

generally good, with only a few distracting miscues (e.g., maps on pages 22, 31 and 104). Despite its shortcomings, the *Atlas of the Pacific Northwest* does contain a great deal of information. In general, information is presented clearly and effectively and the maps presented provide a useful introduction to a large and varied region. In short, this edition of the atlas succeeds in packing a great diversity of themes into a slim volume and carries on the tradition that was started forty years ago, maintaining its place as an indispensable reference work on the Pacific Northwest (at least until the ninth edition appears in a few years). □

BOOK REVIEW

Maps are Territories: Science is an Atlas

David Turnbull, with a contribution by Helen Watson with the Yolngu Community at Yirrkala. Chicago: The University of Chicago Press, 1993. 66 + vi pp., 14 maps in color, 43 in black and white, and 15 additional illustrations, further reading, acknowledgments. \$12.95 paper. (ISBN 0-266-81705-9).

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David Turnbull's book, *Maps are Territories: Science is an Atlas: A portfolio of exhibits*, examines questions about the nature, content, and meaning of maps through a series of museum exhibits. Like an annotated gallery guide, the book presents and comments upon a wealth of images in an effort to show how all maps function as a metaphor for

knowledge and as a means of knowledge representation.

The book was first published in 1989 by Deakin University Press in Geelong, Australia. It was written in response to a review and critique of the cross-cultural content of course material used in Deakin University's Social Studies of Science. It includes examples of maps from Asian, Native American, and Aboriginal-Australian cultures, along with a selection of western maps from various time periods and countries. Although written as one of six "Portfolios" for use in the course, the book stands alone as a thought-provoking introduction to issues of cartographic conceptions and practices.

The preface explains that the book "is conceived and structured not as a linear verbal narrative but as a progression of museum or gallery exhibits designed to exercise the skills of visualization and visual analysis, so essential to any understanding of the basic theoretical issues of perception and cognition." In keeping with this museum motif, the book's contents are arranged in eleven exhibits rather than chapters. These exhibits include reproductions of maps, explanatory illustrations, quotations from relevant books, and short essays. The exhibit topics cover "Maps and Theories," "The Conventional Nature of Maps," "Maps and Pictures," "Aboriginal-Australian Maps," "The Function of Maps," "Maps—A Way of Ordering Knowledge," "Maps—A Way of Ordering Our Environment," and "Maps and Power." These exhibits are actually illustrated discussions of the concepts and ontological arguments Turnbull is presenting. Within each essays, he draws upon authorities as diverse as Arthur H. Robinson and Ludwig Wittgenstein to explain or question some of the basic concepts of what maps are and how they work.

The first exhibit "Maps and Theories" sets the stage for the rest of the book. In examining the "theory as map metaphor," the author cites T. S. Kuhn's *Structure of Scientific Revolutions* to note that paradigms that embody theories "provide scientists not only with a map but also with some of the directions essential for map-making. In learning the paradigm, the scientist acquires theory, methods, and standards together, usually in an inextricable mixture." This statement of the ties between how we think of space (the theory) and how we portray it (the map) is extended beyond the western cartographic tradition to include all forms of map making. Turnbull contends that the role of space in ordering knowledge and experience is a fundamental construct in all cultures. He cites Malcolm Lewis's contention that "cognitive maps"—the ability to apply names, symbols, and spatial relationships to things—"may have been a major factor in the intellectual development of hominids." At the same time, Turnbull speculates that the perception of relative location "may constitute one of the variables that differentiate the way cultures experience the world." In other words, while spatial cognition is a universal phenomenon, it is only expressed in culturally relative systems. Having thus shown "the Western world view" to be one of many possible ethnocentric means of understanding the perceived world, Turnbull goes on to identify two characteristics of all maps. First, he argues that maps are selective, meaning that they are incapable of displaying all there is to know about any given piece of the environment. Second, he asserts that to be a map they must represent at least some aspect of the landscape, albeit a landscape which embraces the full extent of J. B. Harley's and David Woodward's definition of a map as a representation of the spatial

understanding of "things, concepts, conditions, processes, or events in the human world."

As can be seen from this synopsis of the three pages that make up the book's first exhibit, *Maps are Territories* can be a little heavy going. However, once he has established the philosophical underpinnings of the work, Turnbull presents the rest of his exhibits in a more straightforward fashion. Throughout the book, he applies concise and well-informed reasoning to the examination of particular aspects of maps. For example, Exhibit 2, "The Conventional Nature of Maps," explores the roles of both the human agents who produce maps and of the various conventions (e.g. symbols, icons, tools, and methods) that are arbitrarily applied in the representation of the environment. The interaction between a convention's functional adaptations (e.g. map projections and the interests they serve) is seen as one aspect of the power inherent in maps. Turnbull points out that in Western society this power is enhanced by the value placed on "artless" maps – those that are perceived as simple renditions of the landscape providing objective "real world information." He also points out the similarities between this western view of maps and western scientific discourse in which the representation of the phenomenal world is, like maps, laden with conventions.

Rather than defending these western cartographic and scientific claims to "objectivity," Turnbull advocates a constructivist approach. He suggests that we consider our representations of the world as active constructions in which "our experience of the world and our representations of it are mutually interdependent, so there is a sense in which the two are inseparable. Or, to put it in its most contentious form, 'the map is the territory'." Having made his

thesis statement, Turnbull continues with exhibits that examine related aspects of maps. In doing so he often uses non-western maps as examples or demonstrates how, on closer inspection, these "primitive" maps have the same functional characteristics usually thought to be the sole preserve of "accurate," i. e. western, maps.

In Exhibit 4, "Bringing the World Back Home," Turnbull discusses the quality of "indexicality," meaning that maps are dependent upon their context for their truth. Indexicality is often cited as a shortcoming of so called "primitive" maps. Turnbull points out that this can be just as easily said of Western maps, though he admits that the context for western maps is sometimes based on a much larger scale (as in the cartographic convention created by the 1884 international agreement which established the location of the prime meridian). In exhibit after exhibit, the author shows how the distinguishing characteristics of maps—those qualities which make them so basic to the human experience of the world—are universal characteristics. He also makes it clear that all societies imbue their maps with the power to order knowledge and pass it on to succeeding generations.

The principle that culturally relative perceptions are represented in constructs (maps) that have unique universal characteristics raises interesting questions about the nature of human experience and our attempts to express it in functional forms. If, as Turnbull contends, "our experience of the world and our representations of it are mutually interdependent," then the "theories" or concepts that we use to explain and organize this experience represent what Turnbull calls "shared examples of practice" or "science." In this context, Turnbull makes his corollary statement that "science is

an atlas"—a compendium of theories which allow a society to hold its varied and selective experiences together in a coherent and functional image of the world.

Throughout the essays, Turnbull makes well-documented, if at times esoteric, arguments. The many cross-references to the book's maps and illustrations begins to achieve a museum-like quality, providing a visual as well as a textual experience for the reader. This is a fortunate synergy, as the text alone would be a daunting read for any but the most philosophically inclined and it is hard to imagine a long queue forming at the entrance to an exhibition which begins with framed quotations from Jorge Luis Borges and Brian Harley. Luckily, the rich array of images makes the mental aspects of understanding "the basic theoretical issues of perception and cognition" a little less arid. Furthermore, the concepts which Turnbull presents do need to be understood and internalized by anyone involved with thinking about, producing, and reading maps. The book, despite its difficulty, makes a good complement to any serious study of cartography.

Perhaps the most successful aspect of the book is its frequent use of non-western maps. Examples of Native American, Pacific Islander, Chinese, prehistoric, and Aboriginal-Australian maps are shown side by side with western maps and examined with the same careful analysis. Their very presence helps to give these maps some of the validity that the book effectively argues they deserve. Exhibit 5 on Aboriginal-Australian Maps, contributed by Helen Watson and the Yolngu community at Yirrkala, is perhaps the best example of Turnbull's theses in action. Watson and the Yolngu provide an in-depth analysis of the background, functionality, and cultural appropriateness of several

aboriginal bark paintings which have been interpreted as maps. The book carefully examines these "dhulan," explaining how they relate to "the Dreamtime" and represent the "footprints of the Ancestors" who named the landscape. The exhibit effectively demonstrates how these concepts help form the conventions that shape and define the Aborigines' space and how their cartography, which includes an extensive oral component, has enabled Aboriginal culture to flourish and maintain itself. Set within the concepts, arguments, and examples of Turnbull's other exhibits, this examination of the Aboriginal bark paintings is possibly as good an explanation of the nature of maps as western philosophy, history, and anthropology can provide. What it left me hoping for is to someday read an equally cogent Australian Aborigine's analysis of the "forms of life" and "primitive conventions" to be found in the western mapping tradition. □

BOOK REVIEW

Mapmakers of the Sixteenth Century and Their Maps. Bio-Bibliographies of the Cartographers of Abraham Ortelius, 1570
Robert W. Karrow, Jr. Chicago: The Newberry Library, 1993. 846 pp., maps, index. \$110 cloth plus \$6.00 shipping and handling. (ISBN: 0-932757-05-7).

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This work had its origin in a catalog by Abraham Ortelius containing a list of cartographers and their known works from the latter part of the fifteenth and sixteenth centuries up to 1570. The

catalog, titled *Catalogus Auctorum*, has undergone several permutations including a printing by A. E. Nordenskiöld (1889) and an edition by Leo Bagrow that added biographical sketches and descriptions of the maps as well as of many other maps based on them. Karrow initially began with a proposed English translation of Bagrow's *A. Ortelii Catalogus Cartographorum* (1928-30), but soon realized that, due to the loss of many maps during World War II and the discovery of many more maps in the interim, a complete rewriting was in order. The result is not only a rewriting, but a very significant expansion of the individual biographies and the number of maps identified with their cartographers. Over 90% of the works treated were examined personally by Karrow, and although the basis was Bagrow's expansion of the *Catalogus Auctorum*, Karrow's claim that his contribution "... represents [his] own research and emphases ... [and] differs from the earlier work in many respects" is well founded.

The first biography in the book is that of Ortelius. The remaining biographies are arranged alphabetically, with the biographical texts interspersed chronologically with titles of maps, extensive commentary, and references to pertinent literature. Many familiar names appear throughout the text (Mercator, Sebastian Cabot, Münster, Waldseemüller), but many others will be recognized only by the more knowledgeable practitioners of the history of cartography. The limit of cartographers known to Ortelius will be disappointing to those who do not note the subtitle and expect to find the great early-sixteenth-century "discovery maps" and their authors represented. The names and maps range widely among the German, Flemish, and Dutch, with a smattering of French and Italian. However, the Portuguese and

Spanish maps of the Columbian and immediately post-Columbian years, as well as their Italian, German and other derivatives, are almost absent. Curiously, Ortelius seems to have known few of the "pioneers," who in the first few decades after Columbus attempted to include the Americas in their views of the world. Hence, one must turn to works like Kenneth Nebenzahl's *Atlas of Columbus and the Great Discoveries* to complement the list of sixteenth-century cartographers who attempted to represent an imperfectly known world. There are found the likes of Juan de la Cosa, "Cantino," Caveri, Ruysch, Homem, and Ribeiro.

This aside, Karrow presents a rich panoply of European cartographic accomplishment in meticulous, scholarly detail. He has also included bibliographic references to and often exhaustive treatment of the cartographers' works in other disciplines; this range includes fields such as astronomy and astrology, mathematics, medicine, the arts, history, and even ephemeral broadsides and pamphlets. The bibliography occupies sixty-one pages with over 2,000 entries, reflecting the great diligence with which Karrow has searched not only for the works of the cartographers but also for works about them and their maps. There is an index to place and date of publication of the maps that is then usefully reversed to date and place of publication. The general index is truly analytical. For example, among all the maps represented in the work, one can see at a glance a list of those of the British Isles in chronological order with their authors. Or, one finds a list, in alphabetical order of place, of the maps produced by a particular cartographer. Countries, regions, provinces, islands, and cities are interspersed with the personal names, and there are even entries on such esoterica as a map on which ice fishing is shown