



Exhibit 7

THE FUNCTION OF MAPS

We earlier referred to the tendency to assume that the acme of mapmaking is the large-scale Western topographic map because it is seen to be so 'accurate'. But can accuracy be assessed independently of function? After all an Ordnance Survey map can be said to be inaccurate to the degree to which it omits details or, for example, does not use a standardised representation for equivalent items. In the Ordnance Survey map of Exhibit 6 (ITEM 6.1), you can see that some country pubs are given a name while no city pubs are. Does this mean that country pubs are bigger or that there are no pubs in Canterbury? No, obviously the reasonable response to such criticisms is that the accuracy can only be assessed in the light of the purposes for which the map was intended. As E. H. Gombrich has pointed out, a pictorial representation

is not a faithful record of a visual experience, but the faithful construction of a relational model . . . Such a model can be constructed to any required degree of accuracy. What is decisive here is clearly the word 'required'. The form of a representation cannot be divorced from its purpose and the requirements of the society in which the given visual language gains currency.

E. H. Gombrich, *Art and illusion*, 1960, p. 90

If it is true that accuracy is linked to function, then indexicality cannot be simply equated with mere practicality. In other words, highly accurate maps are not really less indexical or less tied to their context of use. Instead it might be more illuminating to see various maps as having different modes of transcending indexicality.

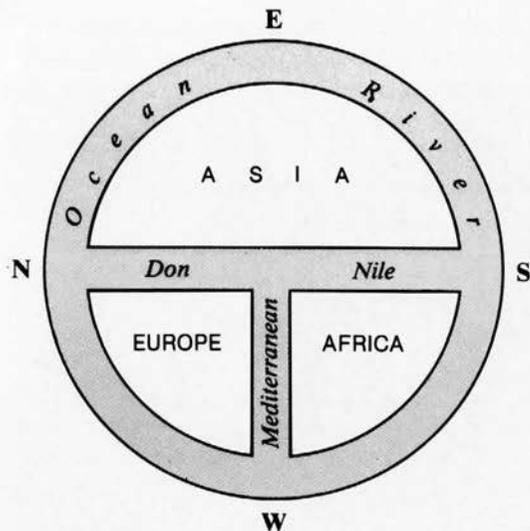
As we have seen in the case of the Ordnance Survey map, it cannot simply be 'read', even in conjunction with the key. Contour lines, for example, make no sense at all without training and facility in imagining a three-dimensional projection. Equally, contour lines can have no meaning without the existence of a plethora of assumptions, institutional arrangements and systems of measurement. The concept of sea level, the infra-structure of benchmarks, national surveys and instruments such as theodolites all constitute the 'forms of life' that are taken for granted in the creation of contour lines. Indeed the state has to put in enormous amounts of money and work to maintain this system of measurement. Were it to cease to do so, the forms of life that make the map possible would collapse and this fine creation would suffer the same fate as the map in Borges's story (ITEM 1.1). Thus, while Ordnance Survey maps are deliberately made to appear non-indexical, and to some extent are successful in that they do enable people strange to a particular piece of territory to find their way around, they are nonetheless highly indexical in that they are completely dependent on forms of life.

Let us return now to ITEMS 2.7 and 2.8 and reconsider the questions raised about them. A stranger to the culture that produced such maps as these, or the Ordnance Survey map, would be unable to read them without the appropriate training, just as Westerners cannot read aboriginal maps, or even their own maps, without training. Thus the claim by Westerners that aboriginal maps are more indexical and hence less scientific than

◀ 7.1

The first woodcut world map, following Claudius Ptolemy, the 2nd-century Alexandrian geographer and astronomer, with the contemporary addition of Scandinavia and Greenland (1482). Note the grid, and the the southern 'Terra Incognita'. Once it was possible to conceive of the whole world as a map, Greek aesthetic sensibilities dictated that there should be a southern body of land to balance that in the north. Australia was thus invented through the power of the map before it was 'discovered'.

The term 'Aborigine' (upper-case 'a') refers specifically to the original peoples of Australia, whereas the term 'aborigine' (lower-case 'a') is used generically to refer to indigenous peoples around the world.



7.2

Early Western Christian *mappamundi* (maps of the world) are called T-O maps. The world is divided by the three major waterways symbolising the cross, with east at the top and Jerusalem at the centre.

theirs springs largely from the transparency of the forms of life in which their maps are embedded. This reflects a difference in the ways the differing cultures achieve a transcendence of indexicality, rather than a difference in their correspondence to reality.

Aboriginal maps can only be properly read or understood by the initiated, since some of the information they contain is secret. This secrecy concerns the ways in which the map is linked to the whole body of knowledge that constitutes Aboriginal culture. For Aborigines, the acquisition of that knowledge is a slow ritualised process of becoming initiated in the power-knowledge network, essentially a process open only to those who have passed through the earlier stages. By contrast, the Western knowledge system has the appearance of being open to all, in that nothing is secret. Hence all the objects on the map are located with respect to an absolute co-ordinate system supposedly outside the limits of our culture.

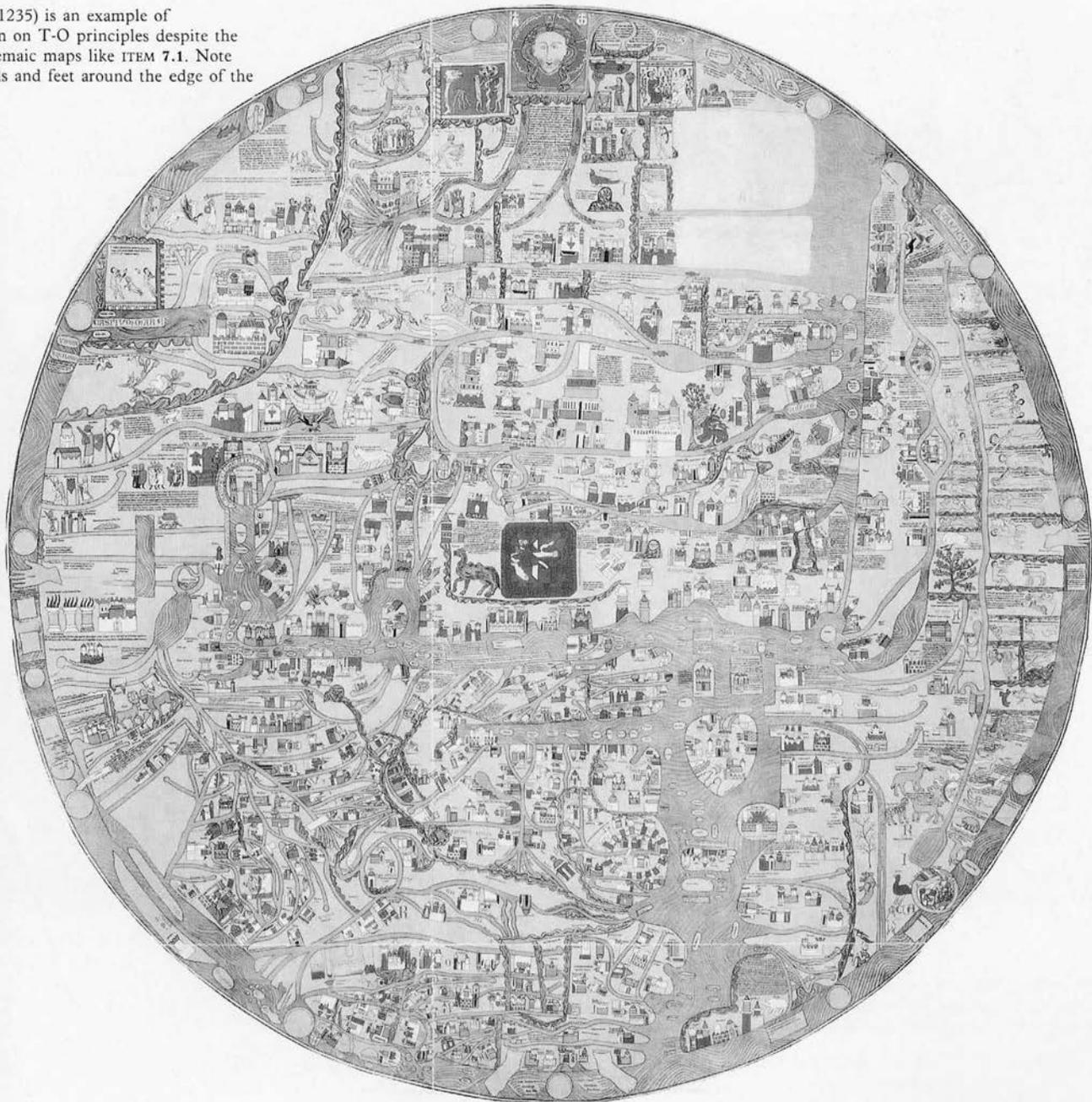
One could argue that in Western society knowledge gains its power through denying, or rendering transparent, the inherent indexicality of all statements or knowledge claims. In the Western tradition the way to imbue a claim with authority is to attempt to eradicate all signs of its local, contingent, social and individual production. Australian Aborigines on the other hand ensure that their knowledge claims carry authority by so emphasising their indexicality that only the initiated can go beyond the surface appearance of local contingency.

In the light of these considerations we should perhaps recognise that all maps, and indeed all representations, can be related to experience and that instead of rating them in terms of accuracy or scientificity we should consider only their 'workability'—how successful are they in achieving the aims for which they were drawn—and what is their range of application.

If you look at ITEMS 7.1, 7.2 and 7.3, some rather curious features of the development of Western maps emerge. Ptolemy first drew his map in the 2nd century AD and it displays an impressive knowledge of the world. It contrasts strongly with Hereford map from 1300 AD, which by comparison is highly inaccurate and limited in its coverage. However, the Hereford map is a T-O map (ITEM 7.2) and serves religious interests as well as topographical ones. The orthodox account would have it that Western maps progressed; they became more accurate and more scientific. The apparent lack of progress shown in these maps is better understood if the differing interests of the makers are taken into account. Thus world maps serve different functions from topographical maps and have to be evaluated accordingly.

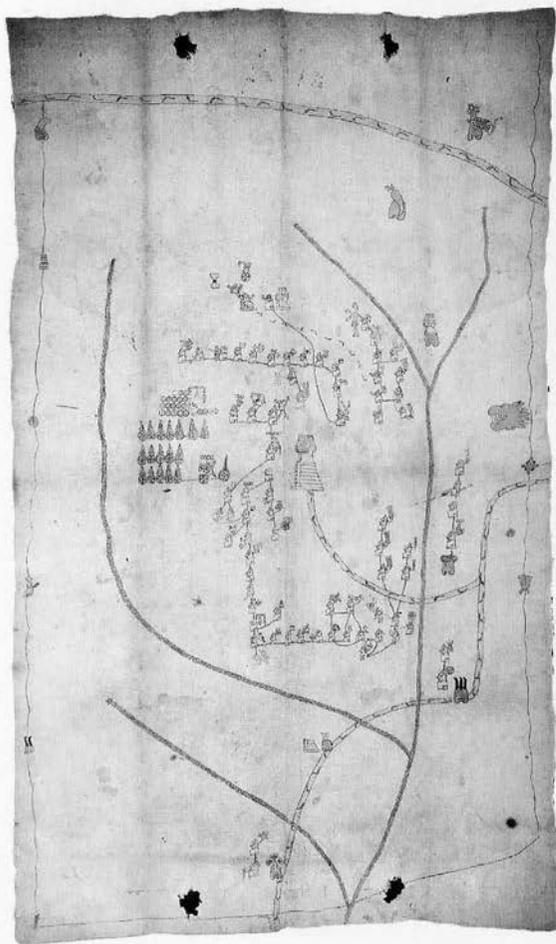
The Mexican land claim map (ITEM 7.4 and see also back cover) and the English and Roman route maps (ITEM 7.5 and front cover) have all the appearances of being distorted, conventional and totally indexical. However, once recognised as route maps their

7.3
The Ebstorf map (1235) is an example of *mappamundi*, drawn on T-O principles despite the availability of Ptolemaic maps like ITEM 7.1. Note Christ's head, hands and feet around the edge of the map.

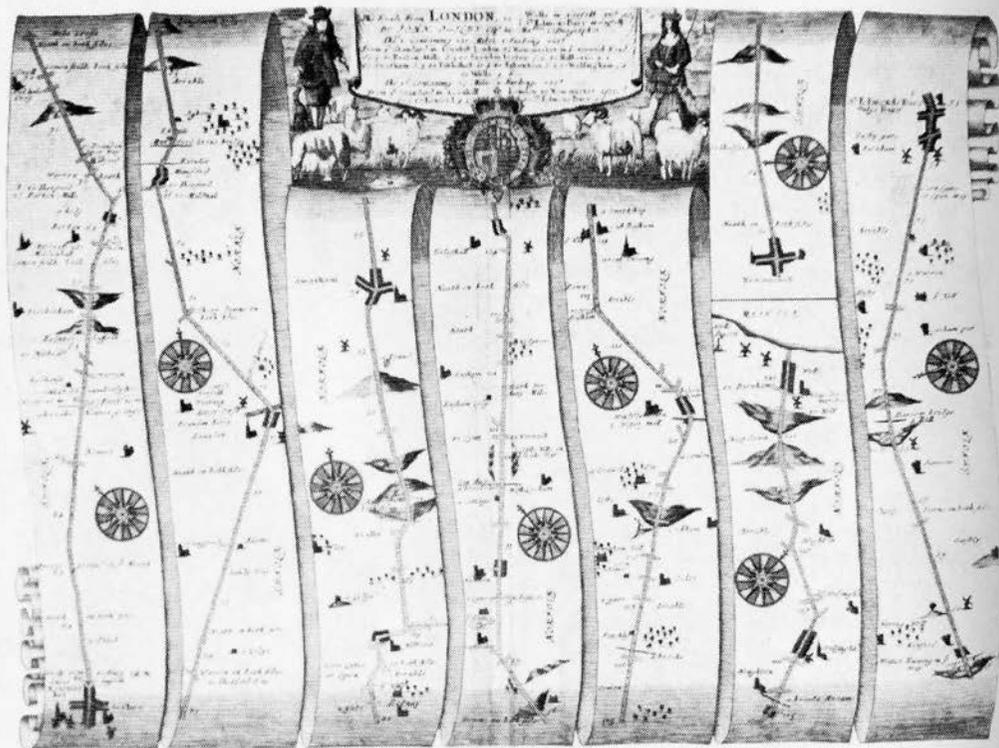


workability becomes apparent. They embody a lot of accurate detail and information. Apart from the language and symbols which require translation, that is, a key, they are as readable as the London Underground map (ITEM 2.8). Their base in a common human purpose in fact makes them more readable than Sagan's plaque (ITEM 2.7), for example.

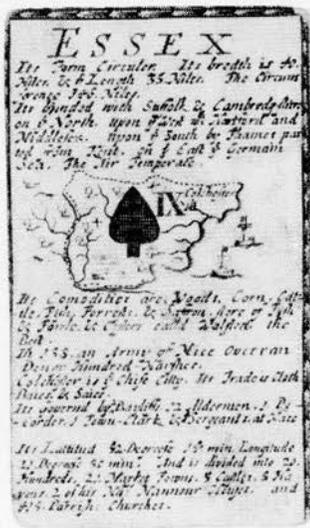
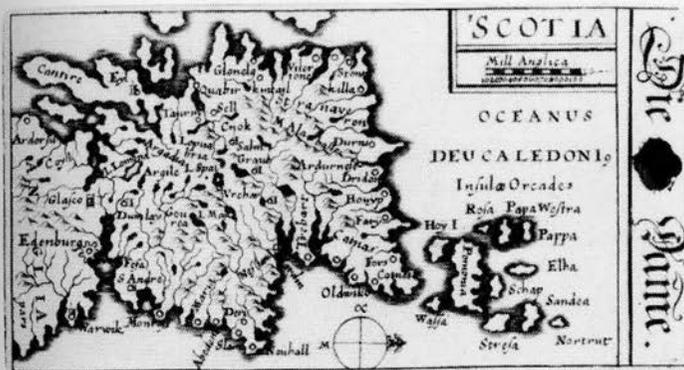
Maps can have a variety of functions: they can make political jokes (ITEM 7.6); they can educate and entertain (ITEM 7.7); and they can tell lies (ITEM 7.8). All maps also have a latent symbolic function, for example, legitimating and disseminating the state's view of reality.



7.4
Early 16th-century Mexican Indian map of Metlacoyuca setting out lordship of the area. The temple marks the town and the figure, the lord's genealogy.

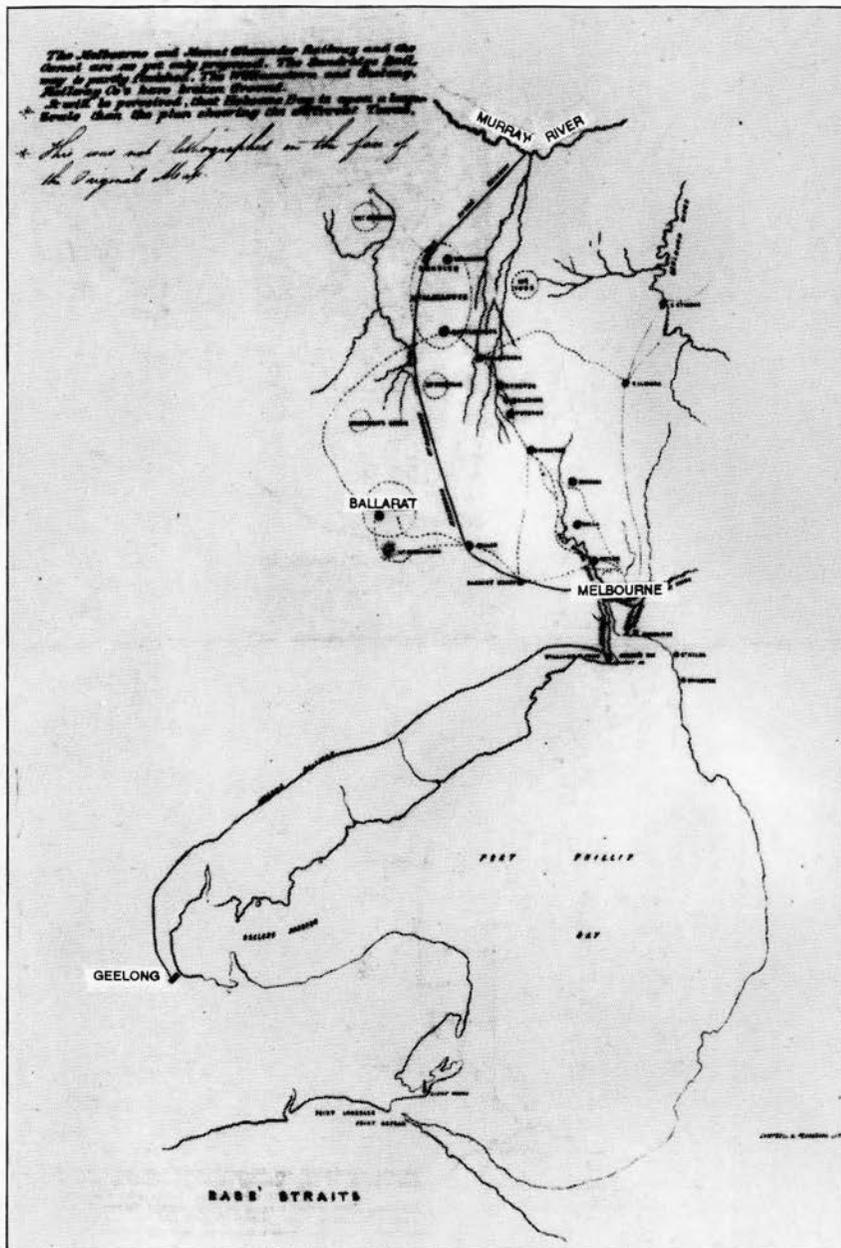


7.5
'The Roads from London to Wells in Norfolk and St Edmons Bury in Suffolk', a strip map (1670). A highly conventional route map (note the reversed hills to indicate that the traveller is going downhill), but just as effective as the Automobile Club route maps of today.



7.6
Cartoon map.

7.7
These playing card maps serve to educate as well as to entertain. The upper pair are by Hoffman (1678) and the lower pair by Redmayne (1711).



7.8

The 'false' goldfields map with Strachan & Co's explanation and the 'real' map.

The false map

The importance of a locality or township in Victoria is increased in proportion as it is well or badly situated relatively to the Gold Fields; and facility of approach, and shortness of distance, confer claims, and offer advantages, the value of which is fully appreciated, as well in the old country as in this. The position of Melbourne and Geelong, in this respect, has been made the subject of controversy by the public press; and that a jealousy on this head has arisen is too apparent to be overlooked, and is readily accounted for when the vast natural advantages of Geelong are candidly viewed. The progressive pace at which this town and its commercial interests have been moving onwards must satisfy its most ardent well-wishers, notwithstanding the obstructions willfully thrown in its way. We do not hesitate to affirm that there have been few places in which a greater amount of sound business, proportionately, has been done within the last three years, than in Geelong. The business now carried on here may be learned at once, when it is stated that the imports for the year ending 30th June, 1854, amounted to £2,211,571, and employed 114,656 tons of shipping; and that the exports during the same period amounted to £1,316,813.

The fact, however, that this jealousy does exist has been recently shown most flagrantly by the publication of a MAP purporting to be a correct representation of the distances of Melbourne and Geelong from the Gold Fields of this Colony. It is attached to a general Price Current, issued by a firm in Melbourne, and is evidently intended to be circulated throughout the world. Its palpable object is to show that the Gold Fields and a highly populated district are in close proximity to Melbourne, while Geelong is placed at a false distance. Ballarat is made to appear just twice the distance from Geelong that it is from Melbourne, whereas the real distance of that township and its Gold Fields is only forty-eight miles, in a straight line from Geelong, and, by the same mode of measurement, sixty-two miles distant from Melbourne; and the same glaring disproportions exist with regard to Mount Alexander, the Murray River, etc. Who the concoctors of this disreputable document were we know not, for it bears no signature—but, for the purpose of indentionation, we state that the lithographers were Messrs. Campbell and Fergusson, Melbourne.

In order the more fully to exhibit the baseness of this fraud, a map is enclosed, published by Messrs. Macdonald & Garrard of Geelong, on a correct scale, and a moment's comparison of the False Map with the true one will point out the dishonorable nature of the SILENT LIE it was the mission of this Map to tell!

Strachan & Co.

Geelong, 1st July, 1854.

Exhibit 8

MAPS—A WAY OF ORDERING KNOWLEDGE



8.1

Bullard's computer reconstruction of the fit of the continents as evidence of their original connection according to Wegener's hypothesis. He used 'objective' mathematical methods to obviate the earlier criticisms of Wegener's fit. The continents are here defined by the 500 fathom contour along the edge of the continental shelves. The black shading represents overlap, and the grey shading, gaps. Latitude and longitude lines indicate present orientations of the continents.

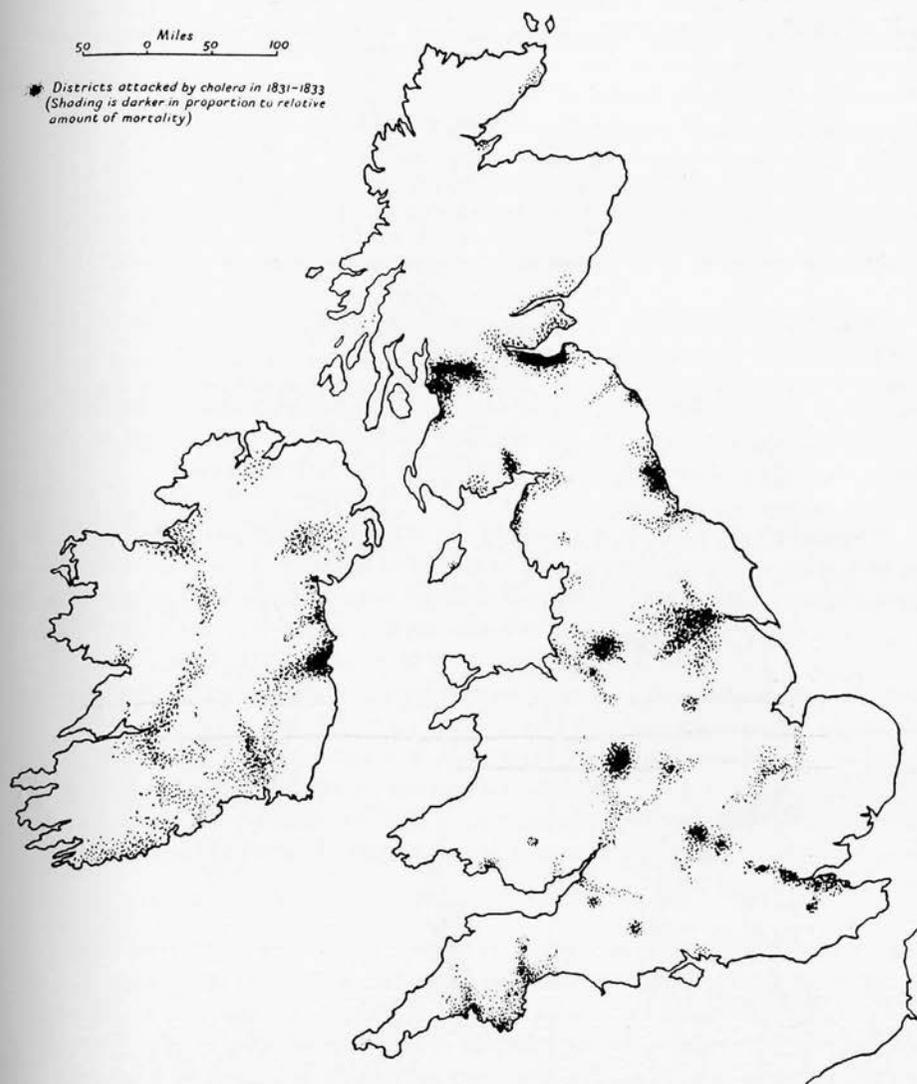
Karl Popper argues that languages have a descriptive function which is clearly distinguishable from their argumentative function. This, according to Popper,

makes the familiar analogy between maps and scientific theories a particularly unfortunate one. Theories are essentially argumentative systems of statements: their main point is that they explain deductively. Maps are non-argumentative. Of course every theory is also descriptive, like a map.

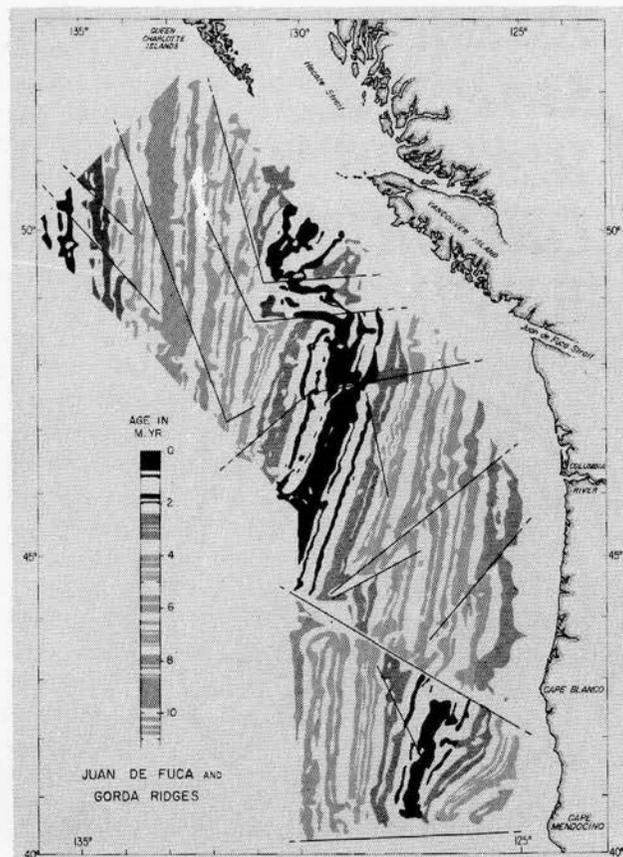
Karl Popper, *Unended quest: an intellectual autobiography*, 1976, p. 77)

Popper may be mistaken about maps, possibly because he is concerned at this point to make a distinction between the descriptive and argumentative functions of language. Though the distinction can be sustained analytically, it cannot be pushed too far because there is a powerful sense in which descriptions *are* arguments. The strongest sense in which that is true is illustrated by maps. They invariably carry less information about the environment than is out there, since they are necessarily selective, but they also frequently carry more information than was actually recorded. Some maps, like those used for navigation, can have data plotted on them and deductions as to position and distance to destinations made from them. But the example of Wegener's theory of continental drift (see ITEM 8.1) and the cholera map (ITEM 8.2), show that new knowledge can be gained from a map in a profound and significant way. It was Wegener's 'fitting' of the continents that led him to hypothesise the original joining of South Africa and South America. It is interesting that, while Wegener used that 'fit' as evidence for his theory, his opponents were able to reverse the argument and criticise his theory on the grounds that map-fitting did not constitute evidence and that the apparent fit was the result of selective distortion. Mapping the outbreaks of cholera also revealed a distribution that could not have been simply read from the data. Moreover maps are not always mere re-presentations of data. In ITEM 8.3 the magnetic stripes in rocks on the sea floor off the coast of West Canada become in their turn evidence of the phenomena of sea-floor spreading from ocean ridges, the ultimate proof of Wegener's theory. Indeed ordering information spatially provides a very powerful mode of inference to new knowledge that is ignored by Popper.

However, there is an even deeper sense in which maps are like theories in that they are 'argumentative systems of statements'. That is the sense in which they embody or express a cognitive schema. As has been discussed in *Imagining nature*, observation statements are not clearly separable from theoretical statements, and theoretical statements in turn embody sets of assumptions about how reality is ordered. This whole complex of unconscious assumptions about the ordering of reality which structures our experience of it can be thought of as a cognitive schema. In the case of maps, the idea that our ability to understand the world is dependent on modes of ordering of which we are at best only partially aware is of particular interest. As concrete examples they provide an opportunity for bringing such cognitive schemas to the fore, and they also provide an opportunity to explore the claim that in the deepest possible way knowledge is inherently spatial, and embedded in practical action.



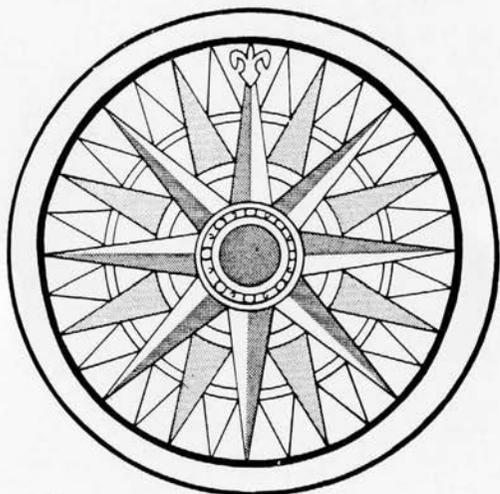
8.2
A 20th-century redrawing of Augustus Petermann's map of 1852, displaying the spatial impact of the cholera outbreak of 1831-33.



8.3
The mapping of the magnetism of rocks beneath the sea reveals mirror image patterning on either side of the central ridge, which is graphic evidence of molten rock flowing out from the ridge and thereby accounting for sea-floor spreading off West Canada.

Exhibit 9

MAPS—A WAY OF ORDERING OUR ENVIRONMENT



9.1
Compass rose

Just as maps can provide us with new knowledge by ordering it spatially, so do they provide ways of ordering and knowing our physical environment—the territory. Consider again a passage from Exhibit 1:

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

An essential way to look at what is implied in concepts like Robinson and Petchenik's 'spatiality' or Lewis's 'connectivity' is to explore their relationship to doing things in the material world—to consider how it is that we navigate or find our way about.

It might be thought that the ultimate evidence of the superiority of Western maps is their use in navigating on unknown waters or in unknown territory. If they are informed by a theory of projective geometry that takes account of the transformations involved in presenting a three-dimensional surface on a two-dimensional one, if they use a highly systematic representational mode, if they are drawn with great accuracy, then one can find one's way across otherwise featureless or foreign terrain. Conventional wisdom has it that 'primitives' do not have maps in the proper sense since they are familiar with the territory that they invariably traverse with great skill. It is sometimes said that such maps as they may have are just ritual objects, aides-memoire, messages of some sort or records of past events. Such views take no account of how we actually navigate today, how we navigated before modern maps were invented or how so-called 'primitive' maps are read or used.

The compass rose (ITEM 9.1), which appears on so many maps, is now often seen as a mere decorative space filler, a hangover from the days when maps were more like illuminated manuscripts than communication devices. In fact, the compass rose 'is a very abstract model, a cognitive schema, of the relations of direction to time, of solar time to lunar time, and of time to tide. [To use a Micronesian term,] it is an *etak* of medieval navigation' (p. 266). It enabled medieval sailors to navigate successfully without literacy, writing, sophisticated instruments, the scientific method or Western schooling. They managed to negotiate the coastal waters of Europe and eventually Africa and the rest of the world without having either a map or foreknowledge. They achieved this by having a thorough understanding of the cognitive schema (C. O. Frake, 'Cognitive maps of time and tide among medieval seafarers', 1985, pp. 254–70).

To predict the tides requires a theory of the tides, a method of determining, recording and correlating solar and lunar time, and a memory of the lunar tidal schedule (the establishment of the port) for every locality. Piaget himself could not have designed a better task for testing formal operational thinking. The medieval sailor met this test ingeniously by appropriating a cognitive schema for spatial orientation—the compass rose—as an abstract device for recording and calculating time and tide.

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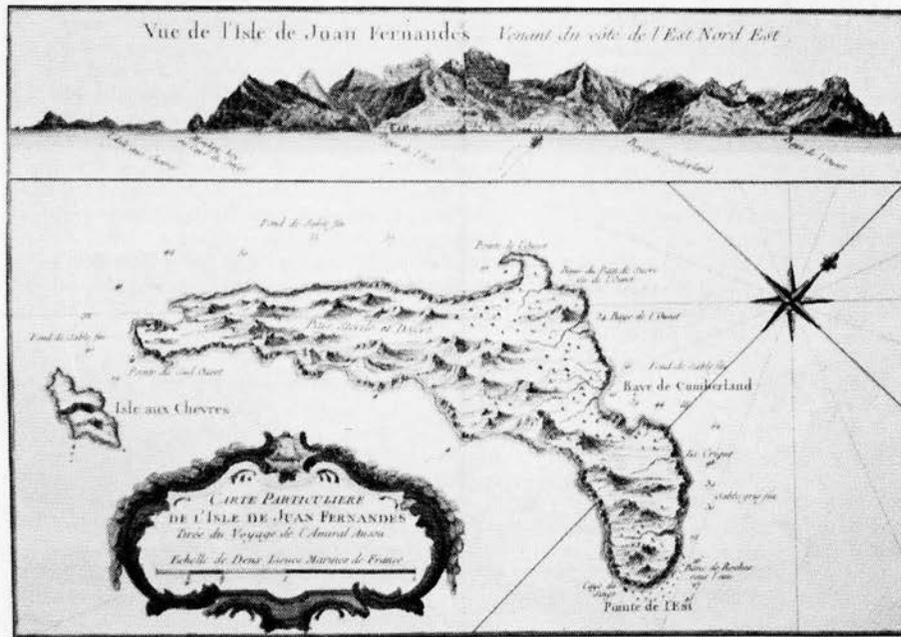
He who wishes to learn to calculate the tides must first know all the points of the compass with its quarter points and half points, since this is the essential foundation of this matter and without it there can be no certainty.

Portuguese sailing directions, c. AD 1500

(Charles O. Frake, 'Cognitive maps of time and tide among medieval seafarers', 1985, p. 262)

In order to find our way successfully, it is not enough just to have a map. We need a cognitive schema, as well as practical mastery of way-finding, to be able to generate an indexical image of the territory. ITEM 9.2 is a map of Juan Fernandos Island. To identify the island, you have to generate an image of what the island looks like from your position, as in the landfall sketch at the top. Thus indexical images are required in addition to the supposedly non-indexical information on the map (A. Gell, 'How to read a map: remarks on the practical logic of navigation', 1985, pp. 271–86). Though having a map makes the task of navigation a lot easier, it is not essential if you have a cognitive schema and practical mastery.

If we recall the Aboriginal bark paintings in Exhibit 5, we find it extremely difficult to see any topographical representation in them. The key map characteristic of spatiality or connectivity seems absent or sacrificed to the interests of symmetry or aesthetics. Reading them requires the acquisition of a large body of esoteric knowledge. However, David Lewis's example of the explanation given of a map of a journey he took with some Australian Aborigines shows that relative spatial location is indeed preserved. (Read ITEM 9.3.) It is accomplished through the telling of a myth that 'connects' the salient features of the landscape in the way the travellers experienced them. In other words, the bark painting can be read as a map only if you have a thorough understanding of the forms of life of Aboriginal culture. Likewise, European maps are not autonomous. They can only be read through the myths that Europeans tell about their relationship to the land.



9.2

Map of Juan Fernandos Island, with a view of the island as seen from an east-north-easterly direction at the top (1754). Made by J. Bellin after the voyage of Admiral Anson.

9.3

The way of the nomad

How do Aborigines find their way across the arid wastes of central Australia? Certainly, they achieve feats of unerring direction finding and tracking. To find out if their methods were in any way similar to the non-instrumental sea navigation of the Pacific Islanders, I travelled the fringes of the Simpson Desert in 1972 with the Antikarinya tracker Wintinna Mick . . . Then, in 1973 and 1974 the investigation was extended into the Western Desert under the tutelage of men, most of whom had spent their youth as nomadic stone age hunters.

What I learnt from them was mainly through practical demonstration on the trail. The lifting above the horizon of a particular escarpment exactly at the point predicted; our arrival at a stated destination in accordance with intricate instructions after hard travelling; and our finding aimed-for waterholes—the ultimate physical necessity—confirmed the value of their concepts and showed that I had grasped them correctly.

The total distance I travelled with Aborigines in those three years was seven thousand eight hundred kilometres, including a thousand kilometres over completely trackless terrain. Most was by Land Rover, with a small proportion on foot. Several journeys required the laying of petrol depots. The longest was a round trip of sixteen hundred and sixty kilometres from Yayayi settlement, three hundred kilometres west of Alice Springs, to the abandoned wells on the old Canning Stock Route, eight hundred kilometres west of the last human habitation in the Northern Territory.

All my preconceived ideas about 'land navigation' turned out to be wrong. In place of the stars, sun, winds and waves that guide Pacific Island canoemen, the main references of the Aborigines proved to be the meandering tracks of the ancestral Dreamtime beings that form a network over the whole Western Desert.

The importance of sacred sites was brought out when I asked Aborigines to point out the direction of distant places. In thirty-three instances, accuracy varied between exactly right and 67 per cent error—an enormous scatter. But every one of the big errors occurred when non-sacred places were being

indicated. For the six far-away sacred sites the error was never more than 10 per cent and, in fact, averaged 2.8°.

The place was between Warren Creek and Ilpili, in western Loritja-Aranda country, familiar to Jeffrey Tjangala and Yapa Yapa Tjangala, both Pintupi. It was featureless and flat, with moderately open mulga and spear grass, devoid of sandhills, creek beds, escarpments, tall trees or other references. Visibility through the evenly-spaced mulga was a hundred metres at most.

A kangaroo, wounded by a bullet, was hunted on foot for half an hour. After it was killed, Jeffrey and Yapa Yapa headed without hesitation directly back towards the Land Rover that had been invisible since the first minutes of the chase.

- Q. 'How do you know we are heading straight towards the Land Rover?'
 A. Jeffrey taps his forehead. '*Malu* (kangaroo) swing round this way, then this', indicating with sweeps of his arm: 'We take short cut.'
 Q. 'Are you using the sun?'
 A. 'No.'

The Land Rover duly appeared ahead through the mulga in about a quarter of an hour. Jeffrey then repeated his explanation, illustrating by gestures and by drawing in the sand the *malu's* track and our own 'short cut' home.

Had Jeffrey any points of reference? The only external one was the starting point, and the sun was not consulted. He was not using the 'points of the compass' (which could have been found from the sun) nor, in this case, did sacred sites come into the picture. It would appear that Jeffrey was orienting on some kind of dynamic 'mental map', which was continually being up-dated in terms of time, distance and bearing, and more radically realigned at each major change of direction, so that the hunters remained at all times aware of the precise direction of their starting point.

Next day we drove on westward over country unfamiliar to both men. About a hundred and seventy kilometres on, and uncertain of our exact position, we camped in a mulga clump on gently undulating but remarkably featureless *rira*, or stony desert country. Jeffrey drew a cross in the sand to represent north, south, east and west: I confirmed by the stars that his directions were accurate. He said: 'North, south, east and west are *like this in my head*. I know them because we were travelling west and circled back south until we were heading south-east

when we made camp.' He denied looking at the stars, and this was later dramatically confirmed by his inability to drive by the stars. Jeffrey went on to point out the directions of important Dreaming sites all around the horizon, beginning with one near Lake Disappointment, four hundred kilometres away.

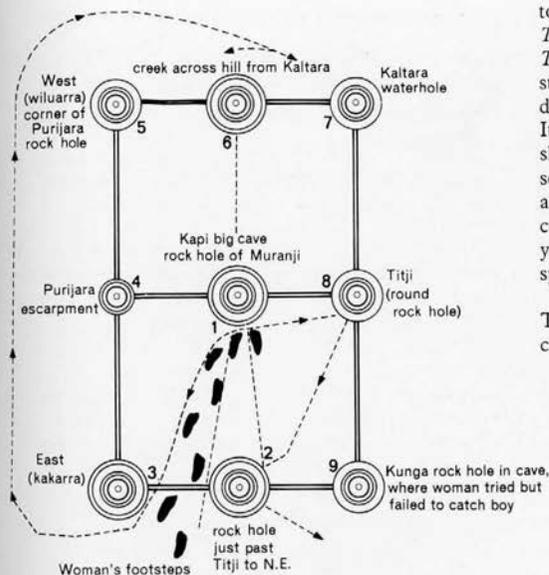
In similar circumstances, Billy Stockman Tjapaltjari, and Anmatjara, explained that he always knew the directions while we were traversing a semicircular route 'by keeping them in my head when we turn another way.' All these explanations of orienting were, plainly, in terms of continually up-dated mental maps.

When an Aboriginal depicts a stretch of country he generally incorporates its mythical with its physical features, so stressing the inseparable interrelation between the two. Such paintings cannot be interpreted without inside knowledge, yet their emphasis on the spiritual attributes of places makes them doubly memorable to the initiated. If such an abstraction seems strange, it is well to remember that Western maps, too, are often stylised. Neither contour lines nor the soundings on a chart are physical realities. Again, the map-diagrams on Sydney suburban trains are quite as abstract as anything drawn by Aborigines.

Let us now analyse a picture of Muranji Escarpment and Dreaming. This was painted in 1974 by Big Peter Tjupurrula, a Loritja and my *kuta* (elder brother), between our two visits to Muranji. It can be 'read' only by realising these three things: that the main Dreaming site is placed at the centre; the rock holes and other features are in the correct travel sequence and the corners of the escarpment (3 and 5) are approximately correctly oriented; the symbols representing rock holes and the rest have to be indentified by the 'map' maker himself.

The picture was taken with us on our second visit to Muranji to be explained and 'sung'. It is both the story of the Dreamtime old woman who chases a little boy and also a 'map'. The 'singing' of this picture was a secret-sacred rite during which a white woman was sent out of earshot. It was also indispensable to the 'map's' interpretation.

Here is an example of faultless orientation by the most unobtrusive landmarks to physically or spiritually significant places (two waterholes and a flint knife deposit; two sacred places). The terrain was a spinifex-covered plain, with some low sandhills and a few undulations hardly deserving the

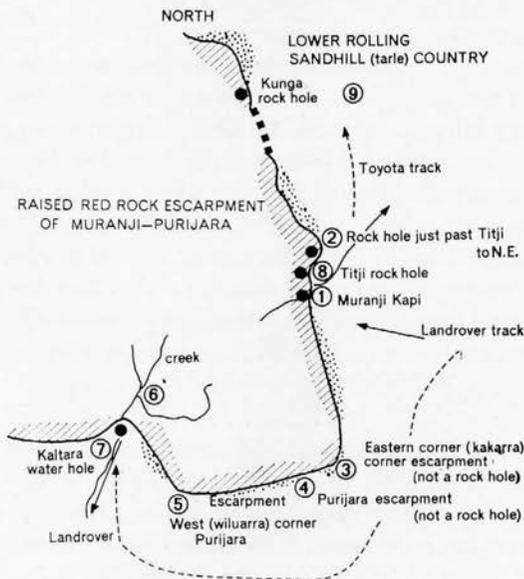


The diagram (top) shows how Big Peter Tjupurrula's picture represented Muranji Escarpment and Dreaming. Below is a sketch map of the same place—"The map diagrams on Sydney suburban trains are quite as abstract as anything drawn by Aborigines".

name of hills; it was known personally or by repute to all the nine Pintupi in the party. Our objective, *Tjulyurnya*, is a termination of the *Wati Kutjura Tjukurpa*, where a pattern of triangular yellow stones represent the Dreamtime *papa* (dingoes) that drove the two lizard men underground at this spot. It is extremely sacred and had not previously been shown to white men. The Pintupi, whose present settlement is at Yayayi, had travelled four hundred and seventy-five kilometres westward into their old country to bring back to Yayayi some of the sacred yellow stones, and to gather *mulyarti* wood for spears.

The distance from our camp at Yunala to Tjulyurnya was forty-three kilometres, all cross-country. The courses were as follows:

1. Seven kilometres a little south of west to Namurunya Soak, a tiny hollow that seemed, to my eyes, to have no identifying marks at all.
2. Thirteen kilometres south-west to a site where *kante*, sharp flints used for stone knives, were found. This was beside a low rise in the ground.
3. Five kilometres south-east, then round the end of a sandhill to Rungkaratjunku, a sacred site.
4. Winding in and out between low sandhills, generally west-south-west, sixteen kilometres to Tjulyurnya rock hole by a little hill. The sacred place was two kilometres further on.



The Pintupi's route-finding by these unremarkable landmarks was uncannily accurate. They always knew just where they were, they knew the direction of spiritually important places for hundreds of kilometres around, and were oriented in compass terms.

Aborigines travelling on foot at night take pains not to impair their night vision and hence their ability to follow the terrain. According to Yapa Yapa Tjangala, it was invariably the practice in such circumstances to have the fire sticks carried at the rear of the column.

Aborigines who move out from their extensive home ground into less familiar country make use of a variety of guidelines. Detailed knowledge of the myth-reinforced geography of the Dreamtime tracks, with their 'camps' and sacred sites—all real places whose physical features are often mentioned in the songs and stories—greatly expands their terrestrial horizons, but only in rather general terms. Mythical information is rarely exact enough to enable a complete stranger to locate with confidence the waterholes upon which life depends.

Animated discussion of every conceivable aspect of places visited or known by repute makes up a good part of camp and wayside conversation. This is an important factor in extending a person's range—and it solves the water problem . . .

(David Lewis, 'The way of the nomad', in *From earlier fleets: Hemisphere—an Aboriginal anthology*, 1978, pp. 78-82)

Exhibit 10 **MAPS AND POWER**

We have found in the previous exhibits that Western maps and aboriginal maps are more fruitfully compared in terms of their range and degree of workability or usability, rather than their accuracy. However, this leaves unexamined the dimension of power. Documents, texts, diagrams, lists, maps ('discourses' in general) embody power in a variety of ways. Discourses set the agenda of what kind of questions can be asked, what kind of answers are 'possible', and equally what kind of questions and answers are 'impossible' within that particular discourse or text. In terms of maps, for example, looking at a Mercator projection you can read off the relative direction of Anchorage from London as straight line, but you cannot read off the shortest route, it being a segment of a great circle. Maps, like theories, have power in virtue of introducing modes of manipulation and control that are not possible without them. They become evidence of reality in themselves and can only be challenged through the production of other maps or theories.

Joseph Rouse argues that

all interpretation (which includes all intentional behavior, not just discourse) presupposes a configuration or field of practices, equipment, social roles, and purposes that sustains the intelligibility both of our interpretive possibilities and of the various other things that show up within that field . . . Power has to do with the ways interpretations within the field reshape the field itself and thus reshape and constrain agents and their possible actions. Thus to say that a practice involves power relations, has effects of power, or deploys power is to say that in a significant way it shapes and constrains the field of possible actions of persons within some specific social context.

J. Rouse, *Knowledge and power: toward a political philosophy of science*, 1987, pp. 210-11

Bruno Latour, an anthropologist of science, has considered the question of power in a way that is of particular relevance to our analysis of maps and theories. Power is not, as many believe, the cause of society. It is not the glue that bonds classes or groups together. Rather, according to Latour, it is the consequence of association, and it is the varying techniques of association that should be the focus of study, in looking at power. John Law, a sociologist of science who takes a similar approach to Latour's, has looked at the methods of long-distance control that were necessary for the Portuguese to sustain a trading route to India. Law concludes that the power of the Portuguese trading empire derived from the forms of association embodied in three essential ingredients: documents, devices and drilled personnel (John Law, 'On the methods of long-distance control', 1986, p. 234ff).

Latour has discussed the difference between what he calls 'savage' and 'civilised' geography in the context of searching for an explanation of the difference between what are often referred to as 'scientific' and 'primitive' cultures. This, he argues, must not be looked for in terms of some 'great divide' based on the postulation of radically different intellects, cultures or societies. Instead we have to look for small mundane differences.

10.1

La Pérouse travels through the Pacific for Louis XVI with the explicit mission of bringing *back* a better map. One day, landing on what he calls Sakhalin he meets with the Chinese and tries to learn from them whether Sakhalin is an island or a peninsular. To his great surprise the Chinese understand geography quite well. An older man stands up and draws a map of his island on the sand with the scale and the details needed by La Pérouse. Another, who is younger, sees that the rising tide will soon erase the map and picks up one of La Pérouse's notebooks to draw the map again with a pencil . . .

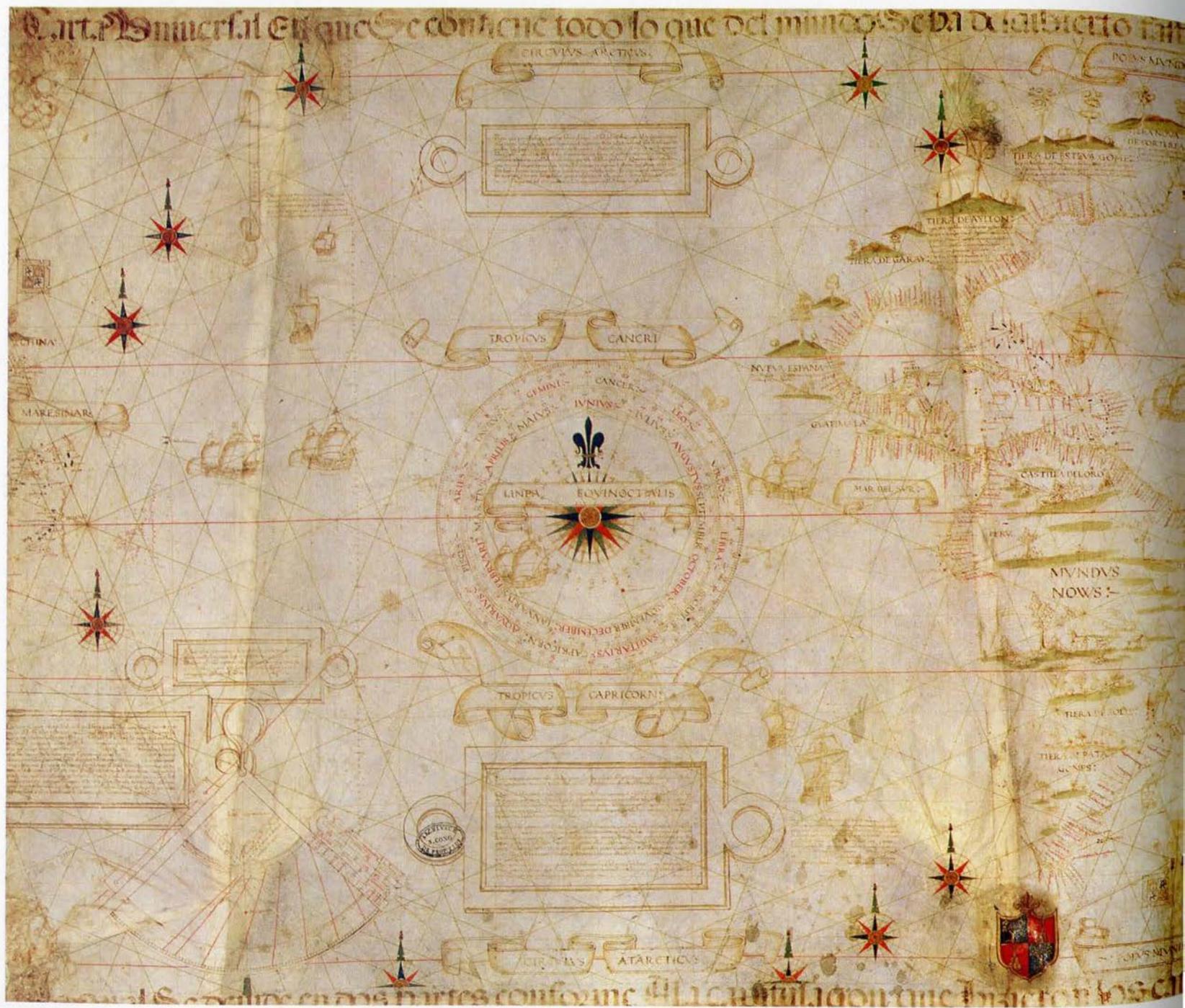
What are the differences between the savage geography and the civilized one? There is no need to bring a prescientific mind into the picture, nor any distinction between the close and open predicaments . . . nor primary and secondary theories . . . nor divisions between implicit and explicit, or concrete and abstract geography. The Chinese are quite able to think in terms of a map but also to talk about navigation on an equal footing with La Pérouse. Strictly speaking, the ability to draw and to visualize does not really make a difference either, since they all draw maps more or less based on the same principle of projection, first on sand, then on paper. So perhaps there is no difference after all and, geographies being equal, relativism is right? This, however, cannot be, because La Pérouse does something that is going to create an enormous difference between the Chinese and the European. What is, for the former, a drawing of no importance that the tide may erase, is for the latter the *single object* of his mission. What should be brought into the picture is how the picture is brought back. The Chinese does not have to keep track, since he can generate many maps at will, being

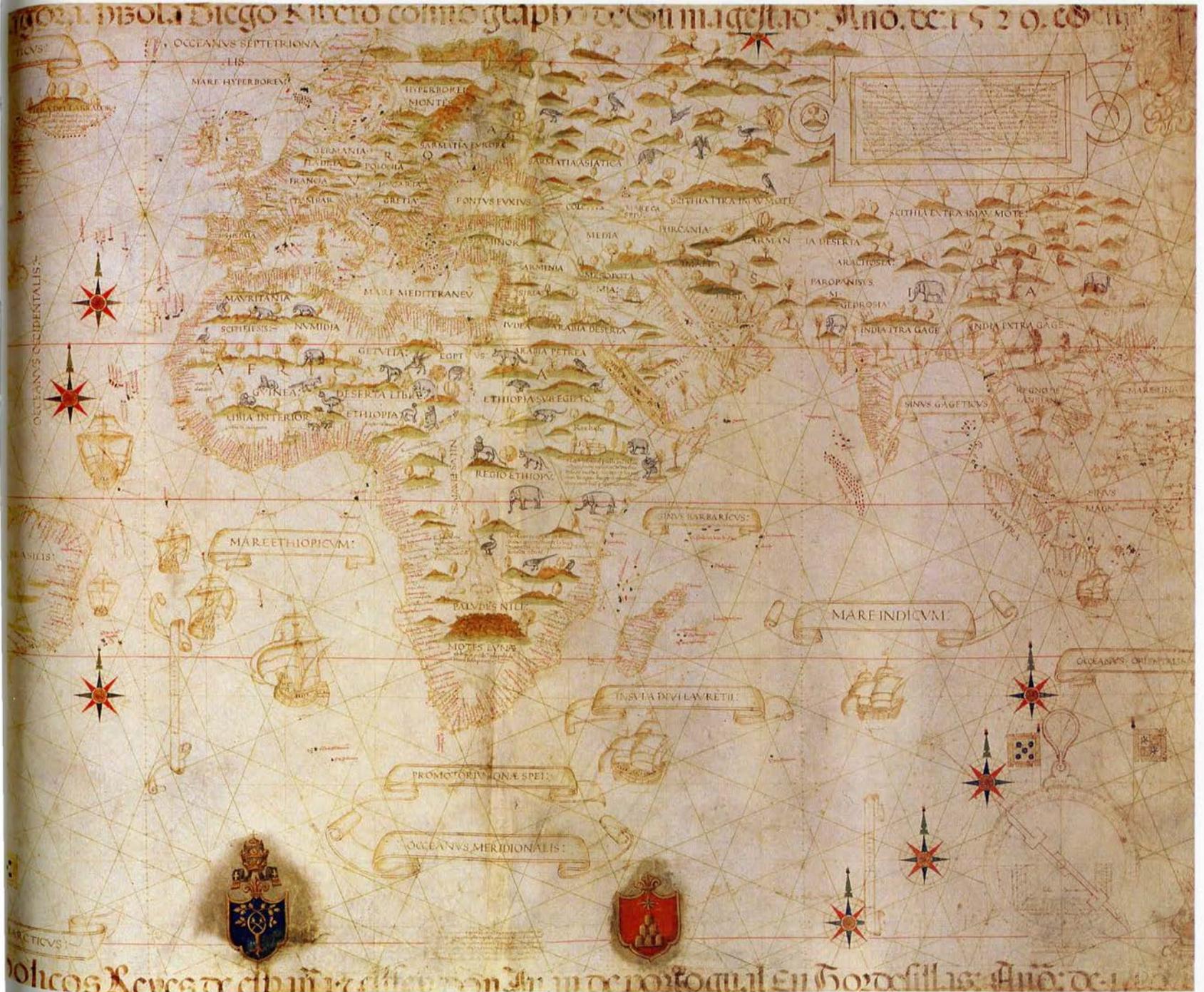
born on this island and fated to die on it. La Pérouse is not going to stay for more than a night; he is not born here and will die far away. What is he doing, then? He is passing through all these places, in order to take something *back* to Versailles where many people expect his map to determine who was right and wrong about whether Sakhalin was an island, who will own this and that part of the world, and along which routes the next ships should sail. Without this peculiar trajectory, La Pérouse's exclusive interest in traces and inscriptions will be impossible to understand—this is the first aspect; but without dozens of innovations in inscription, in projection, in writing, archiving and computing, his displacement through the Pacific would be totally wasted—and this is the second aspect, as crucial as the first. We have to hold the two together. Commercial interests, capitalist spirit, imperialism, thirst for knowledge, are empty terms as long as one does not take into account Mercator's projection, marine clocks and their markers, copper engraving of maps, rutters, the keeping of 'log books,' and the many printed editions of Cook's voyages that La Pérouse carries with him. This is where the deflating strategy I outlined above is so powerful. But, on the other hand, no innovation in the way longitude and latitudes are calculated, clocks are built, log books are compiled, copper plates are printed, would make any difference whatsoever if they did not help to muster, align, and win over new and unexpected allies, far away, in Versailles.

(Bruno Latour, 'Visualisation and cognition', 1986, pp. 5–6)

The answer, he claims, lies in the power of techniques of writing and imaging. They do not achieve this power in and of themselves but as a result of their capacity to muster allies on the spot—*allies*, that is, in the struggle over what is to count as fact. To illustrate his argument he tells the story of La Perouse's encounter with the Chinese on Sakhalin Island. (Read ITEM 10.1.) This story has parallels with that of the Inuit and the Belcher Islands (ITEMS 4.7–4.9). Clearly the Hudson Bay Company acquired greater power than the Inuit through the production of a more powerful map.

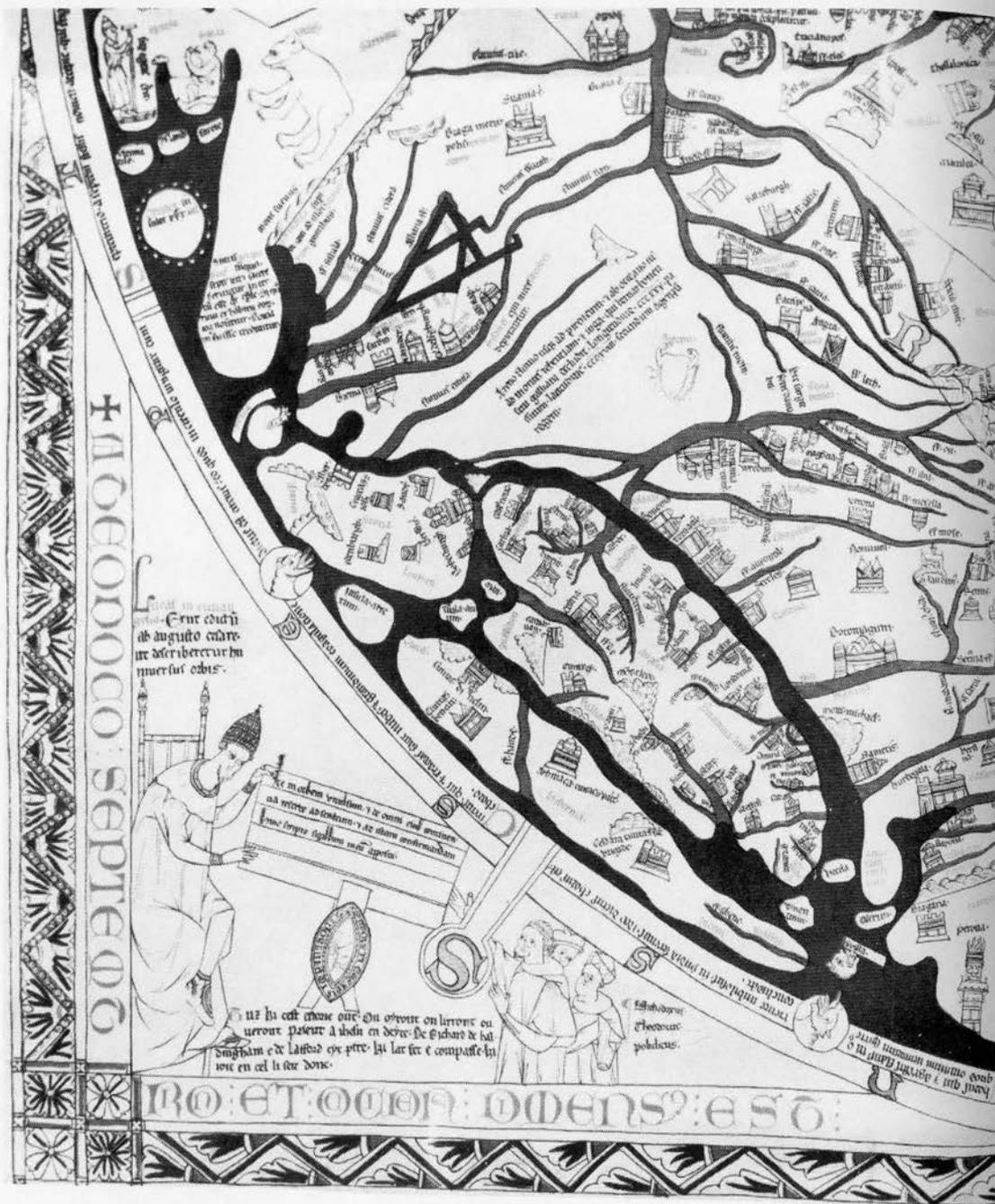
Thus we can now see that the real distinguishing characteristic of Western maps is that they are more powerful than aboriginal maps, because they enable forms of association that make possible the building of empires (see ITEMS 10.2 and 10.3), disciplines like cartography and the concept of land ownership that can be subject to juridical processes (ITEM 10.4). Western and non-Western societies alike are based on knowledge networks, the important difference being in the mobility of the network. The Western one can be mobilised to cover the whole earth, if not the universe, whereas aboriginal ones are usually dependent on interpersonal oral modes of transmission. One of the most effective devices that Western maps employ in creating power is the grid, as we have seen in Exhibit 4. But, as we have also seen, the grid does not provide power of itself.





10.3

Augustus Caesar's edict on the 13th-century Hereford *mappamundi* ordering a survey of the whole world.



10.2 (previous page)

The Portugese cartographer Diego Ribero's map of the world (1529), showing Pope Alexander VI's 'line of demarcation', dividing the undiscovered world between Spain and Portugal, following the Treaty of Tordesillas in 1494. Despite the fact that no one had either the instruments or the techniques to locate or define the line with any accuracy, the mere fact of having a map enabled a division of the world with immense political ramifications. The division was renegotiated in the Treaty of Saragossa in 1529. Portugal paid Spain 350 000 ducats to move the line in the Pacific further east in order to protect its monopoly of the Spice Islands. This readjustment gave the Portugese all of Australia bar a thin slice of the east coast, though this was not recognised in the treaty since Spain did not know of Australia's existence and Portugal kept her knowledge secret. The original demarcation line was established at the longitude that separates Western Australia from South Australia to this day. The Atlantic demarcation line is indicated by the two small flags at bottom centre and the Pacific demarcation flags are below the Spice Islands in the open sea where Australia was not known to exist at this time, at least by the Spanish.



10.4
Map of Inclesmoor Yorkshire produced in a dispute during 1405–08 over rights to pasture and peat.

While Australian Aborigines are capable of mobilising their networks beyond the local circumstance, this mobility does have social and technical limitations. But interestingly, it is because of the common social element in networks of power that Aborigines are able to use maps of their country, as shown by the dreaming tracks, in supporting land claims in white courts of law (ITEM 10.5). Thus in certain circumstances maps can be mobilised to move from one network or form of life and inserted in another. It is a mobilisation not always guaranteed of success as shown by such aboriginal examples as Hawk Puma (ITEM 2.6), the Chippewa Indians (ITEM 4.1), Non Chi Ning Ga (ITEM 4.6) and the Mexican Indians (see back cover). Examination of this issue is beyond the limits of this book, but the way knowledge in maps relates to social and political power is an important area for further study.

10.5

Story of the Yalata map by Kingsley Palmer, Australian
Institute of Aboriginal Studies, Canberra.

The Southern Pitjantjatjara and the map of their Dreaming tracks

In 1981 as part of my research in the southern portion of the Great Victoria Desert I collected extensive information about the myths and tracks of the ancestral beings of the creative era of the Dreaming in this part of Australia. When my research was completed I drew up the Dreaming tracks and transferred this information onto a topographical map which provided a visual representation of the travels of the ancestral beings across this portion of Australia.

I subsequently returned to the community and took with me the map as a gift since I thought it was one way of demonstrating to the people something of the work that I had undertaken on their behalf. The response of the Aboriginal people was most interesting.

My Aboriginal helpers immediately regarded the map as an item of great cultural importance. They were concerned about the safety of the map and about the information that it contained. They considered that some of the details were in fact secret and should only be known by them. This was because a number of the myths included incidents that would generally only be discussed by mature and fully initiated men. They also recognized that the map contained secrets about their country and they were concerned to ensure that it did not fall into the wrong hands. They were particularly concerned about exploration geologists or certain government officers seeing the map and thereby understanding their secrets. It was agreed that the map would be placed in the vault of the bank in the nearby town. It was also arranged that the map could only be withdrawn with the permission of three of the older members of the community.

At this time the community was involved in extensive and protracted negotiation concerning the return of the Maralinga lands to the community. As a part of the negotiations a group of parliamentarians flew up from Adelaide to hold a meeting with the community at a site not far from the lands, in order to hear the Aboriginal claims to the country.

I was also invited to attend this meeting which was held in the sand dunes a few kilometres north of the trans-Australian railway line at a place known as Ooldea. When I arrived and the meeting commenced, I was surprised to discover that my map had been withdrawn from the bank. At a suitable time when the men had taken the parliamentarians to one side, the map was unrolled on the desert sands and the visitors were shown the Dreaming tracks as they extended over the countryside. The Aboriginal people were at great pains to point out the extent of the Dreaming tracks and the numerous sacred sites that were noted on the map and which were linked by the lines that represented the travels of the Dreaming ancestors.

Subsequently, in 1984, the majority of the Maralinga lands were handed back to the Aboriginal people who now hold this country freehold. The map has been returned to the bank where it has acquired the status of a title deed to the country. From the Aboriginal perspective it represents one proof of their close and enduring spiritual ties with their country. According to their understandings, the travels of the mythological beings and the sites they made are a spiritual reality which links them to the land and demonstrates their unity with it.

Exhibit 11

MAPS AND THEORIES CONCLUDED

'Only connect . . .'

(E. M. Forster, *Howards end*, epigraph)

What, then, have we learned about maps that is of some value in understanding theories? They are conventional, selective, indexical, embedded in forms of life, dependent on the understanding of a cognitive schema and practical mastery. They can be enormously powerful and can sustain not just successful exploration of foreign parts but whole empires. At base there is something more than merely metaphoric about maps and theories; they share a common characteristic which is the very condition for the possibility of knowledge or experience—connectivity. Since we cannot have a pure unmediated experience of our environment, that experience is better understood as an active construction resulting from a dialectical interaction between the 'lumps' in the landscape and our imposed connections of those lumps. Our experience and our representations are formative of each other and are only separable analytically. Hence there is an important sense in which the map *is* the territory, even though paradoxically the territory *is not* the map.

However, there are some difficulties in equating maps with theories if we take theories to be the embodiment of objective knowledge. This view of science has become problematic since the appearance of Thomas S. Kuhn's *Structure of scientific revolutions*. It is now recognised that theories and observations are inseparable, and also that for any given set of observations there exist in principle an indeterminately large number of theories that could fit. Most problematically though, theories do not come with a full set of rules about how to apply them in given cases. If you go back and reread the quote from Kuhn at the beginning, which was selected for its discussion of maps, you find Kuhn saying 'Through the theories they embody, paradigms prove to be constitutive of the research activity'. This gives the impression that to Kuhn theory is central to science. However, Kuhn himself in later trying to clarify his position makes it clear that he takes 'shared examples of practice' to be the central elements in science (T. S. Kuhn, 'Second thoughts on paradigms', 1977, pp. 459–99).

To see science as a 'field of practices' rather than a 'network of theories' makes a profound difference to our understanding. It is especially significant when it comes to maps. If maps are seen as theories in the sense of fully articulated objective knowledge, then only one small group of maps appears to qualify as real maps—the supposedly accurate contemporary Western maps. We have seen, in the process of looking at the exhibits, that there are difficulties with that position. On the one hand, it fails to acknowledge the workability and potential power of maps from non-Western cultures, while on the other hand, it fails to acknowledge the contingent character of Western maps. The approach we are considering here, by recognising maps as embodying shared examples of practice, makes it perfectly reasonable to accept all maps as having a local, contingent and indexical character intimately tied to human purposes and action.

The concept of science as fields of practice also highlights the importance of skills and tacit knowledge, which are often overlooked or suppressed when the purely theoretical is emphasised. Skills and tacit knowledge are modes of knowing the world that exemplify Wittgenstein's forms of life. They depend on givens that cannot be spoken of, in the same way that you cannot explain how to ride a bike. If we had to wait for a theoretical explanation of bike riding, nobody would even get on the saddle. If maps are shared examples of practice, perhaps science can be thought of as a compendia of maps, that is, an atlas, as an example of the way in which people have to work to make the whole hang together. Ultimately maps and theories gain their power and usefulness from making connections and enabling unanticipated connections. Science is an atlas not because all its theories are connected by logic, method and consistency. There is no such logic, or method or consistency. Science is riddled with contradiction and disciplinary division. Science is an atlas because the essence of maps and theories is connectivity. Maps and theories provide practical opportunities for making *connections* whenever and wherever it is socially and politically strategic.