The nature of maps: an ambiguous phrase.
Furthermore, a comparatively famous one. In 1976 Arthur Robinson and Barbara Bartz Petchenik used it for the title of a book they subtitled Essays Toward Understanding Maps and Mapping. In 1991 J.B. Harley added New to the phrase to give the book he was proposing the title, The New Nature of Maps: Essays in the History of Cartography.¹

Harley’s was an explicitly subversive gesture. Although Harley died before he was able to write the introduction that would have justified his title, he gave his publisher the following description of his intentions:

The dominant view of modern Western cartography since the Renaissance has been that of a technological discipline set on a progressive trajectory. Claiming to produce a correct relational model of terrain, maps are seen as the epitome of representational modernism, rooted in the project of the Enlightenment, and offering to banish subjectivity from the image. Cartographers have thus promoted a standard scientific model for their discipline, one in which it is claimed that a mirror of nature can be projected through geometry and measurement. Furthermore, this model for maps has colored the critical values of historians of cartography; they often assess early maps by this modern yardstick, thereby excising from the accepted canon of mapping not only maps from the pre-modern era but also those from other cultures that do not match Western notions of accuracy.

The essays in this book – through historical examples and by a critical examination of the practices of modern cartography – seek to offer an alternative view of maps. Drawing on ideas in art history, literature, philosophy, and the study of visual culture, they subvert the positivist model of cartography, replacing it with one that is grounded in iconological and semiotic theory of the nature of maps. The interest of maps is shown to lie not so much in mimetic value but as simulacra which nevertheless may exert a profound influence upon the way space is conceptualized and organized within different cultures.
societies. The theme of power is central to many of the essays. The way in which power – whether military, administrative, religious, or economic – is inscribed on the land through cartography is dissected and the nature of the political unconscious in maps is explored and illustrated. In new introductory and concluding essays aspects of this debate will be updated. The conclusion addresses the ultimate cartographic paradox: the map is not the territory yet it often precedes, and even becomes that territory.2

Despite their differences, Harley’s and Robinson and Petchenik’s ideas about the nature of maps – and certainly Harley intended his first paragraph to be a description of Robinson and Petchenik’s nature of maps – refer to the nature of maps, that is, to the nature, or inherent character, of maps as distinguished from the nature of painting, sports, or small dogs. But with equal grace the phrase can refer to the nature of maps, that is, to concepts of the natural – as distinguished from the cultural – figured by and brought into being on and by maps.

It is our intention both to insert ourselves into this history of ideas about the nature of the map and to embrace the ambiguity of the phrase, to explore the nature of maps by exploring the nature of maps and the nature of maps by exploring the nature of maps. We contend there can be little understanding of the one project except in the light of the other. We will show that the nature maps bring into being is one – actually it is a multitude – dependent on the nature of maps, while the nature of maps is best understood through its mapping of nature. This follows from the very idea of nature, which is about the intrinsic, the essence, the physical, the out-of-doors, the forces of the physical world, the primitive, the untouched-by-civilization, the uninfluenced-by-artificiality: the real. Nature wants to be the just-born, the innate, the naive, the untutored, the untaught, the unsophisticated, the unpolluted, the apolitical, the above-all-else nonideological, which is the one-word way Harley described what he’d been writing in those essays of his – an “inquiry into ways in which maps are ideological constructions and have been used as a classic form of power/knowledge in past societies.”3

In the years since Harley wrote these words it has grown apparent that many people (if by no means all) are willing to accept maps as ideological constructions when it comes to zoning, school attendance districts, legislative districts (people love to say “gerrymander”), and national boundaries. But, then, the subjects of such maps are understood to be human constructions in the first place. There is nothing (it is said) natural about political boundaries; all are ideological creations. In this way, the ideological construction gets displaced from the map to its subject. The map itself remains uncontaminated; it is recovered as (what it claimed to be all along) no more than a conduit through which the ideological content – as all map content – passes undistorted, or if at all, then by no more than the “white lies” necessitated by the difficulties of printing the world on paper. We reject this sophistry in all its parts.

The Structure of the Map’s Construction of Knowledge

By focusing our attention on the nature of maps, that is, on what above all is supposed to be free of ideological construction – mapped wildlife, earthquakes, hurricanes, mountains, canyons, birds, butterflies, pinnipeds, ecosystems, landforms, vegetation, topography – we show that it is the map, hardly alone, in collaboration with other sign systems, which creates ideology, transforms the world into ideology, and by printing the world on paper constructs the ideological. It doesn’t matter what has the map’s attention. Whatever its subject is will be turned into something it isn’t and in the process inescapably, unavoidably made ideological. At a minimum, at the most atomistic, it will be a construction, an invention, a conception, something drawn not from the world but from the mind of men and women; for maps are made not of wildlife, earthquakes, hurricanes, mountains, canyons, birds, but of signs – these themselves composed of marks and concepts.

The map: a field of concepts. There can be no escaping this.

But it’s worse, much worse, for as slippery as these conceptual atoms may be, to make a map they must be aggregated into molecules and macromolecules of meaning in which constructions, interests, and ideologies enter at every point. But no sooner have we realized this than we find ourselves dealing with the nature of the map. We will show that the map is nothing more than a vehicle for the creation and conveying of authority about, and ultimately over, territory. We will demonstrate that the authority the map claims is the social manifestation of what the map presents as its “intrinsic” and “incontrovertible” factuality. We will spell out the way this factuality is constructed through the social assent given to the propositions maps embody. We will show how these propositions take the form of connections made among conditions, states, processes, and behaviours. Finally, we will make clear the way these connections are realized through the fundamental spatial/meaning propositions we propose to call postings. The posting is a proposition of the form, “this is there.”

By uniting an existence claim and a location, the posting locks together the nature of the map and the nature of the map. It is here, at the level of the posting, where it is claimed that this of nature is – a waterfall or cliff, sequoia or syncline, high pressure cell or coral reef, mountain range or river – and that it is there – at this bend in the river or on that face of the mesa, in this grove or beside that anticline, in this system of winds or surrounding that island, rising above that plain or draining that basin – that
the *this* takes on its *there* form, and the *there* takes on its *this* form. It is with the posting that nature is made spatial. The claims, that it *is*, and that it *is there*, reinforce each other. The *there* claim implies a reality test, that you can go there and look, a test that rises to the level of a challenge: “Why would we put it there if it weren’t so? Check it out if you want!” Insisting that something is *there* is a uniquely powerful way of insisting that something *is*. Mapped things – no matter how conceptually daunting – possess such extraordinary credibility that they’re capable of propelling into popular discourse abstruse abstractions cantelivered from abstruse abstractions: high pressure cells, El Niño, seafloor spreading, thermohaline circulation.

“You don’t believe it? Check it out.”

*This* is *there* – that tree – and *this* is *there* and *this is there*: through spatial magic the existence of the tree is transmuted into the existence of a forest, the existence of the forest is transfigured into the existence of an ecosystem, the existence of the ecosystem is transmogrified into the existence of nature. Nature. In space. As a spatial thing.

But the map can’t leave well enough alone. It wouldn’t be a map if it did. If it stopped at this atomic level – at the level of spatialized thing – the map would amount to a kind of spatial ontology. What makes the map a map is its exploitation of spatialized things – themselves propositions (this is there) – as the subjects of yet higher order propositions (this is there and therefore it is also . . .). The map *is* these propositions. Technically, a proposition is a statement in which the subject is affirmed or denied by its predicate (this is there). Take this ginseng plant. The map affirms of this ginseng plant (the proposition’s subject) that it *is*, and therefore that it is also *in*, which is to say *of*, the Great Smoky Mountains National Park (the proposition’s predicate). It could be the other way around (there is this). The map equally affirms of the park (the new proposition’s subject) that it *is*, and therefore that it also *contains* ginseng (the new proposition’s predicate). Either way the map *links* the plant and the park.

In so doing it connects the plant to the system of rules and regulations that is just another way of saying “national park.” The park is not a collection of trees, shrubs, and other wildlife. That would just be a forest. The park is a way of *relating* to trees, shrubs, and other wildlife. These ways of relating are codified in rules and regulations. Some of these forbid the culling of ginseng. To cull ginseng in the Great Smoky Mountains National Park is therefore to poach. To cull ginseng outside the park, say across the road in a national forest (Pisgah or Nantahala), or on private land, is either to harvest or to steal, depending on how the map in question links the *theses* of the plants in question to the relevant systems of rules and regulations, codes and laws (to the relevant property rights). In the national forest, where trees can be cut, animals hunted, and plants gathered and sold, anyone can get a permit to cull ginseng. Poaching from private land, on the other hand, is a larceny.

Note that at this point a territory has been invoked. It has a national park, national forests, and parcels of private property. These are all equivalently subjects of different propositions made by the maps that invoke the territory. It is through the simultaneous affirmation of these propositions that the territory *as such* is brought into being. What assures us that the propositions are true? That they state facts? Only the *social assent given them*, the confirmation by the courts and by the court of public opinion, the voice of newspapers, and friends: “You shouldn’t have been in the park. You should have stayed in the forest on the other side of the road.”

**Social Assent and Reference Authority**

The continual assent given to the propositions made by maps endows them with the authority that is uniquely that of *reference objects*. These include catalogues, calendars, concordances, encyclopaedias, directories, phone books, dictionaries (*Merriam-Webster’s*, the *OED* [look it up!]), thesauruses (*Roget’s*!), glossaries (at the end of every textbook), textbooks (*Organic Chemistry* – no subtitle), the *National Geographic*, the *Times* (*New York, London, Los Angeles*), *TV Guide*, style guides (*The Chicago Manual of Style* [fifteenth edition!], *Turabian*, *Strunk* and *White*), cookbooks, field guides, travel books (“What does the *Mobil Guide* say?”), footnotes, citations, legal citations, priests, eye witnesses, constitutions, parliamentary procedures. All of these constitute objectifying resources that permit a claimant to insist that, “It is not I, not I who says this, but –” before dropping, like a tombstone, the name of some revered reference object (*Langenscheidt’s*, *Grove’s*, the *Britannica*, *Larousse*, *Merck*).

Maps too are objectifying resources: the maps of Hammond, Bartholomew, Rand-McNally, Esselte, the National Geographic Society, AAA, Mobil, Michelin, the United States Geological Survey, other national mapping services, state highway maps, the *Thomas Guides*, *Falk’s*, bus maps, maps of metro lines. Maps objectify by winnowing out our personal agency, replacing it with that of a reference object so constructed by so many people over so long a time that it might as well have been constructed by no one at all (“It is not I who says this, but . . . *the entire human race*”). Citation enhances a source’s authority but also the authority of the one who cites it. The reflected light is blinding. Opposition is extinguished.

“You don’t believe the map? Check it out!”

This authority, apparently descriptive, is inherently prescriptive. The phone book is not a guide to numbers from which one may feel free to pick and choose (though plenty evidently do): it *tells* you what to dial, it *prescribes*
the number. A street directory gives you the address. There is no “Hmmm” here as there is over the choices a thesaurus offers or among the shades of meaning provided by decent dictionaries, where even so there is little hemming or hawing over spelling. The dictionary is absolutely prescriptive about spelling, a social fact we acknowledge – that we dramatize – in the annual rite of the National Spelling Bee. Among the mutual validations – spellers validating the authority of the dictionary, dictionary validating the speller’s spelling – the prescriptive, the authoritative, is hard to miss.

Here: in this morning’s paper there is an article about the new legislatively mandated North Carolina social studies curriculum. The large, colourful photo illustrating the story is an overhead shot of an eighth-grade girl crouched over the state’s transportation map. Her left hand, forefinger extended, is on the transportation map, while her right hand transfers features – interstate highways and state and national forests – to a small outline map of the state. She is a human pantograph, literally reproducing – and by reproducing affirming – the existence (the this-ness) of state and national forests. As she traces their location (their there-ness), she simultaneously reproduces – and by reproducing affirms – the existence of North Carolina as a state of state and national forests. North Carolina’s there-ness is established later, in an exercise caught in another colour photo on an inside page, where another student uses a globe to establish the state’s coordinates. In all of this the map’s authority is absolutely taken for granted.

The newspaper validates, with its literally glowing presentation, this power of the map to establish, almost in the religious sense: the world as a sphere; North Carolina as a state of roads and forests; and the state and national forests as enclaves of green (the students colour them green). It is these validations – the newspaper’s, the curriculum’s, the school’s, the girl’s – repeated uncountable times (hundreds and hundreds of times in this classroom alone) – that makes the map the potent vehicle for the creation and conveyance of authority about, and ultimately over, territory.

The Paramap Tells Us How to Read the Map

The map itself – the piece of paper covered with ink – insists on this authority. Rare is the map that fails to advertise in itself its claims to be taken authoritatively. This advertisement takes the form of what, by analogy with Gerard Genette’s coinage of “paratext,” we propose to call the paramap (see Table 1). Genette distinguishes paratext into peritext and epitext (thus, the perimap and epimap). “In other words,” Genette says, “for those who are keen on formulae, paratext = peritext + epitext.”

The peritext consists of all the verbal and other productions that surround and extend a text in order to present it: the quality of the paper, the quality of the binding, the character of the type, that of the printing, the dust jacket copy, the series indication (if any), the author name (anonymous, pseudonymous, with titles, without, etc.), and the work’s title, together with whatever dedications, inscriptions, epigraphs, prefaces, forewords, intertitles, notes, and illustrations there may be. The epitext consists of all the paratextual elements “not materially appended to the text within the same volume, but circulating, as it were, freely, in a virtually limitless physical and social space” – for example, advertisements, the letters publishers send out with review copies, promotional appearances by the author, interviews, lectures and so on, again, surrounding the text in order to present it, in order to shape its reception. We have in hand, for example, a book club flyer, “Bonum Book Selections: Choose from a Wide Range of Reader Favorites” advertising The Smithsonian Atlas of the Amazon. Copy promising an “exhaustively researched volume” is decorated with a cover shot, an inset map, and a blue bubble enthusing, “More than 150 Color Maps!” The exclamation point, the large number, the assurances that the book is a “Reader Favorite,” that it’s been “exhaustively researched,” and its institutional affiliation with the Smithsonian conspire to position the atlas as authoritative and desirable. In Genette’s terms, the flyer is a piece of the epitext; it also happens to be a piece of the epimap of every map in the atlas.

The perimap carries out its labour closer in. “Australia Under Siege,” a map supplement from the National Geographic Society, smoothes its primary map (equivalent to Genette’s “text”) with seventeen ancillary maps, a timeline, a chart, four graphs, five photographs, twenty-seven blocks of type, several dozen call-outs, legends, titles, scales, and credits. The map’s construction of Australia as a biological horn of plenty besieged by its human inhabitants is largely a function of this rich

Table 1. The paramap can be broken down into perimap elements and epimap elements.

<table>
<thead>
<tr>
<th>Perimap</th>
<th>Epimap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titles</td>
<td>Accompanying article(s)</td>
</tr>
<tr>
<td>Photographs</td>
<td>Advertisements that refer to the map</td>
</tr>
<tr>
<td>Illustrations</td>
<td>Marketing copy</td>
</tr>
<tr>
<td>Charts, graphs, timelines</td>
<td>Letter from the editor</td>
</tr>
<tr>
<td>Legends, scale bars, north arrows, other standard cartographic elements</td>
<td>Letters to the editor about the map</td>
</tr>
<tr>
<td>Callout text, blurbs</td>
<td>Behind the scenes info (how the map was created)</td>
</tr>
<tr>
<td>Credits</td>
<td></td>
</tr>
<tr>
<td>Borders, decorative elements</td>
<td></td>
</tr>
</tbody>
</table>

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perimap, though the epimap – the accompanying article in the National Geographic and its paratext (the title, “Australia – A Harsh Awakening,” the blurb on the contents page with its “...now barren fields of salt and dwindling marsupial populations,” the note “From the Editor,” the photographs with their titles and captions [“A graveyard of skeletons with gray arms raised in good-bye”], the “Behind the Scenes” item, and the later letters to the editor) – contributes to the construction substantially.

Ignoring the paramap, as contemporary cartography textbooks do (except for titles, legends, and scale bars, it’s like the paramap doesn’t exist), makes it much easier for such texts to ignore the claims of ideological construction to which the paramap is the essential guide. As a way of suggesting what’s at stake we ask, “Would the projection promoted by German historian Arno Peters have stirred an iota of interest had it not been for its paramap?”

This is easy to answer, since except for its paramap the Peters projection is identical to James Gall’s 1885 Orthographic Projection, which never attracted any attention at all. But then Gall’s perimap said, “Gall’s Orthographic Projection/ Equal-area Perfect/ for Physical Maps, chiefly statistical,” and its epimap more of the same at greater length.9 Whereas Peters’ perimap said, among much, much else (in large type along the margins of the map):

Five thousand years of human history have brought us to the threshold of a new age. It is an age typified by science and technology, by the end of colonial domination, by a growing awareness of the interdependence of all nations and all peoples.

Such a moment in history demands that we look critically at our understanding of the world. This understanding is based, to a significant degree, on the work of map-makers of the age when Europe dominated and exploited the world.

Surprisingly, maps still reflect that bygone era.

The new map, the work of German historian Arno Peters, provides a helpful corrective to the distortions of traditional maps. While the Peters Map is superior in its portrayal of proportions and sizes, its importance goes far beyond questions of cartographic accuracy. Nothing less than our world view is at stake.

... In the complex and interdependent world in which the nations now live, the peoples of the world deserve the most accurate possible portrayal of their world. The Peters Map is that map for our day.10

Peters’ perimap essentially accused cartographers of producing distorted maps in the service of a discredited European colonialism – of being ideologists in a bad cause – and positioned his map as a unique antidote. Next to the UN seal in the map’s lower right-hand corner it said, “This map is produced with the support of the United Nations Development Program.”

Cartographers flipped! Driving them even more insane was an epitext, Peters’ inflammatory book, The New Cartography.11 The most reputable review of The New Cartography – Arthur Robinson’s – opened with, “The review of a book such as The New Cartography would ordinarily be short since much of it is misrepresentation, is illogical and erroneous, and one’s initial reaction is simply to dismiss it as being worthless.” The review nevertheless proceeded to eviscerate Peters for another eight pages.12 As a scholar and a gentleman, Robinson did not stoop to mudslinging, but characterizations like, “Arno Peters, the German architect of this novel map, was in fact not a cartographer at all but a journalist and propagandist for leftist causes who had mastered ‘the art of writing press releases,’”13 by other critics made them sound like right-wing ideologues on an AM talk show. An entrenched profession attacked everything – especially the claim that the map was new (Peters hadn’t known about Gall) – but remarkably, the critics didn’t confine themselves to Peters’ paramap or even the rechristened Gall-Peters projection: they launched an attack against rectangular world maps in general.

Like Mercator’s and many others, the Gall-Peters projection produces a rectangular world, unlike those of, say, Robinson and Mollweide, which are curved. At the very height of the controversy, the American Congress on Surveying and Mapping adopted a “sternly worded resolution condemning [rectangular maps] for ‘showing the round earth as having straight edges and sharp corners.'”14 This preposterous (and wholly ineffectual) resolution was endorsed by the American Cartographic Association, the American Geographical Society, the Association of American Geographers, the Canadian Cartographic Association, and the National Geographic Society and all because of the paratext – which few of those endorsing the resolution would even consider part of the map – of a map they universally dismissed.15

That the paramap should have this power is no surprise. Rare is the image that can dispense with words. Roland Barthes wondered whether any system of signs could do without them: “Is there,” he asked, “any system of object-signs which can dispense with articulated language? Is not speech the inevitable relay of any signifying order?”16 By relay Barthes always understood a second-order message, a connotation parasitic on a first-order message, as a caption to a photograph (say in a fashion magazine), or the text on a map (say in the title or legend). Among what Barthes called the relay effects of speech were its ability to fix – to immobilize – perception at a given level, first of all at the level of the photo or map, say, rather than at that of the paper, the printing screen, or the typeface; but then to draw attention, as to the collar or hemline (in the fashion photo) or to the system of highways (in a road map).
Other relay effects of speech include its ability to go beyond the image, to interpret, to say what the narrow collar means (it’s sexy) or the tint of red in the legend (the road is limited access), and its ability to direct attention, to emphasize (“Pay attention to this”). In Peters’ case, the paramap attempts to keep us focused on the equal-area property of his map, to force us to compare it along this dimension to the unequal-area Mercator, and to pretty much ignore everything else. His paramap immobilizes our perception on his chosen ground. Every map does this.

Cognitive Cartographics

Given a main map, legend, texts, seventeen ancillary maps, a timeline, a chart, four graphs, five photographs, several dozen call-outs, legends, titles, scales, and credits as in “Australia Under Siege”; or even a main map, text, seven ancillary maps, titles, scales, and credits as in The Peters World Map; given this heterogeneity, what is one to do? That is, what sense is one to make of it? How to assemble it, pull it all together?

Contemporary cartography textbooks treat this as a problem in graphic design: “Titles, legends, scales, and insets may be arranged in various ways in the graphic organization of a map,” say the authors of Elements of Cartography, Sixth Edition, where none of their examples comes near to approaching the complexity of ours:

Nothing should seem out of place. Layout is the process of arriving at proper balance. In a well-balanced design, nothing is too light or too dark, too long or too short, too small or too large, in the wrong place or too close to the edge… The cartographer’s job is to balance visual items so that they “look right.”

In the illustration accompanying these remarks, circles and squares balance or unbalance a beam depending on their size and distance from the fulcrum. Another illustration displays differently proportioned rectangles with the admonition that those in the ratio of three to five make “the most stable and pleasing map format.” Yet another illustration shows different arrangements of title, legend, and locator inset, all three of which map-makers are encouraged to retain no matter how difficult the design. The text does not contemplate a text (with citations to other texts), twenty-six supplementary maps, titles, scales, and credits. Another text, Borden Dent’s Cartography: Thematic Map Design, is more sophisticated, but again nothing like the complexity of our examples is contemplated. This whole tradition of thinking about maps as graphics comes out of an illustration, out of an advertising tradition. Indeed, the text in Elements of Cartography (whose first edition came out in 1953) could have been lifted from something like William Longyear’s Advertising Layout (whose first edition came out in 1946). For example, Longyear says:

Balance is most important in a layout. The various sizes and shapes of the elements in the layout must have good artistic composition. There are few, if any, distinct formal rules to guide the layout man in deriving good balance. Balance has some of the qualities of a seesaw. By setting a vertical line through the center of the layout to serve as a fulcrum, elements may be balanced for both size and weight.

Given the prevalent idea that maps amount to a kind of “seeing,” none of this is surprising. Committed as most cartographers are to the idea that maps “present information,” cartographers rather appropriately approach map design as they would the design of an advertisement… or a smorgasbord… where the aim is to make everything as attractive as possible to draw the grazing eye.

Doubtless this is all sound advice (though what heart a designer is to take from knowing that in a well-balanced design nothing is “too light or too dark, too long or too short” is open to question) but, given that we see maps as systems of propositions (as arguments), nothing could be further from what we have in mind. The question is not for us how things are arranged for the eye, but how the design promotes and constrains, how it directs, the construction of meaning. It is not about the “presentation of information.” It is about the construction of meaning as a basis for action. It is for us a question of cognition. The discipline that has contributed most substantially to our thinking is the new and rapidly evolving one of cognitive linguistics. We’re proposing that cognitive linguistics is a good model for thinking about cartography, for thinking about cognitive cartographics.

Why cognitive linguistics? Because it is a nonrepresentational approach to language that is concerned with how we think, act, and communicate. Unlike historical forms of linguistics, which were essentially concerned with the nature of the signal, cognitive linguistics is concerned with the meaning construction upon which language operates. For cognitive linguists, “meaning construction refers to the high-level, complex mental operations that apply within and across domains when we think, act, and communicate.”

This makes it a form of linguistics analogous in intent to the theorizing we’re doing about cartography, which is directed toward the thinking, acting, and communicating that maps facilitate (i.e., cognitive cartographics). No surprise then that cognitive linguistics critiques historical forms of language theorizing in much the same way that we have critiqued traditional theories of cartography. For example, cognitive linguistics critiques traditional forms of language theory for their predisposition to sharply separate components (syntactic, semantic, pragmatic), and to study these in isolation, especially independent of
their use in the world for reasoning and communication. This parallels traditional cartographic thinking, which not only compartmentalized map-making from map use, but within map-making, compartmentalized projection, generalization, symbolization, design, and the rest. In its interest in understanding the role of, say, grammar in discourse configuration, cognitive linguistics is a model of appropriate procedure for, to give one example, understanding the role that the choice of map projection plays in shaping world view. As we’ve already quoted Gilles Fauconnier in the introduction, “Language data suffers when it is restricted to language,” not just because language depends on highly structured background knowledge, conversational meaning, negotiations, and the like, but because it is directed toward an end in action. The same has to be said of maps: map study suffers when it is restricted to maps.

Furthermore, unlike historical forms of language analysis, including semiotics (which we nonetheless hang on to), cognitive linguistics is dynamic, committed to understanding the way meaning is constructed on the fly, which is certainly the way we propose to understand – and model – map reading, as a process in time, which encourages the construction of certain kinds of meaning and ultimately behaviour. We’re not interested in maps as pictures. We’re interested in maps as the significant players they are in the world of action. Maps – let us acknowledge this – are not just of the world, but in it, very much a part of it.

At the heart of cognitive linguistics is what its developers think and write about as mental spaces. Mental spaces, says Fauconnier, “are partial structures that proliferate when we think and talk.” Since these constructions take place on a cognitive level, they are partial cognitive structures. This is to mark their distinction from the structure of language. Such a cognitive structure “is not an ‘underlying form,’” it is not a ‘representation’ of language or of language meaning, it is not bijectively associated with any particular set of linguistic expressions.” Such a cognitive structure is not a representation of the world either, but it relates language to the world by providing “real-world inferences and action patterns.” Fauconnier and Mark Turner characterize these mental spaces as “small conceptual packets constructed as we think and talk, for purposes of local understanding and action.” These small conceptual packets (or partial cognitive structures) “correspond,” Fauconnier and Turner elaborate, “to activated neuronal assemblies,” which are linked or link themselves to other activated neuronal assemblies. Cognitive linguists think about these neuronal linkages as mappings. For example, the configurations of words you’re reading right now are opening up thinking spaces in your brain, that is, activating assemblies of neurons, which are connected to, project to, are mapped onto, other thinking spaces in the process of constructing meaning.

These mental space mappings are the essential subject of cognitive linguistics (giving rise to an alternative name – space grammar):

In terms of processing, elements in mental spaces correspond to activated neuronal assemblies and linking between elements corresponds to some kind of neurobiological binding, such as co-activation. On this view mental spaces operate in working memory but are built up partly by activating structures available from long-term memory. Mental spaces are interconnected in working memory, can be modified dynamically as thought and discourse unfold, and can be used generally to model dynamic mappings in thought and language. Spaces have elements and, often, relations between them. When these elements and relations are organized in a package that we already know about, we say that the mental space is framed and we call that organization a “frame.”

George Lakoff says that these frames can be structured by idealized cognitive models (ICMs). ICMs are descended from the earlier plans and scripts of Roger Shank and Robert Abelson’s “script theory,” where a script was a hypothetical knowledge structure capable of generalizing about a socially appropriate sequence of events. A script was a sort of ideal, an ideal you attempted to follow, or that you expected others to follow. Schank and Abelson’s best known example was the Restaurant Script. Script theory, in turn, made powerful connections to Steven Toulmin’s theory of logic as “generalized jurisprudence” and to Mikhail Bakhtin’s ideas about speech genres.

One of the appealing things about cognitive linguistics is the way it absorbs, integrates, and updates so many worthwhile concepts from the past, while at the same time promising to connect them to neurophysiologic evidence being developed tomorrow from PET scans and functional MRIs. Via cognitive linguistics, yesterday’s hypothetical knowledge structures promise either to disappear into the junkyard of failed models (still always worth braving the junkyard dogs to visit) or to transform themselves into actual knowledge structures. It’s all very heady.

“The dynamics of mental space construction and space linking are technically abstract, but conceptually straightforward,” Fauconnier and Eve Sweetser write. “The basic idea is that, as we think and talk, mental spaces are set up, structured, and linked under pressure from grammar, context, and culture. The effect is to create a network of spaces through which we move as discourse unfolds.” Similarly, as we read the main map and the various elements of the paramap – text, ancillary maps, title, photos, scale bar, graphs – one or more mental spaces open up that are structured (frequently by ICMs or frames) and linked under pressure from the graphic structure, context, and culture to create a network of
spaces—one space opening up after another—through which we move as we read and make sense of the map.

In Figure 1, motion through this network starts from a base space, which establishes the initial viewpoint (the space from which, at a given point in the reading, other spaces can be accessed or created) and focus (the space to which structure is actively being added); and then shifts viewpoint and focus as the reading unfolds. In natural languages, it is grammar that helps answer such questions as Where is the starting point (the base space)? What space is currently the viewpoint? What space is currently in focus? What is the relationship of the viewpoint to the base? What is the nature of the connections between spaces? In maps it is graphic structure—the design—that helps answer these questions.

Contemporary cartography texts are not entirely unaware of this parallelism. For example, Elements of Cartography says:

The task of map design has much in common with writing. An author—a literary designer—must employ words with due regard for many important structural elements of the written language, such as grammar, syntax, and spelling, in order to produce a first-class written communication. Likewise the cartographer—a map designer—must pay attention to the principles of graphic communication.26

Of these so-called principles we have seen a sample (“nothing too dark or too light, too long or too short”), and despite infusions of psychophysics over the years this remains state of the art.27 As such, these “principles” bear

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**Figure 1.** Cognitive linguistics diagrams represent mental spaces with circles, a network of which is propagated as discourse unfolds. The first space that a discourse opens is considered its base space (here upper left). The elements in the space are lettered. If a frame, ICM, or script structures these elements, it appears as a box containing the elements and naming the framing structure. For example, the frame “buying and selling” with its buyer, seller, consumables, money, price, and rich set of inferences about owning, exchange, and so on; or the frame “vegetation map” with its locative field and vegetation classes, and inferences relating to hierarchic relationships, adjacency expectations, and the like. Continuing discourse spawns further spaces. The space to which structure is being added is the Focus (here lower right). Dashed lines indicate the transfer of structure from space to space, while solid lines map the movement of elements. The diagrams are a graphic way of keeping track of what’s going on.
little relationship to the structure provided by grammar 
and indeed, absent explicit scaling arguments, offer no 
guidance to map-makers – and so no guidance to map 
readers – whatsoever. Yet however unarticulated, implicit 
principles masked by the chatter about aesthetically 
pleasing appearance and “looking right” must in fact be 
structuring the elements of the map, that is, guiding the 
creation of spaces through which we move as we read and 
make sense of the map.

Space mapping has convinced us – and we are convinced 
it will convince you – that the principles underwriting the 
graphic design of maps are wholly at the service of the 
structure of the map’s construction of knowledge. That is, 
the principles of map design are concerned with the 
straightforward display of postings amenable to con-
sumption by propositions appearing on the plane of the 
map as incontrovertible characteristics of the territory the 
map thereby evokes and over which it exhibits its 
authority. The essential goal of these principles is not 
“looking right” but the preservation and enhancement of 
authority, and nothing supports this goal more strongly 
than the pretence, and so the impression, that all maps do 
is “present information.”

Did we mention how preliminary the work in cognitive 
linguistics is, how tentative its conclusions? Even more 
preliminary are our proposals, which nonetheless we 
advance as a model for understanding how maps hoist 
themselves off the page into our brains, spawning world 
views, images of the city, and a spatialized, a regionalized 
nature; a nature plucked equally from the vagaries of 
veneration and from the toils of taxonomy; a nature 
capable of being isolated as a region, capable of coming 
into conflict with other regions, and capable of being 
legislated and commercialized. This spatialized nature can 
threaten and be threatened; it can awe and it can be 
cuddled; it can be collected and it can be systematized; it 
is unknowably remote and it is underfoot. It is a nature, 
ultimately, quietly put in its place.

Eight Natures of Maps

Which is our question: the place of nature, what is it? Our 
contention is that, today, maps play a significant role in 
the way we frame this question and in the answers we give 
to it. Since what nature is taken to be affects the 
possibilities of its being mapped, and since what mapping 
is taken to be affects the nature we can imagine being 
mapped, there has been a continuous evolution in the 
mapping of nature over the half millennium during which 
maps have played a significant role in human affairs.28 
This evolving history, being eagerly explored, has not yet 
been written – nor do we propose, despite its importance, 
to write such a history ourselves. Our interest lies 
elsewhere, in the present, in the ways in which everyday 
map readers, encountering maps throughout the course 
of their lives, find maps participating in the construction 
and reconstruction of their ideas of nature.

Nature, as we suggested earlier, is a powerful concept, 
circling as it does around ideas of the real and the 
nonideological. It can be used as a heavy hammer 
to attack the “unnatural” and as a powerful flag around 
which to rally the “natural.” So it has been interesting, as 
we have worked our way through the maps that came to 
hand, to discover so many different natures. There is the 
nature that is threatened, but there is also the nature that 
threatens. There is a sublime, awe-inspiring nature, but 
there is also a pretty, endearing, and bounteous nature. 
There is a nature that we collect, which may be different 
from the nature that we study. There is an unfathomable, 
mysterious nature, but there is also a nature in which we 
can picnic.

1. THREATENED NATURE

Nature as victim, susceptible to countless threats, is 
inescapable these days. This is nature harassed by man. 
It is nature on the ropes. “Wildlife as Canon Sees It” is the 
headline in a series of full-page advertisements that Canon 
has run for years in a broad range of magazines with an 
enormous readership: Scientific American, National 
Geographic, Natural History, The Smithsonian. A photo-
graph of an animal (doubtless taken with a Canon 
camera) fills the top half of the page. A text – one of 
Barthes’ relays – says (in the case at hand), “In the relative 
cool of early morning, a terrestrial long-tailed ground-
roller probes among leaf litter and around thorny thickets, 
hunting for insects and their larvae. The shy bird stands 
quietly for extended periods surveying an area, slowly 
lifting and lowering its long tail. Then, with a few quick 
hops, it disappears into the scrub.”29 Another sentence 
sketches the bird’s domestic economy (“stays with its 
mate while nesting”), and another its imminent peril: 
“Confined to a small strip of unprotected coastal forest, 
the long-tailed ground-roller is threatened by loss and 
degradation of habitat.” A map is invariably appended: it 
shows, in green and blue, the Indian Ocean, southeast 
Africa, and Madagascar. An ageing eye can hardly discern 
the miniscule dot (in red) on the southwest coast of 
Madagascar that signifies the bird’s remaining – shrinking, 
threatened – habitat. By translating “habitat” into space 
the map gives the habitat real credibility at the same time 
it dramatizes how small this habitat is. Beleaguered 
nature. Canon wants to help. Canon wants us all to help.

2. THREATENING NATURE

Yet every bit as common are maps of a beleaguering 
nature: nature threatening man, nature on the rampage. 
Every summer newspapers in our part of the country 
publish inserts with titles like, “Stormtracker 2005, 
your Official Hurricane Survival Guide.” A joint effort
of Raleigh’s News and Observer and a local television station, this one was widely distributed and “prudently sponsored” by Jiffy Lube and North Carolina’s Electric Cooperatives. Stuffed with sound advice (“Prepare a Family Disaster Plan”), these inserts are really all about the maps. There are usually two of them. One describes areas prone to flooding and sketches the evacuation routes. The other—typically a couple of feet across—is a hurricane tracking map showing the East Coast and Atlantic Ocean, and extending to 30deg west. The water area is gridded in one-degree increments. Inset is a graph for you to record facts about the storm, the time, its latitude and longitude, and other statistics, sort of like a line score in baseball. Transferring the storm’s latitude and longitude to the map lets you keep track of the storm.30 As you keep updating its location, you transform the hurricane into something spatial. You spatialize it. It’s a short step from this to synoptic hurricane maps (like the widely reproduced satellite map NASA’s Goddard Laboratory made of 1989’s Hurricane Hugo), maps compiling tracks of hurricanes, and maps of hurricane regions. On the National Geographic’s “Hurricanes: Where Ill Winds Blow” map, gradations of blue demarcate the frequency of hurricanes per hundred years in steps of forty.31 Hurricaniana: it’s now a region—a place—like any other.32

3. NATURE AS GRANDEUR

What can threaten also can awe, and the sense of powerlessness and personal insignificance that hurricanes inspire is not unrelated to what people experience standing on the rim of the Grand Canyon, looking up at Everest, down on Victoria Falls, or across the Amazon. With their majesty, their sublimity, each inspires a sense of the power of nature, less its strength (hurricanes are strong), than its boundlessness, its magnanimity, its glory. As we write these words, a new National Geographic map of Everest arrives, an extraordinary image, photographic in detail. Here Everest, vast beyond understanding, is caught at a resolution of nineteen inches. But . . . didn’t National Geographic just publish a map of Everest? Wholly different but just as awesome? A joint production of the Geographic, the Boston Museum of Science, and the governments of Nepal and China? Actually, that was fifteen years ago (November 1988), and it came in a long line of powerful Himalayan images. The Kingdom of Sikkim, glorious mountains from north to south, appeared as a supplement to the Annals of the Association of American Geographers in 1969. Four years earlier the Annals had published The Kingdom of Bhutan, twelve square feet of Himalayas folded up and shipped along with the journal.33 Before that . . .

But the list is long. Each of the great sublimities has been mapped, the maps as extraordinary in their way as their subjects, the efforts invariably daunting (so high, so deep, so far away). This is not a nature we can threaten (not one we can dream of threatening), nor yet is it one that threatens. This is a nature beyond us.

4. NATURE AS CORNUCOPIA

There is yet another nature, the nature that we embrace, that we cuddle. This is the nature of the small and the soft, the fuzzy and the warm. This is the nature of fur and feathers, birds and bees, flowers and seed. If the mountain is awesome, its flower-strewn meadows are beautiful. If the oak is sublime, the dogwood is sweet. Anything but austere, this nature is giving, prodigal. It is a gigantic cornucopia, an unceasing gush of bounty: flowers, fruit, berries, nuts. “The sublime moves,” Immanuel Kant wrote, “the beautiful charms.”34 But it also feeds, also nurtures, and the soul no less than the stomach: “Emblazoned with beauty, this floral map shows the origins of 117 of man’s favorite flowers” begins the perimap of one called “The World of Flowers.” Beguiling bouquets burst from the hearts of continents. A clump of tulips sprouts in Turkey. A branch of a flamboyán flowers in Madagascar. Oriental poppies bloom in Pakistan. The theme of profligacy mingles with that of beauty. The abundance of this nature is inexhaustible: in yet another National Geographic map, individual portraits of sixty-seven birds—from “hundreds of kinds”—festoon a map of migratory routes in the Americas.35 The routes lace the continents from pole to pole. The numbers are insane: the arctic tern may travel 25,000 miles a year! Ain’t nature something else! The maps demonstrate that this nature—flowers, trees, birds, seals, furry friends—is everywhere.

5. POSSESSABLE NATURE

The beautiful, the profligate (and so the exotic) is also the collectible. We yearn to tally it, catalogue it, photograph it, and perhaps even own a small piece of it. Maps of this collectible, possessable nature—bird sightings, birds’ nests, rocks and minerals, gemstones, big game animals, highest points, stars—are less interested in display than they are in inventory. At stake here are lists, head counts, censuses, catalogues, statistics. We’re holding in our hands A Bird Lover’s Life List and Journal, a luxurious, hardbound volume, based on the checklist of the American Ornithological Union, in which birdwatchers can keep score. It lists 715 species and is decorated with illustrations by John James Audubon. While life lists rarely include maps, field guides almost always do. There are 362 maps, for example, in Peterson’s Birds of Britain and Europe, each map distinguishing breeding and winter ranges for an individual species. Here the maps are corralled into an “atlas” in the back of the book, but in The Audubon Society Field Guide to North American Birds (Western Region) the maps accompany the text, one per species, each with its textual relay: “Southeastern Arizona,
southern New Mexico, and western Texas, where it breeds at the northern fringes of its otherwise all-Mexican range."³⁶

Historically, the construction of spatial identities for species led to the construction of synthetic regions composed in different ways of numbers of species,³⁷ and these syntheses, too, appear in the field guides, as in Trees of North America (a Golden Field Guide), where hundreds of thumbnail maps are preceded by a map of forest regions. Here, for example, we read that in the Northern Forest region “far northern tree associations” consist of conifers, birches, and willows. In Hugh Johnson’s The Principles of Gardening we find maps not only of where domesticated plants originally grew wild, but of plant hardiness zones which pretty much amount to maps of zones of consistent annual average minimum temperature.³⁸ Maps like these hint at the systematization – that is, at the science – that consumes the collectible nature.

6. NATURE AS SYSTEM
The nature of science, of system, is anything but collectible, for it is a nature that exists less in its parts than in the whole. It is an inherently spatialized nature, and maps are a primary way of knowing it. Here individual outcrops metamorphose into strata and strata into geologic formations; soil series aggregate into soil associations and these into soil groups; plant species fall into plant associations and associations combine into plant communities; variations in barometric readings grow into weather systems and these merge into climate. It is a paradigmatic nature. With Seasonal Land Cover Regions we have already glanced at a representative of the genre, but other examples abound: Robert Bailey’s Ecoregions of North America, USGS’s A Tapestry of Time and Terrain, Simon and Fels’ Plant Associations of the Chattooga River Basin, the endless suites of thematic maps (of landforms, climate, temperature, winds, precipitation, ocean currents, natural vegetation, soils) that stand in the front of so many atlases. This nature is neither threatened nor does it threaten. It does not awe nor is it cute. It is anything but collectible. It is nature that is known. It is that of science.

7. NATURE AS MYSTERY
Out of science a new nature has lately risen: it is a nature seen but mysterious, unknown. It is that from space. Its construction reverses the usual process through which careful measurements are compiled over time to reveal, for example, a continent (as in the gradual emergence of the Americas on European maps in the fifteenth and sixteenth centuries), an ocean current (as on Ben Franklin’s map of the Gulf Stream), a hole in the ozone layer (as with the TOMS data from the Nimbus 7 satellite). This new seen-but-unknown nature emerges whole, apparently unscarred by conceptual categories. Maps of this nature pass for photos, of which Barthes famously remarked, “the feeling of denotation,’ or, if one prefers, of analogical plentitude, is so great that the description of a photograph is literally impossible.” This special status of a photograph? It is that of a message without a code. At least it appears to be without a code. Barthes showed that photos did have a code, but one developed on the basis of a message without one: “It is read, connected more or less consciously by the public that consumes it to a traditional stock of signs.”³⁹ It also turns out that these new maps are not photographs, they are maps after all, the connotation – the code, the concepts – has been imposed in their production (looking like a photograph is part of this code). This new genre of “portrait” maps presents a nature of gradations without distinctions. “What is that?” The map does not answer. It is whatever you wish to make of it. This nature is fragile. It is threatened. Or it is tough, resilient. It is enduring. It is distant. It is somewhere else. It is unknowable. It is a vehicle for our anxiety; a recipient of our admiration.

8. NATURE AS PARK
One final nature, the intimately known, that nature mapped at a scale of two and a half inches to a mile, with a contour interval of ten feet (or less). This is the nature of the USGS topographic quad and other national mapping surveys. Here again is the sense that everything can be seen, but here everything is coded. In fact, here only the coded exists, anything not on the (admittedly capacious) legend doesn’t. “What is that?” The map returns an answer. It is an intermittent stream; it is a mangrove; it is a dry lake; it is a sunken rock; it is scrub; it is a gravel beach. But nature is not brought to the foreground here. The map is as loquacious about exposed wrecks, landing strips, railroads under construction, vineyards, gauging stations, built-up areas, and dams as it is about glaciers and permanent snowfields, shorelines, mountains, swamps, and rivers. Here nature is subject to no rhetorical flourish, no isolation, no highlighting. It is not the theme of these maps. It is along for the ride. This is the nature of the phenomenological inventory. At this level nature lies so deep in the conceptual frame that it manifests itself in things instead of attitudes. But the things it manifests itself in are not hills, rivers, or trees, which, undifferentiated from culture, here lie below the level of nature. Here nature shows up as parks, monuments, sanctuaries, and preserves. It is a fenced-in nature that we can visit, that we can protect, that we have to protect...because it is threatened.

* So we have come full circle. Only it is not a circle. It is a multidimensional space of contradictions. It is a dialectical space ripe with the interpenetration, struggle, and
unity of opposites. Eight natures – doubtless there are others – each spatialized, each areal, each hoisting itself off the page, taking shape in the mental spaces of cognitive linguistics as we read the map, as we unfold it, turn it over, and refold it; as we bring it closer to our eyes or move it away; as we scale its distances with our fingers: nature as victim, bully, spectacle, cornucopia, collectable, paradigm, mystery, park.

Ours is not a systematic survey. We have made no effort to search for maps of nature but taken as examples those that came to hand in our grappling with the nature of maps. We shall proceed by unfolding in each chapter a map or maps of a different nature, and to use this reading as an opportunity for probing one component or another of our model of the map – the logical structure of the map’s construction of knowledge; the physical structure of the paramap; the intellectual structure of the act of map reading itself – as well as probing the nature of the nature in question. Inescapably, we attend closely to the concept of nature as it intertwines itself with economic structures, class formations (nature is above all else a construction of class), and official systems of construal. As we scan sheet after sheet, more and more the maps appear as players in a complicated social game defining the relationship of our species to the rest of existence. Pretending to be no more than scorekeepers, maps stand revealed as more like the ball, the very medium through which the game’s moves are made.

Notes

1. Robinson and Petchenik, The Nature of Maps: Essays toward Understanding Maps and Mapping (Chicago: University of Chicago Press, 1976); Harley, The New Nature of Maps. Note that although Harley’s book wasn’t published until 2001, the manuscript, lacking the promised introductory and concluding essays, was submitted for publication ten years earlier. The title originally bandied about was Maps and Society, which Harley had found “a bit tame: could we devise something more arresting?” (letter to George Thompson, 15 October, 1991). In a postscript a month later Harley wrote, “Please note the new title which is final as far as I’m concerned: The New Nature of Maps: Essays in the History of Cartography” (letter to George Thompson, 26 November 1991).

2. This is from the questionnaire prospective authors were asked to file with the Johns Hopkins University Press. Harley dated it 11/25/91.

3. Ibid.


5. Jacques Derrida plows related ground in his treatment of the parerga, those elements about, outside, or around a work – in short, the frame; but also the columns of a building, the drapery on a statue – in short, hors d’oeuvres. See especially pp. 53–82 and the whole section “Cartouches” (183–253) in his Truth in Painting (Chicago: University of Chicago Press, 1987). Be forewarned: “Parergon” is a reading of Kant’s Critique of Aesthetic Judgment, and “Cartouches” is a catalogue essay for a show of Gérard Titus-Carmel’s drawings. Where Derrida and Genette are closest is in their understanding of the paratext/parerga as liminal, as threshold. See also (always) Goffman’s Frame Analysis: An Essay on the Organization of Experience (Cambridge, Mass.: Harvard University Press, 1974).


8. While rarely discussed in the cartographic literature as such, the epimap has become an issue in the liminal area between the history of cartography and the history of science. Jane Camerini, for instance, is explicit about her interest in “the notion that the meaning of a map resides not only in the map, but in relation to the written text of which it is a part.” See her PhD dissertation “Darwin, Wallace and Maps” (PhD diss., University of Wisconsin, Madison, 1987), or her “Evolution, Biogeography, and Maps: An Early History of Wallace’s Line,” Isis 84 (1993): 700–27. The quotation comes from this latter, p. 702.


10. There are many versions of this map in circulation, with more or less inflammatory perimaps. This is from a copy distributed by ODT in 2000.


13. Jonathan Yardley, review of Mark Monmonier’s Drawing the Line, Washington Post, December 18, 1994 (p. X3). Yardley developed his jibe by stringing together phrases of Monmonier’s. The tone, however, cannot be attributed to Monmonier whose treatment of the Peters affair in Drawing the Line is thorough and thoroughly scrupulous (9–44). Monmonier’s list of sources for both sides is the best available (301–2).

14. This is from The Wall Street Journal’s front page story about the resolution, June 8, 1989.

15. All this commentary, the reviews, the ACSM resolution, its coverage by The Wall Street Journal, and the rest (and see Monmonier’s treatment for an idea of how extensive this “rest” was) constitute what Genette calls the “metatext.” See the presentation of the five varieties of “transtextuality” – intertextuality, paratextuality, metatextuality, hypertextuality, and architextuality – in Genette’s Palimpsests: La literature au second degree (Paris: Seuil, 1982). Each of these forms of transtextuality plays an important role in the world of maps.
27. In fairness to Elements, it must be acknowledged that its discussion of the principles of graphic design is relatively more sophisticated and revolves around the concepts of legibility, visual contrast, figure-ground, and hierarchical structure (324–38). Discussions of these issues occupy hundreds of subsequent text pages. Much of this, however, is the development of technical production vocabularies. The principles themselves remain at the level of “If these visual relationships coincide with the cartographer’s intentions, effective communication can take place. If not, the map design is likely to fail” (324), which is – effectively – meaningless.
28. More or less. Not that maps played no role in human affairs prior to, say, 1400, but that after that time they begin to play the role they continue to play today. Our decision to draw the line here is akin to Ian Hacking’s drawing the line for the birth of statistics at 1660. It’s not that there weren’t all kinds of precursors but that “We do not ask how some concept of probability became possible. Rather we need to understand a quite specific event that occurred around 1660: the emergence of our concept of probability. If there were Indian concepts of probability 2,000 years ago, they doubtless arose from a transformation quite different from the one we witness in European history;” and so on (*Emergence of Probability*, Cambridge: Cambridge University Press, 1975, 9). Similarly, we are not concerned with the host of potential precursor map-like things, but with the map as we know it, and have known it for five or six hundred years. See Wood’s “P.D.A. Harvey and Medieval Mapping: An Essay Review,” *Cartographica* 31 (Autumn 1994): 52–59; and his “Maps and Mapmaking” in *Encyclopedia of the History of Science, Technology and Medicine in Non-Western Cultures*, ed. Helaine Selin (Dordrecht, Boston: Kluwer Academic, 1997), 549–54.
29. Our example comes from the May, 2001, issue of *National Geographic*, among the unpaginated front matter.
32. Marita Sturken observes this and more in her “Desiring the Weather: El Niño, the Media, and California Identity,” *Public Culture* 13, no. 2 (2001): 161–89. She focuses on TV not maps, but her paper is all but a disquisition on the spatialization of the weather in which all such media collaborate.
35. “Bird Migration” was a supplement to the August, 1979, issue.
