps merely as a matter of guesswork until Wetalltok drew a map of them in 1895. Eventually Flaherty's expedition in 1912–16 established the accuracy of Wetalltok's map of a very complex bit of topography (see ITEM 4.11).

It would seem, then, that many apparently 'primitive' maps are just as capable of conveying useful information as are Western maps. So let us now return to the question of whether Western maps are non-indexical by examining the way they structure information using a projective geometry based on a co-ordinate system. The introduction of perspective geometry in Renaissance Europe had a revolutionary impact:

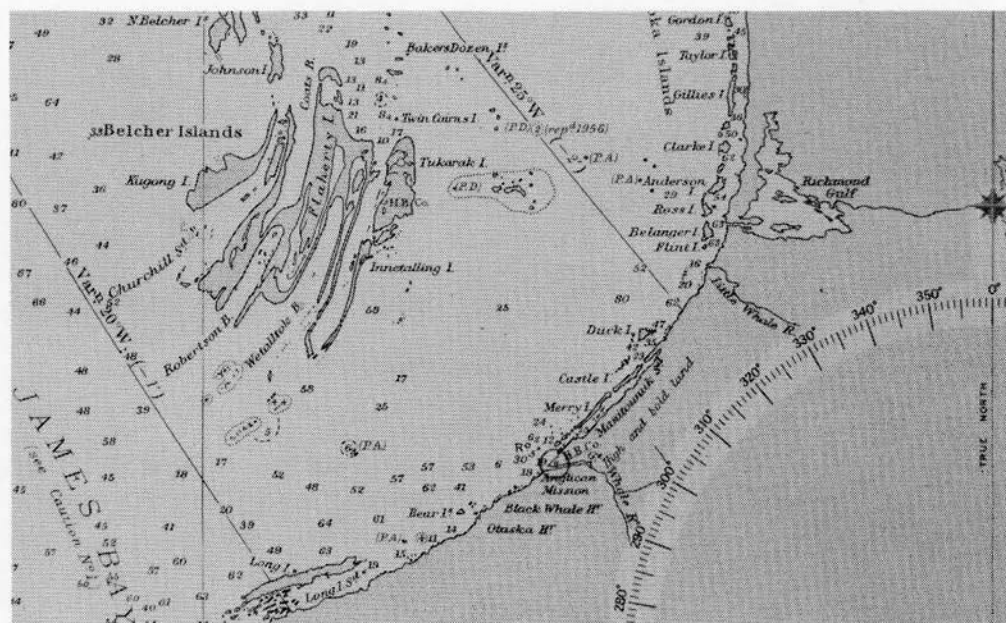
Following the discovery of perspective geometry, the position of man in the cosmos altered. The new technique permitted the world to be measured through proportional comparison. With the aid of the new geometry the relative sizes of different objects could be assessed *at a distance* for the first time. Distant objects could be reproduced with fidelity, or created to exact specifications in any position in space and then manipulated mathematically. The implications were tremendous. Aristotelian thought had endowed all objects with 'essence', an indivisible, incomparable uniqueness. The position of these objects was, therefore, not to be compared with that of other objects, but only with God, who stood at the centre of the universe. Now, at a stroke, the



4.10
Map of Hudson Bay and Belcher Islands before
Flaherty's expedition (1912–16).

4.11

Map of Belcher Islands after Flaherty's expedition, confirming the accuracy of Wetalltok's map.

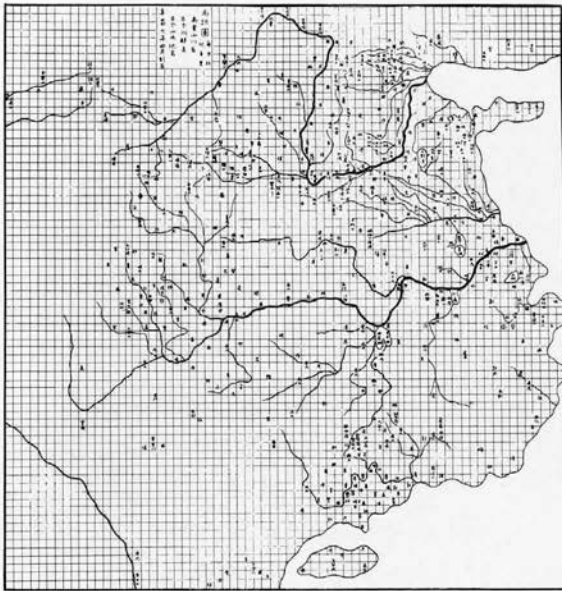


special relationship between God and every separate object was removed, to be replaced by direct human control over objects existing in the same, measurable space.

This control over distance included objects in the sky, where the planets were supposed to roll, intangible and eternal, on their Aristotelian crystal spheres. Now they too might be measured, or even controlled at a distance. Man, with his new geometrical tool, was the measure of all things. The world was now available to standardisation. Everything could be related to the same scale and described in terms of mathematical function instead of merely its philosophical quality. Its activity could also be measured by a common standard, and perhaps be seen to conform to rules other than those of its positional relationship with the rest of nature. There might even be common, standard, measurable laws that governed nature.

James Burke, *The day the universe changed*, 1985, pp. 76-7

It was not until the early 1400s that Ptolemy's *Geographia* arrived in Europe, the same period in which Brunelleschi developed perspective geometry and its application in architecture. The *Geographia* mapped the entire world and presented all the known information in a standardised and consistent way with grid lines of latitude and longitude (see ITEM 7.1). This metrication meant that all points were commensurable: that is, distances and directions could be established between one place and any other. Further, unknown places could be given co-ordinates. It was the synthesis of perspective geometry and Ptolemy's work that enabled the imposition of a grid on the known world. Once that grid was imposed, the mathematician Toscanelli was able to argue plausibly that sailing westwards across the Atlantic was a shorter voyage to the Spice Islands than the traditional route around the Cape of Good Hope and on to the East. Thus



4.12
Chinese grid map drawn on stone, known as 'Map of the tracks of Yu the Great' (1137).

Columbus 'discovered' America even though in 1492 he was convinced that Cuba and Japan were one and the same.

There is of course nothing in reality that corresponds to such a grid; it is a human construct, and hence arbitrary, conventional and culturally variable. Ptolemy (AD 90–168) located his grid by designating the Fortunate Isles (Canary Islands) as the prime meridian, because they were the western extremity of the known world. Spanish and Portuguese cartographers used the Tordesillas line (see ITEM 10.2). The use of grids originated in China, probably with the work of Chang Heng in the 1st century AD. Although none of his mapwork survives, his biographer, Tshai Yung, wrote that he 'cast a network about heaven and earth and reckoned on the basis of it' (R. Temple, *The genius of China*, 1989, p. 30). Subsequently the grid was in continuous use in China, and one of the two early maps inscribed in stone at Sian in 1137 is covered by a well-defined grid (ITEM 4.12). Phei Hsiu, the 3rd-century Chinese cartographer, laid down the use of the grid as one of his six principles of scientific cartography, claiming that 'When the principle of the rectangular grid is properly applied, then the straight and the curved, the near and the far, can conceal nothing of their form from us' (in P. D. A. Harvey, *The history of topographical maps*, 1980, pp. 133–4). The Romans used a grid system called 'centuration' by which they came close to turning 'all Europe into one vast sheet of graph paper' (S. Y. Edgerton, 'From mental matrix to *Mappamundi* to Christian Empire', 1987, p. 22). The British use the National Grid system and in Australia the Australian Map Grid is used.

Even the system of lines of latitude and longitude are conventional: 'At an international conference held in Washington in 1884 it was agreed by many countries that subsequently 0° of longitude would be assumed to pass through Greenwich [England]. This meridian is now widely, though not universally, used for mapmaking' (A. G. Hodgkiss, *Understanding maps*, 1981, p. 30). For a grid system to work it has to be *literally* conventional. Grid systems require real conventions, negotiations and agreements. In order to bring the distant and the large to your table top you need perspective geometry, reproducible and combinable representations, a grid and the agreement of your fellows. The power of maps lies not merely in their accuracy or their correspondence with reality. It lies in their having incorporated a set of conventions that make them combinable in one central place, enabling the accumulation of both power and knowledge at that centre. The significance of Ptolemy's *Geographia* was not just its use of a grid: it was also an atlas which enabled the co-ordination of maps of individual lands into one map of the world. Similarly, the map of China (ITEM 4.12) was constructed as a pathwork of local maps drawn from itineraries.

In Exhibit 5 we shall be considering Aboriginal Australian bark paintings as maps. These have the appearance of being incapable of being combined in the European or Chinese way. Their maps appear to have no grid, no standardised mode of

representation. Nonetheless it is possible for Aboriginal people to know about, and to travel across, unknown, even distant, territory. Their knowledge is in fact combinable because it is in the form of narratives of journeys across the landscape. Aborigines inculcate and invoke conventions just as we do, through conferences and agreement. They call them business meetings; anthropologists call them ceremonies and rituals. Songlines (which are accounts of journeys made by Ancestral Beings in the Dreamtime) connect myths right across the country. One individual will only 'know' or have responsibility for one section of the songline, but through exchange and negotiation, the travels of the Ancestors can be connected together to form a network of dreaming tracks. These may be constituted as bark paintings or song cycles.

The strength of the distinction between indexical maps and non-indexical maps will seem even less cogent when we come to consider the use of maps as instruments for navigation in Exhibit 9. It will then be seen that in order to find our way about we need at least a mental map, or a cognitive schema, and an indexical image of the landscape, and that we can never navigate with non-indexical statements alone.

That maps consisting entirely of non-indexical statements cannot be used for practical purposes involving direct interaction with the material world such as navigation constitutes another similarity with scientific theories. Scientific theories consist of non-indexical universal statements about reality, and as such cannot be applied directly to a particular circumstance, or be confirmed or falsified by particular items of evidence. Scientific theories always need additional assumptions and qualifications, or specification of conditions in order to apply in practice. Strictly speaking, scientific theories could be said to be, on the one hand, useless, or, on the other hand, false, in the sense that they can never apply without modification to a particular circumstance. If, for example, you wish to calculate the orbit of a planet around the sun, Newton's laws of motion and gravitation, or even Einstein's laws, are not sufficient. You have to assume that there are no other forces at work, that there are no unobserved bodies in our solar system, that space is empty, that planets are effectively point masses, that there are no effects of the system acting on itself and so on. Then you have to live with the fact that in the case of Mercury, for example, the predicted orbit does not completely fit the observations. It seems that scientific theories gain their non-indexicality at the expense of their applicability.

Another way of capturing the notion of indexicality is to recognise its connections to 'forms of life'. All indexical statements are embedded more or less explicitly in a form of life. Non-indexical statements attempt to transcend or deny a form of life. In the attempt to maximise the objectivity of scientific theories and to display them as universal truths they are increasingly distanced from their forms of life and consequently lose their connection to the world. This, however, does not make them either useless or powerless. They gain great strength and efficacy in the social and cultural domain. Once again this point is illustrated by maps as we shall see in Exhibits 8, 9 and 10.

Exhibit 5

ABORIGINAL-AUSTRALIAN MAPS

by Helen Watson
with the Yolngu community
at Yirrkala

Paintings by Aboriginal Australians are not immediately recognisable as maps. Nonetheless Aborigines sometimes see them as maps and so now do some Western anthropologists (Williams, Peterson and Morphy—see Further Reading list). In Exhibit 5, we shall examine whether, and in what sense, the graphic representations we conventionally call ‘Aboriginal bark paintings’ are maps. In particular, three barks that were presented to Deakin University by the Yolngu* community of the Laynhapuy region of NE Arnhemland will be studied. (Refer to *Singing the land, signing the land* for more information about this community. ITEM 5.1 shows the location of Yolngu homeland centres in the Laynhapuy Region of NE Arnhemland.) To avoid prejudging the issue of whether and in what way they are maps, we shall call the barks by the name that Yolngu give them, *dhulaŋ*. (We write Yolngu words using the orthography that Yolngu use. For a full description, see *Singing the land, signing the land*. The pronunciation of Yolngu words that appear in this exhibit are given in the accompanying box.) First, we must consider the conceptual framework that surrounds their production and use by Yolngu.

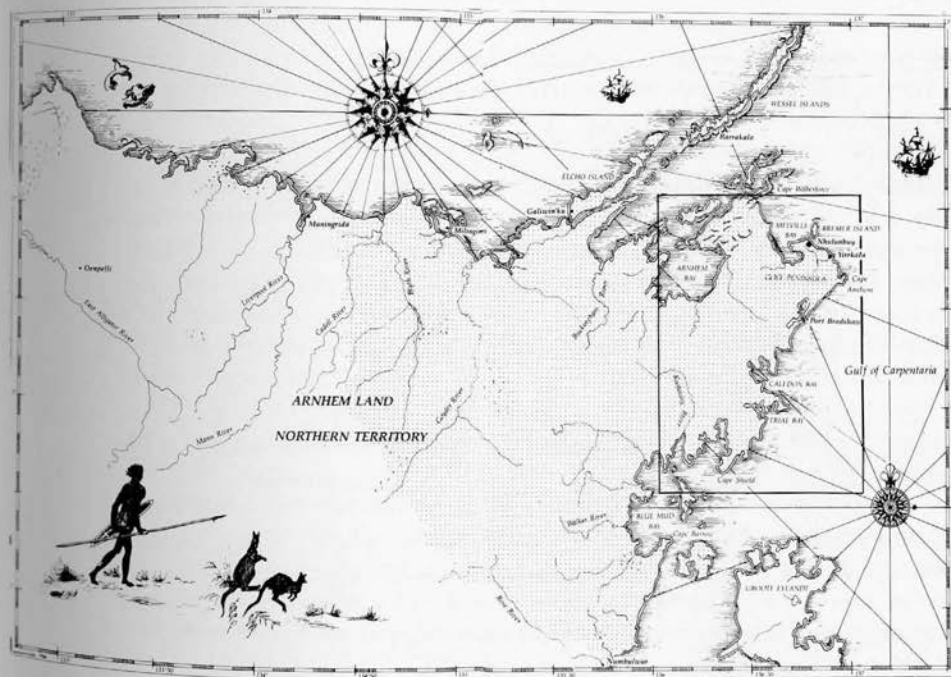
Preparing *dhulaŋ* is a common pastime for many Yolngu, for *dhulaŋ* serve a number of important purposes in the life of the community. *Dhulaŋ* are representations of concepts which are part of what Yolngu explain as ‘*djalkiri*’. *Djalkiri* is a generic term, often translated as ‘footprints of the Ancestors’. For Yolngu to say that the notion of *djalkiri* is structurally important in Yolngu life would be akin to an English speaker saying that the notion that material things have qualities is a basic concept in her way of life. *Djalkiri* is one of the network of concepts through which time, space, personhood and community are constructed in Yolngu life.

A person’s or a clan’s *djalkiri* could be called their ‘songline’; it refers to what English speakers have come to call ‘the Dreamtime’ or ‘the Dreaming’, the ‘other time’ when the people of the two great ancestor clans socialised the landscape by living in it, thus variously creating the *Dhuwa* and the *Yirritja*, the dual sub-worlds of the Yolngu world. In the course of their everyday doings the Ancestral People left their ‘footprints’ and ‘tracks’, and this *is* the now known landscape. In talking of their *djalkiri*, a speaker refers to a specific series of stories, songs, dances and graphic representations about that creative epoch, as well as to the country defined by those stories, songs, dances and graphic representations. This is the country ‘owned’ by that person or group. The ‘whole country’ is constituted by a network of tracks which intersect and define a framework for the political and economic processes of Yolngu society.

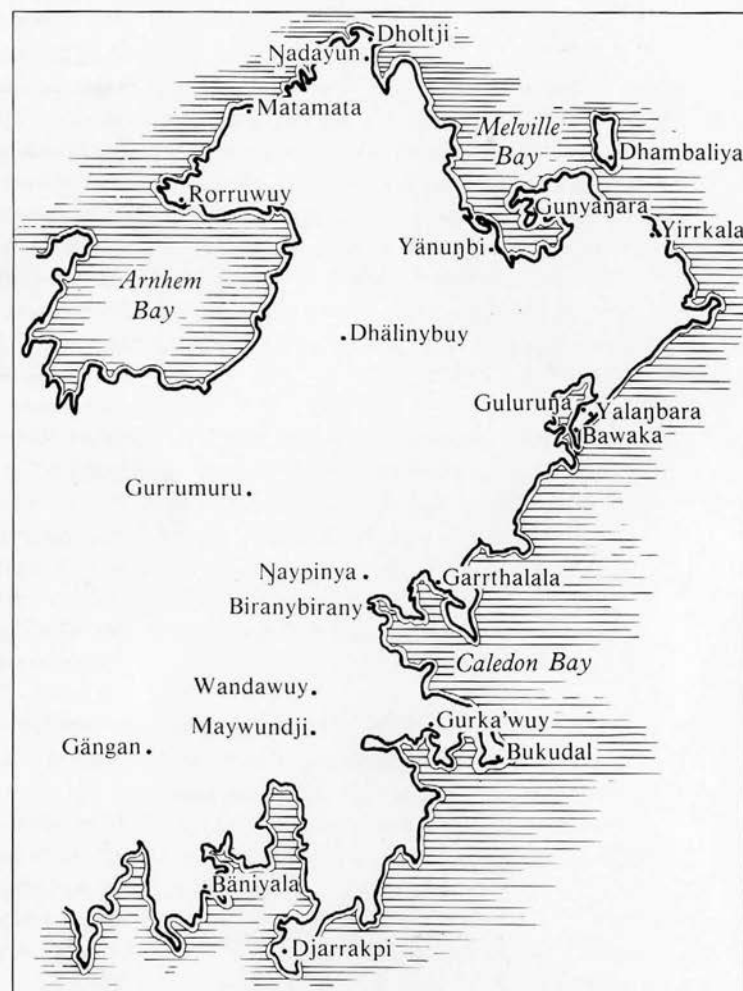
That ‘other time’ transcends the present; the landscape, in being a series of narratives related in specific ways, is also transcendent. The Ancestors, frequently in the form of animals (water goannas, salt water crocodiles, dugong and the like), travelled from place to place, hunted, performed ceremonies, fought and finally turned to stone or ‘went into the ground’, where they still remain. The actions of these powerful beings created the world as it is known today. They gave the world its forms, and its identities—its names.

Whenever we wish to refer generally to the original inhabitants of Australia, we have used the term ‘Aborigine/s’; whenever possible, we use the specific term used by the people themselves, for example ‘Yolngu’.

The bush is criss-crossed with their lines of travel and just as a person's or an animal's tracks are a record of what happened, the features of the landscape—hills, creeks, lakes and trees—are the record, or the story, of what happened in the Dreaming. While particular actions give name and identity to each location, the fact that together, in a certain sequence, the named places constitute journeys by particular Beings, who themselves are related in particular ways, links all identified places into a whole. It is not only the landscape that assumed its identity at this time; all things gained their identities, their places in the scheme of things.



5.1
Small-scale map showing the location of Yolngu
homeland centres in the Laynhapuy Region of NE
Arnhemland.



Yolngu knowledge is coincident with the creative activity of the Ancestral Beings. They traversed the land and in the process created the topography. What they did then provides the names of places along the path; the identity of each place is established by its connections to other places. Their actions also link groups of people. In turn, these links are given a social form and determine the social and political processes of Yolngu life. Thus the landscape, knowledge, story, song, graphic representation and social relations all mutually interact, forming one cohesive knowledge network. In this sense, given that knowledge and landscape structure and constitute each other, the map metaphor is entirely apposite. The landscape and knowledge are one as maps, all are constituted through spatial connectivity.

For Yolngu, what provides the connections between places—bits of socialised topography that are known through being named—are the tracks of the Ancestral Beings, and the tracks *are* the landscape. For Westerners, the connections between places are seen in terms of abstract qualities such as length or width. In a profound sense the Yolngu 'theory of land' has the landscape as a map of itself. In considering this paradox return to Exhibit 1. Yolngu resolve this paradox one way; Westerners resolve the paradox in the contrary way.

The fact that Ancestral Beings socialised the landscape and thus created its identity in that 'other time' does not mean, however, that the world is unchanging. The interrelated cosmos must be maintained by constant intervention—negotiation and renegotiation—by those responsible. There are no dualistic oppositions here, between good and bad, right and wrong, background and foreground. All elements of the world are constitutive of all other elements in the cosmos, through being related to them, and are in some sense responsible for them.

Yolngu knowledge is a commodity, or a product. You can earn it, trade it, give it and, more importantly, restrict access to it and hence use it as a means of control. It provides the basis for ceremonial power in the profoundly egalitarian Yolngu world. Moreover, the knowledge network is not transparent or passive, it is the real stuff of interaction between groups, and depends for its existence on constant activity, singing, dancing and painting. Through constant negotiation everyone knows who is responsible for what part of the knowledge network, who is charged with the care and maintenance of what song, and what land.

It seems that in raising the question of the way in which *dhulag* are maps we may have gained a general insight into the construction of meaning. If the process of acquiring topographical knowledge occurs at least partly through the process of naming, then the connectivity that provides for knowledge in general is that of the network of meaning. According to this account of meaning, words acquire their meaning not simply by reference to objects but by their relationship to one another in a three-dimensional

network. Thus, while the notion of a network is essential to all cultural formations, the way it manifests varies from one culture to another. In Yolngu life the knowledge network is taken as there for all to see, so long as they know what to look for; but then it takes a long time to learn that. This knowledge network is tangible and must be actively maintained.

Interested as we are in landscape and its representation, *wāṅa* too is a useful concept for us to investigate. Orientation in space is of prime concern for Yolngu. Any recounting, whether ancestral, historical or contemporary, is framed by a discussion of place: where events happened. Events coalesce in space rather than in time; landscape punctuates stories, and behind this is the 'working assumption' that human activities 'create' places by socialising space.

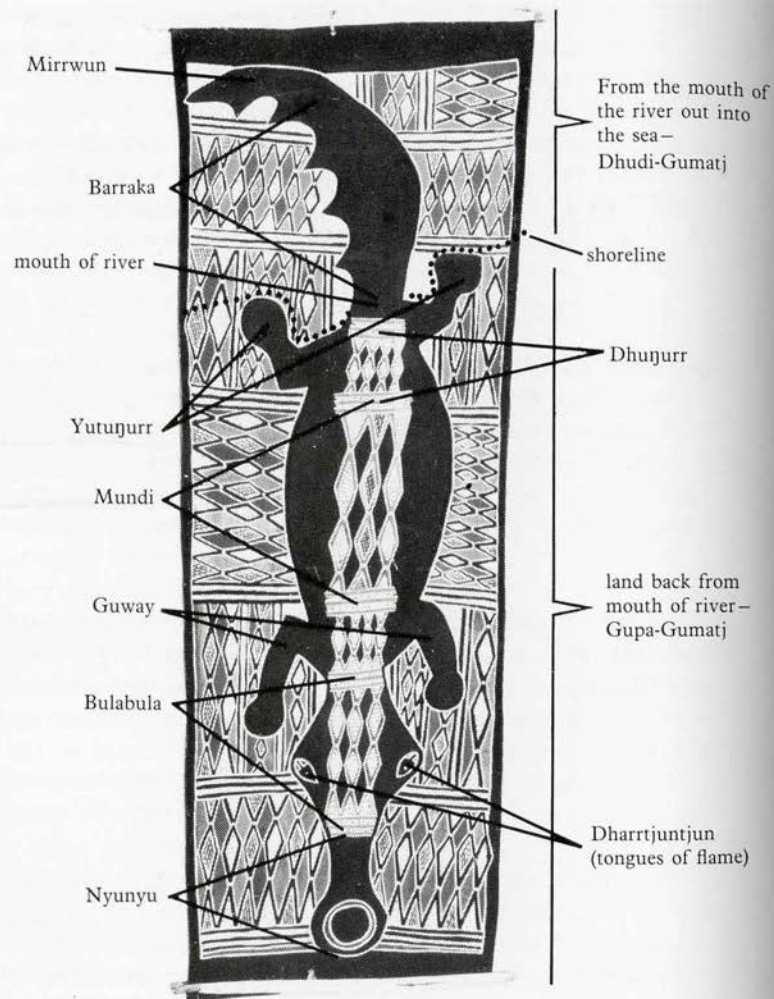
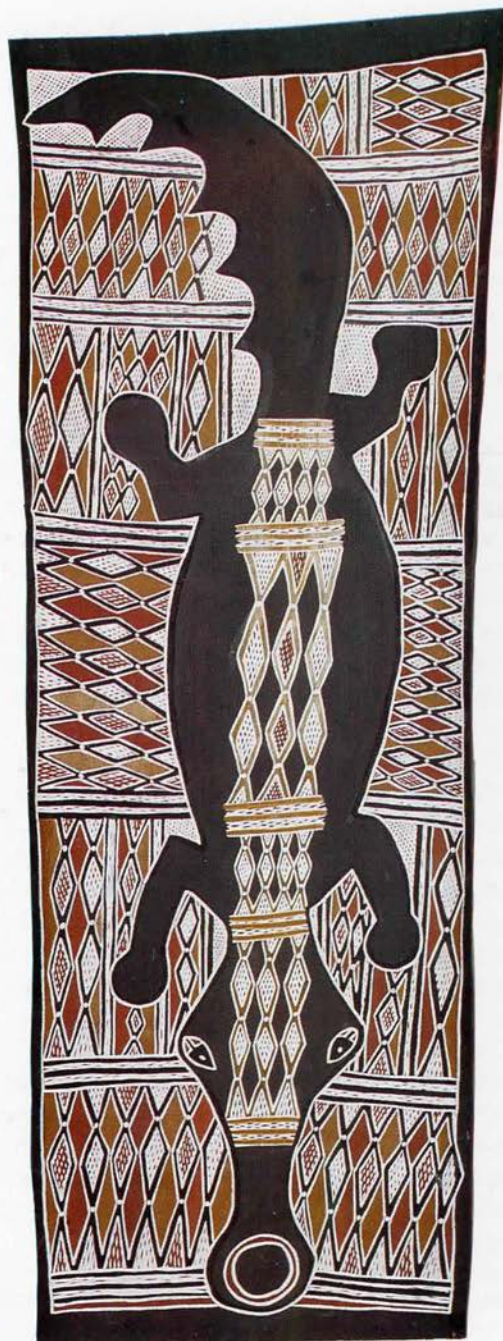
Yolngu do not build a domesticated space and oppose it to 'wild nature' outside this domain, instead they are truly at home when they walk through the bush, full of confidence in knowing it as their own place. A camp can be made almost anywhere within a few minutes: a smooth place to sit or lie, a fire and perhaps a billycan of tea. Previously unmarked country becomes a camp, a *wāṅa*, with all the comforts of a familiar sitting room. The way of thinking which enables people to make a camp almost anywhere they happen to be, with no sense of dislocation, is a way of thinking that has the country as its own universe of meanings. Yolngu, who like to move and shift so regularly from specific place to specific place, have made space their own. Space is socialised; landscape, a home, a *wāṅa*.

But *wāṅa* is more than this; it is in fact a very complex bundle of concepts. In calling up notions of socialised space it is used in connection with the temporary site at which people live, but it also means 'enduring country'—a named place. *Wāṅa* in this sense carries with it connections to all other named places. *Wāṅa* is not only the human creation of 'camp' but also the Dreaming creation of 'country', a concept primary to Yolngu social organisation. In the first *dhulaṅ* we shall consider (see ITEM 5.2), the salt water crocodile (*bāru*) is said to have its legs splayed out 'holding the *wāṅa* with his feet' (Gulumbu Yunupijū, 1987).

If the *dhulaṅ* in ITEM 5.2 is oriented with the crocodile's head pointing upwards, then it can be recognised as a map in the conventional Western sense. The place mapped here is called Njalarrwi, near Biranybirany (the homeland centre of the Gumatj people, which can be located on ITEM 5.1). The position of the crocodile's feet and body define the area of the Gumatj clan homeland by holding on to it. The coast is represented by the rear legs, the mouth of the river is where the tail joins the body.

By looking at the detailed Western map of Caledon Bay (ITEM 5.3) you can identify the section of river that is being referred to here. The land which is owned by the Gumatj

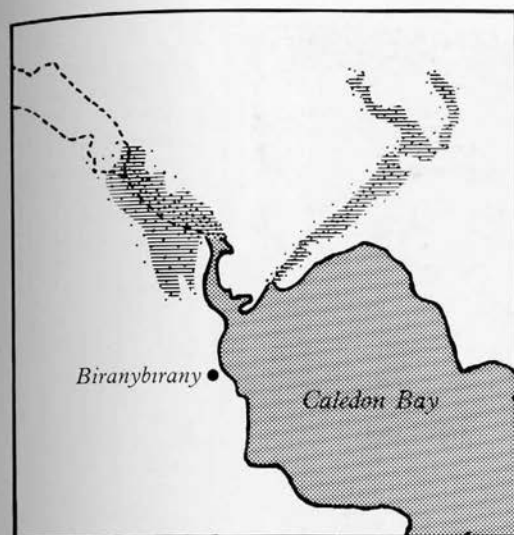
The interpretations of the *dhulaṅ* given here are the product of conversations between Helen Watson of Deakin University and the artist Djamika Mununggurr and his wife Gulumbu Yunupijū and daughters Njalawurr Mununggurr and Wuyuwā Mununggurr in April 1988. The discussions were held with the specific intention of generating the information in a form suitable for this publication.



5.2

Crocodile and fire dreaming; moiety—Yirritja; clan—Gumatj; painter—Djamika Munungurr, 1985.

This *dhulan* 'maps' the homeland of the Gumatj clan. The names of the parts of the crocodile are the names of areas of land. There are names for general areas like Gupa-Gumatj and Dhudi-Gumatj, which name separate sections of the clan. Also there are very specific names like Djarrrjuntjun, which names a small and restricted area.



5.3
Western map of Caledon Bay.

clan extends in all directions from this river. Its boundaries are not shown here for to do so would be 'a breach of good custom' (Nancy M. Williams, *The Yolngu and their land*, 1986, p. 19).

The *dhulaŋ* represents a specific place where the crocodile (an Ancestral Being) lives, and the graphic elements are organised on spatial principles: that is, they are intended to correspond to elements of the landscape. Hence it is a map. However, it is obviously a highly conventional map. In order to be able to read it, you have to know something of the stories, songs and dances of the creation of this landscape by this Ancestral Being and his kin.

The background pattern, or *mitji*, is 'the fire dreaming', a design owned specifically by the Gumatj. The irregularities of the 'diamond design' indicate flickering flames going in all directions. Here fire is a metaphor for knowledge:

Fire always has the same elements: flames (the red diamonds); ashes (yellow diamonds); sparks (white dots); charcoal (black lines); flaming coals (white with red lines); dust (white lines on yellow) but in any particular fire these elements combine and manifest in different ways. So it is with knowledge: the general elements and their relations are always there but the way knowledge is revealed anew to each generation is particular for that generation and that time.

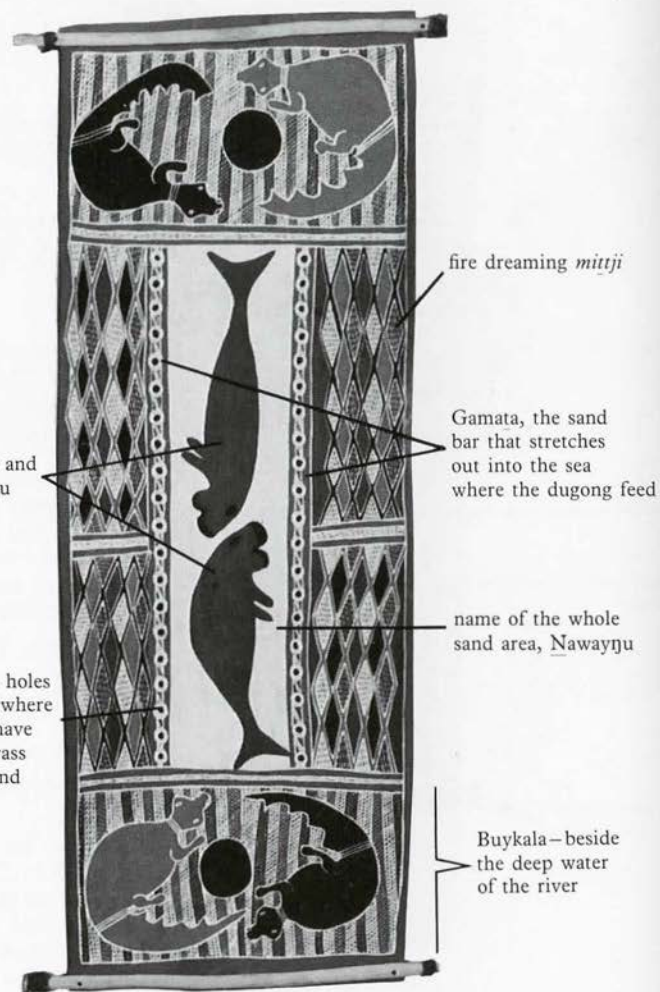
Gulumbu Yunupingu, 1987

Each part of the crocodile has a name and the 'outside names'—those that can be generally known—are shown in ITEM 5.2. The pattern we see on the back of this crocodile, and indeed all crocodiles, represents the murky water which is its *wāŋa*:

Dhulaŋ like this one are for teaching children—they learn from the bark and from the land itself. Children can learn the shape of the land from the bark, and from being instructed about what is written there. From being instructed they can get a map in their heads. Children can learn to have respect for the *wāŋa* in this way and the *wāyin* (game animals) that live there, and learn to mind it properly. If they don't do that it will take its revenge.

Gulumbu Yunupingu, 1987

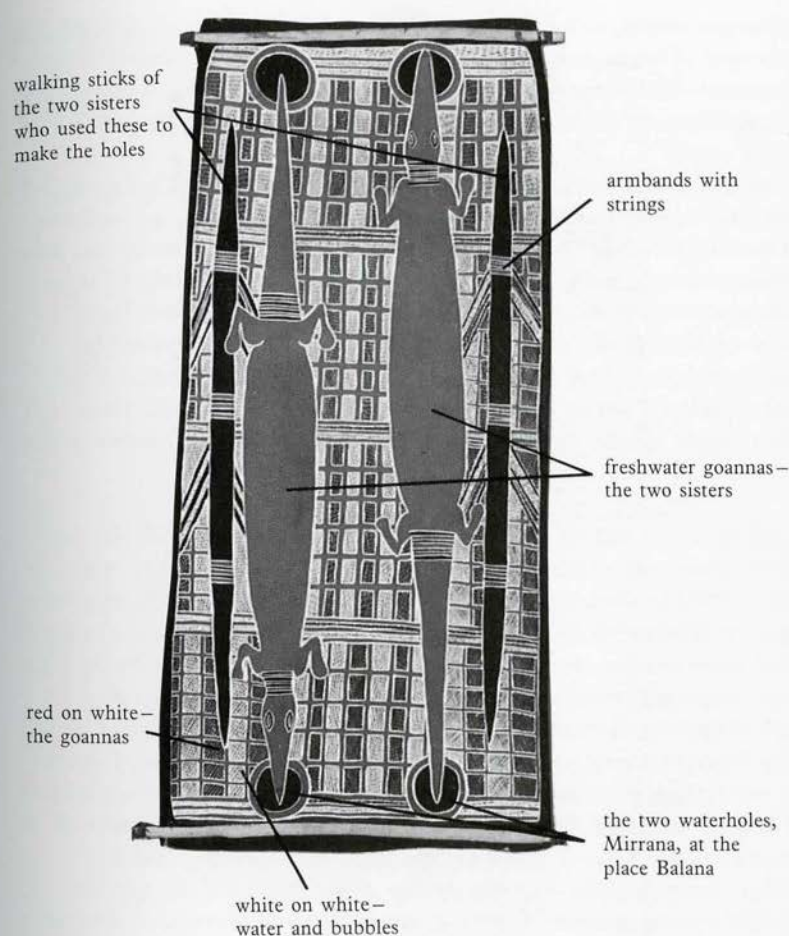
The bark shown in ITEM 5.4 is a large-scale portion of the one shown in ITEM 5.2: it is one side of the river. The name of the place represented here is Badaymirriwuy. If you stand at the mouth of the river facing the land, it is on the left-hand side. Beside this sandy stretch of river bank are the crocodiles' water holes. The name of that place is Buykala.



5.4

Dugong and fire dreaming; moiety—Yirritja; clan—Gumatj; painter—Djamika Mununggurr, 1985.

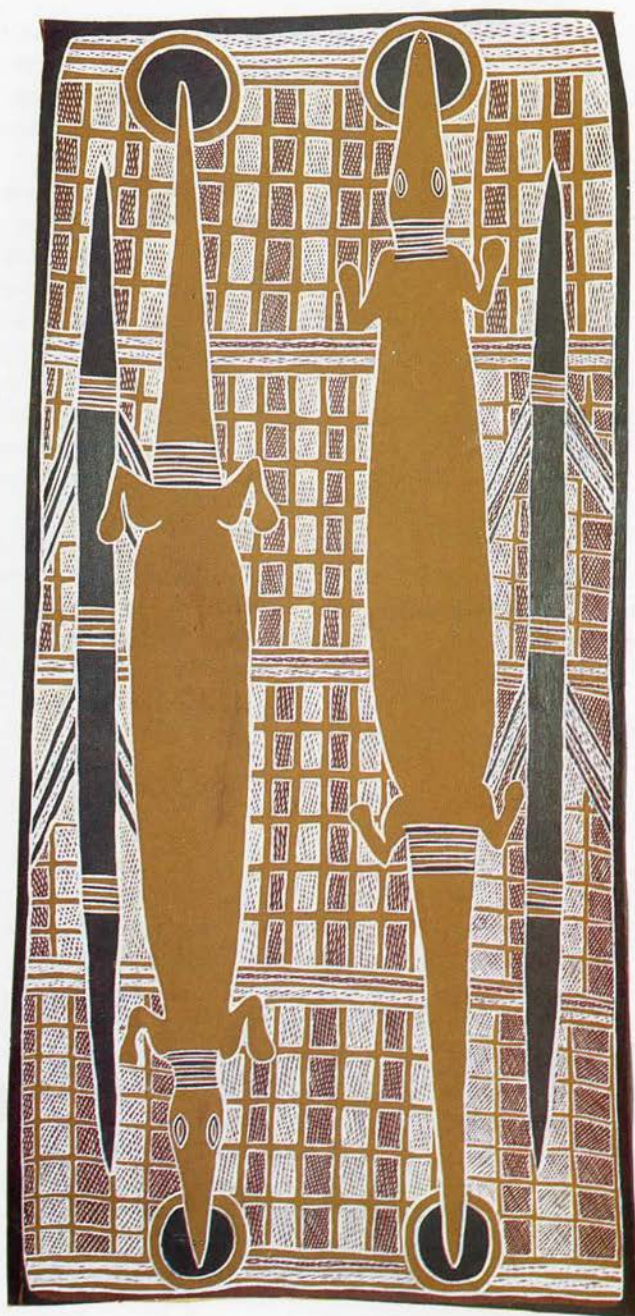
The central white area is the sand bank *Nawaynyu*. It stretches out at the mouth of the river, the area of the crocodile's tail in ITEM 5.2. The dugong (two Ancestral Beings) feed on the sea grass on the edge of the sand bar *Gamata*. In doing so they leave the holes depicted around the white area.



5.5

Water goannas and water dreaming; moiety - Dhuwa; clan - Djapu; painter - Djamika Mununggurr, 1985.

This *dhulan* portrays the episode in which a *Dhuwa* place, Balana, was created and named by the Ancestors, the two Djan'kawu sisters. In this place, a green leafy grove, the two sisters, the water goannas, made the water holes with their walking sticks. The name of the water holes is Mirrana. The sisters both enter and re-emerge from the ground here, shown by the fact that the holes are at both ends of the animals. The background patterning, the *mitji*, represents the 'water dreaming', which is a metaphor for the way knowledge continues in its structure unchanged - it continually bubbles up in the same place. The pattern carries the idea that, while for each generation knowledge is revealed anew, the structure of the knowledge is always there, continually bubbling up.



The organisational principle employed in ITEM 5.5 is not spatial, it carries a narrative which is specifically located. Though it depicts topographical features we would hesitate to call it a map. As an account of what happened at one particular stopping place in the journey of the Ancestral Beings, it could be described as a diagram rather than as a map.

Only after much deliberation can we decide whether to translate *dhulag* as 'painting', 'map', 'diagram' or 'graphic representation'. In making this decision, it may be useful to seek out other bark paintings to study. For example, refer to ITEM 4.40 in *Beasts and other illusions* (p. 55) and ITEM 4.3 in *Imagining landscapes* (p. 51). What do you make of these *dhulag*? Can a European attempt to recount some of the information encoded here? Does it help to know something of the theory behind the production of *dhulag*? In Exhibit 4 in *Imagining landscapes* (ITEMS 4.4, 4.5, 4.7 and 4.15) we see maps produced by Aboriginal people with a different set of graphic conventions. One intuits that these mapmakers share something of the Yolngu 'theory of the land' from the explanations that are provided here.

Pronunciation of Yolngu words

Balana	Ba-la-na
Badaymirriwuy	Bud-ae-mirri-woi
bäru	bar-roo
Biranybirany	Bir-ane-bir-ane
Buykala	Boi-kala
dhulag	dthoo-lung
Dhuwa	Dthoo-wa
djalkiri	djal-kiri
Djan'kawu	Djan-ka-woo
Gamata	Ga-ma-ta
Gumatj	Goom-ach
Mirrana	Mirr-a-na
mitji	mint-jee
Nalarrwi	Ng-a-larr-wi
Nawayngu	Na-wae-ngu
wäja	waa-ng-a
Wagarr	Wa-ng-arr
wäyin	waa-yin
Yirritja	Yirr-i-cha
Yolngu	Yol-ng-oo

In considering the ways in which *dhulag* are maps, we must not lose sight of the fact that *dhulag* are also religious icons. They have at least two aspects in common with Christian religious icons. Firstly, they present another, 'transcendental', world; they carry with them the presence of *Wagarr*—the Time and the Beings of the Dreaming—in much the same way Christian icons present 'the living God'. The second element they have in common with Christian icons is that they are a 'gloss on text', the narrative of the Dreaming. *Dhulag* are maps only insofar as the landscape is itself a 'text'. Unlike Western maps, *dhulag* do not seek to represent the text of landscape 'in ratio'; they do not seek the 'rational representation of nature'. *Dhulag* and Western maps have different theories of picturing because they are produced within different theories of knowledge. It is because the Yolngu knowledge system has landscape itself as a meaning system, through which meanings are made following the actions of the Ancestral Beings, that *dhulag* are coincidentally maps and icons. Rights in graphic representation, in *dhulag* and other ways of presenting the Ancestral World (song and dance) are inextricably interwoven. The Ancestral Beings handed over the land to *particular* human groups. The condition of maintaining the world in this proper state is that those groups continue to perform ceremonies and produce the paintings and ceremonial objects that commemorate their creative acts.

We might say that in a profound way the Ancestral Beings of the Yolngu were mapmakers. They created the landscape and at the same time made the country a map of itself in the knowledge network. They created the symbols and the ways of their use so that the map might be read by those to whom these things have been revealed. Reading the map is penetrating deeper into the texture of the knowledge network—the land itself.

Exhibit 6

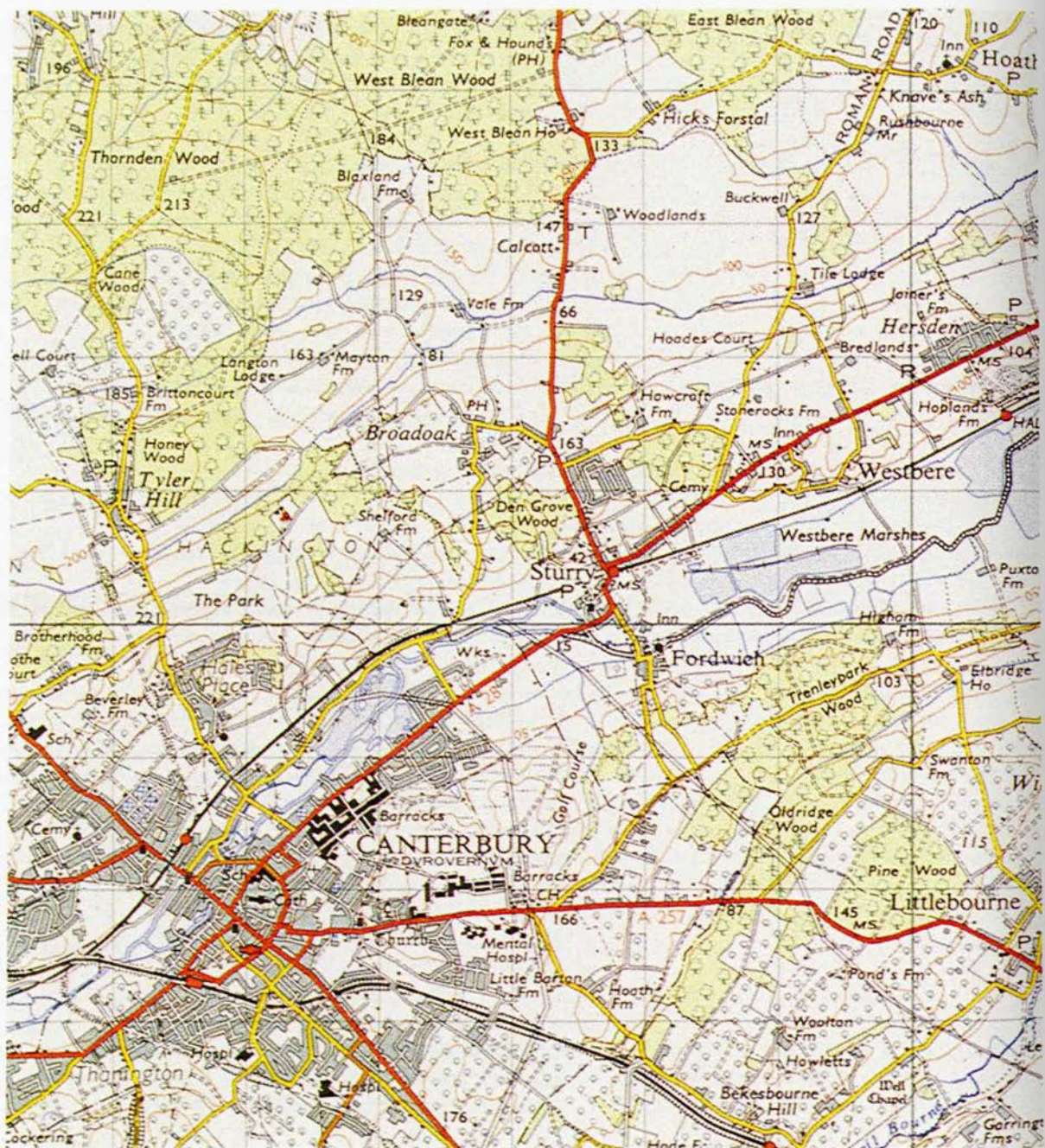
THE STORY SO FAR

In this exhibit we turn to a modern topographical map to see how the issues we have raised so far bear up under examination. Closely examine the Ordnance Survey map (ITEM 6.1) and the two photographs (ITEMS 6.2 and 6.3) of the landscape depicted. Consider carefully the following questions.

- How do you know ITEM 6.1 is a map?
- How do you read it? Do you need anything that is not on the map to read it?
- Why is it called an Ordnance Survey map?
- What kind of symbols does it employ? Are they purely arbitrary, symbolic, natural, iconic? Are they all explained in the key? On what kind of conventions are they dependent? Can anyone read the map or is there tacit knowledge involved?
- Is there anything indexical about the map?
- Is there anything invariant between the map and reality, that is to say non-indexical?
- Is a scale necessary? What does it enable you to do?
- Does the map contain more information than is specifically recorded by the cartographer?
- Is there any information lost?
- Does it contain all the possible information? Can there be multiple maps of the same place?
- What sort of projection is used? Are you told? What difference does it make? Are projections necessarily conventional?
- What orientation does it have? Why is north usually at the top? Does it matter?
- What are the criteria by which one evaluates a map? Are they all necessarily tied to human purposes? Does 'workability' cover them all?
- What possible uses are there for maps? Are any maps anything else as well as maps?
- What does the grid enable you to do? If one of the functions of the map is to allow accurate measurements to be made, what sort of things can be measured? What social accomplishments and practices are required to enable those measurements (bench marks, sea level, National Grid datum, standard yard etc.)?
- How many of the features in the map are non-geographical, that is, constructed? How many of them depend on continuing social and political practices for their existence?
- Are any of the functions of the society, state, interest groups, military served by this, or any, map?
- What is the difference between a map and a photograph? Which is more real?
- The two aerial photographs are of the top right-hand and bottom left-hand quarters respectively. Did you find any difficulty in matching them? What does this tell you about the representational power of the map?
- What do the photographs show that the map does not? What are the differences between them with respect to time? What is the difference in function? Why can't we replace maps with photographs?

6.1

An Ordnance Survey map,
scale 1:63 360, of the city of
Canterbury, published in 1959.



6.2

Aerial photograph of top right quarter of ITEM 6.1, taken in 1967.

**6.3**

Aerial photograph of bottom left quarter of ITEM 6.1, taken in 1967, showing a new road on the west side of Canterbury.

