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# Book Review - The Unnatural Nature of Science: Why Science Does Not Make (Common) Sense

David Lopatto
*Grinnell College*

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# REVIEW

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**The Unnatural Nature of Science: Why Science Does Not Make (Common) Sense.** Lewis Wolpert. 1992. Harvard University Press, Cambridge, MA. xiv + 91 pages. ISBN 0-674-92981-0. $19.95 hdbd., 12.95 pbk.

A distinguished psychologist once wrote that if you wished to understand the history of scientific thought you need a psychologist at your elbow. Lewis Wolpert, Professor of Biology at University College in London, has taken that sentiment further. It seems that if you wish to understand the difference between scientific and non-scientific thinking you should delve deeply into the literature of cognitive psychology. For natural thinking, "ordinary, day-to-day common sense will never give an understanding about the nature of science." Instead, the trained scientist engages in unnatural (i.e., counterintuitive) thinking about a word that defies ordinary experience. In order to understand science, the teacher, the student, and the citizen need to understand the esoteric manner in which scientists gather knowledge.

Apart from its unfortunate title, the book gets off to a promising start. The first chapter clarifies the thesis with examples drawn from psychological research on decision making and problem solving. Naive thinkers give anecdotal evidence equal weight with systematic research. They gather evidence to confirm a hypothesis rather than test (potentially falsify) a hypothesis. They confuse randomness with haphazard. They don't check baselines to see if a particular statistic is ordinary or extraordinary. They believe that causes should resemble effects, and they answer questions with information that happens to be available from memory instead of instigating systematic research. This listing of naive shortcomings draws a great deal from the influential work of psychologists Daniel Kahneman, Amos Tversky and their colleagues. Unlike these researchers, however, Wolpert offers no advice about how the characteristics of scientific thinking are acquired. Instead, Wolpert takes the reader on a historical tour of scientific thought, beginning with Thales, whose thought that the world was composed of water was "unnatural". The chapter is useful for general science education. The chapters that follow, on creativity, cooperation, and philosophical relativism highlight some currently discussed issues in science, albeit from a distinctly conservative point of view.

The book concludes with chapters on nonscience, morality, and science's relation to the public. Of the varieties of nonscience, religious topics such as creationism are obvious targets, but the inclusion of psychoanalysis in the book has the aspect of beating a dead horse. Wolpert's inclusion of the social and psychological sciences in the nonscience chapter is bemusing, considering that Wolpert drew on the work of experimental psychologists to make his case for natural and unnatural thinking.

Wolpert believes that science is amoral. It is the behavior of scientists as citizens that can be judged from a moral standpoint. He cites the case of the physicist Leo Szilard who at first urged the United States government to build the atomic bomb in the early days of World War II. Szilard then reversed himself and attempted to persuade the government to not use the bomb when it was evident that the allies would win the war. Szilard's attitude towards the bomb was certainly complex, and Wolpert seems to feel that Szilard's reversal demonstrates that the physics of the atom bomb did not dictate a particular moral view.

The closing chapter, "Science and the Public", is meant to be reassuring to those who feel that scientific progress has made the world regimented and predictable. The world is too complex to be subdued by science, asserts Wolpert, which cannot predict even its own future. What's more, because so few people have an adequate understanding of science, it is unlikely to threaten other ways of thinking.

Such an ending is a good jumping off point for ideas about teaching science, but Wolpert does not write about science education. The lack of a program for transforming "natural" thinkers into scientific "unnatural" thinkers is a failing of the book, which otherwise is useful for scientists, science educators, and college level students. To make any sense of what to do, we could drop the distinction between natural and unnatural in the book's title, and substitute "novice" and "expert". Teaching expert reasoning in science may not be overly difficult. The same examples, tests, and procedures used by psychologists to study the problem solving heuristics of naive thinkers might be converted into teaching examples or even science laboratory exercises. The current pedagogic trends toward "workshop" or "hands on" science might be joined by a "mind on" science that clearly demonstrates the different ways that novices and experts go about solving scientific problems. Science educators could design such exercises to good effect. Remember that you will need a psychologist at your elbow.—DAVID LOPATTO, *Department of Psychology, Grinnell College, Grinnell, Iowa 50112.*

**This Fragile Land. A Natural History of the Nebraska Sandhills.** Paul A. Johnsgard. 1995. University of Nebraska Press, Lincoln, NE. xv + 256 pp. ISBN 0-8032-2578-4. $35 hdb.

When I travel to new areas, I always find that prior knowledge of the natural history of an area increases my enjoyment and appreciation. Paul Johnsguard presents a highly enjoyable and readable introduction to the natural history of the Nebraska Sandhills in his "kind of love letter to the Nebraska Sandhills and especially to their inhabitants past and present." Johnsguard calls upon 30 years of research and teaching in the region to draw together a series of essays that cover geology, ecology, ethology, and environmental issues while offering his personal perspectives on the past, present and future.

Part 1 begins with a geologic history of the region with the metaphor of "A Grassy Ocean" to introduce the concept of dune formation throughout the Cenozoic in Chapter 1. As Johnsguard traces the geologic history of the area, he also relates the succession of Cenozoic plant and animal communities to the changing landscape.

Chapters 2, 3, 4, and 5 present ecological descriptions of 4 regions: The Niobrara Valley, The Pine Ridge and High Plains, The Loess Hills and Platte Valley, and the True Prairie and the Tall Cornfields. In all but the latter chapter, there are descriptive diagrams that present the surface geologic formation, the plant communities relative to the topography, and the amphibians, reptiles, birds, and mammals most common to the plant communities.

Part 2 focuses on more specific areas: Roads and Ranch Trails, Bunchgrass Prairie, Lowland Meadows, and Brooks and Rivers, Marshes and Lakes. In each chapter, Johnsguard describes a biological