

Theodore L. Brown, MAKING TRUTH: THE ROLE OF METAPHOR IN SCIENCE.

In a book review published in 1995, Max Perutz, the 1962 winner of the Nobel Prize in chemistry, made clear his position on the role of rhetoric in scientific research: "Good research needs no rhetoric, only clarity" (p. 83). He also asserts that those in disciplines that believe rhetoric matters in scientific endeavors are pretending. "Its practitioners can set themselves up as judges over scientists whose science they fail to understand" (p. 83). Although his comment is aggressive, he is not alone in his positivist reaction to constructionist claims. It has been only in the last few decades that a number of scientists have started to break with the objective view of science represented by Perutz.

Theodore L. Brown, emeritus professor of chemistry and the first director of the prestigious Beckman Institute at the University of Illinois, takes issue with scientists like Perutz. His book *Making Truth: Metaphor in Science* offers a scientist's perspective on what can generally be labeled the rhetorical turn (Simons, 1990) in science studies. Although he is not a trained rhetorician or communication scholar, he makes claims with which rhetoricians can easily identify and find insightful and important, while simultaneously supporting his thesis that "metaphor plays a central role in the development of a scientific subject" (p. x). For Brown, metaphors are the core of scientific practice and communication.

In the first three chapters, Brown highlights the significance of understanding the role of metaphor in scientific practice, discusses metaphors in general, and discusses the theory of the conceptual metaphor in particular. In these chapters, rhetoricians tread on familiar ground. Brown notes how metaphors are traditionally defined as a form of trope. However, rather than engaging the literature on metaphors, he simply advises the reader to refer to the notes while he advances one particular definition derived from the cognitive sciences. Borrowing heavily from Lakoff and Johnson, Brown claims a metaphor maps information from a *source* domain onto a *target* domain. Although Brown is not the first person to draw attention to scientific practice (e.g., Pickering, 1992) or the use of metaphor-like structures in science (e.g., Gross, 1990), he does support his overall claim with a series of excellent case studies.

In the following chapters, the reader is given case studies that develop spatially, moving from some of the smallest units of science, such as the atom (chapters 4 and 5), to the largest units of science, such as the planet experiencing global warming (chapter 9). He comments on a number of well-known topics, including molecular models and cellular metaphors (chapter 6), as well as topics such as protein folding (chapter 7). His comments are detailed and thorough, but not bogged down with the overly technical language of the physical sciences. In his chapter on the atom, for example, he takes his readers through a brief, yet insightful, history of the atom, beginning in ancient Greece and finishing with the splitting of the atom in the 20th-century. Brown manages to balance his role as a historian with his role as a scientist. He also makes a strong case for the experientially grounded metaphors that make their way into scientific discourse. For example, one does not literally fold a protein, but it is nonetheless useful to think of the process in this way. However, his discussion of global warming (chapter 9) appears slightly out of place. A reader can easily move from a discussion of atoms into a conversation about molecules and from observations about DNA and cells into concepts about protein folding because they all feel connected by the physical interactions that take place linking one to the next. The shift to global warming requires a larger leap. However, from small to large, Brown makes a number of compelling arguments about the nature of metaphors in science.

In his final chapter (chapter 10), the author attempts to summarize his conclusions about the nature of metaphors in science and to preempt a number of possible objections. Not only does Brown argue that knowing how metaphors work in science contributes to our understanding of how science works, but he also puts his work in direct opposition to strong versions of scientific realism. Ultimately, he argues, "the strong realist claims can't be justified" (p. 188).

Overall, this book makes a number of important contributions to science studies and can inform rhetoricians of science in particular. New students of rhetoric and science studies wishing to further their understanding of the metaphorical aspects of science will find this book a useful reference. However, rhetoricians who are familiar with the literature on metaphors may be uncomfortable with Brown's dismissal of such figures as I. A. Richards and his over reliance on Lakoff and Johnson. Because Brown does not reconstruct any theoretical understanding about metaphors, but rather applies a specific understanding to a number of new contexts, established rhetoricians may wish to only reference this book in introductory rhetoric courses that have sections dedicated to metaphors. However, there is one area of the book that rhetoricians will find extremely valuable: Scholars concerned with visual communication will find Brown's initial treatment of visual metaphors an excellent starting point for future studies into this relatively unexplored area of scientific practice.

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