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## Forging Alliances with Words. (Topical Reviews: Rhetoric)

**Author:** George D. Gopen

**Date:** May 1, 2002

**From:** American Scientist(Vol. 90, Issue 3.)

**Publisher:** Sigma Xi, The Scientific Research Society

**Document Type:** Book review

**Length:** 1,105 words

Full Text:

Shaping Science with Rhetoric: The Cases of Dobzhansky, Schrodinger, and Wilson. Leah Ceccarelli. xii + 204 pp. University of Chicago Press, 2001. \$20.

In *Shaping Science with Rhetoric*, Leah Ceccarelli attempts to explain the persuasive success or failure of three well-known books on science solely by means of close rhetorical analysis of the arguments. Despite some shortcomings in the presentation, this book makes a real contribution both to the history of science and to the possibilities for rhetorical criticism.

All three books Ceccarelli explores attempt to reconcile warring scientists in supposedly opposing fields, guiding them to recognize not only the efficacy of each others' work but also its interdisciplinary congruence. Theodosius Dobzhansky's *Genetics and the Origin of the Species* (1937) succeeded in showing geneticists and naturalists that they were approaching the same problems from separate but equally fruitful perspectives. Erwin Schrodinger's *What Is Life? The Physical Aspect of the Living Cell* (1944) helped give birth to the field of molecular biology by convincing physicists no longer to disrespect biologists and biologists no longer to distrust physicists. But Edward O. Wilson's *Consilience: The Unity of Knowledge* (1998), Ceccarelli argues, fails as markedly as the other two books succeeded, being unsuccessful in an attempt to subjugate the social sciences to the natural sciences.

None of these books broke new ground in any particular scientific effort, nor did they attempt to do so. They belong to a genre Ceccarelli calls "interdisciplinary inspirational works of science"; they are all attempts to realign and recombine existing disciplines. To demonstrate why the first two succeeded in that effort and the third one failed, she focuses not on the reputations of the authors, the inherent logic of their arguments, or the social, political and intellectual timing of their efforts, but rather on their rhetoric.

It should come as no great surprise that the way an argument is made has a great deal to do with whether it succeeds or fails in persuading. From the reader's perspective, the rhetoric of a text is everything in and about that text that persuades you to interpret it the way you do. Much of that rhetoric functions without your conscious knowledge. Its effects emanate from structure, from arrangement and from the usage of figures of speech. Dobzhansky's and Schrodinger's books act as "effective catalysts," Ceccarelli argues, persuading hostile parties to listen to each other and eventually to work with or toward each other; Wilson's book fails in the same effort, undercutting its own catalytic function.

Ceccarelli focuses on two rhetorical techniques in particular, "conceptual chiasmus" and "polysemous textual construction." "Chiasmus" is a rhetorical figure of speech in which two or more elements are repeated in reverse order (as in John F. Kennedy's "Ask not what your country can do for you--ask what you can do for your country"). "Conceptual chiasmus" is a neologism she has created "to indicate a rhetorical strategy that reverses disciplinary expectations surrounding conceptual categories, often through metaphor, to promote the parallel crisscrossing of intellectual space. With a conceptual chiasmus, unusual linguistic choices force readers from one discipline to think about an issue in terms more appropriate to their counterparts in another discipline, and vice versa." Although she offers few examples of this, one she describes from the Dobzhansky work is convincing:

Without necessarily solving the conceptual problem, the adaptive landscape metaphor began to bring genetics and natural history together by allowing biologists to think about the abstract genetic problem and the spatial realm at the same time. After assimilating this metaphor, the thought patterns of each group would change: whenever geneticists thought about gene frequencies, they would imagine populations moving about in space; whenever naturalists thought about populations inhabiting ecological niches, they would think about the alteration of gene frequencies.

A "conceptual chiasmus," as Ceccarelli defines it, presents a single concept that can simultaneously appeal to two otherwise incompatible communities; a "polysemous textual construction" travels in the opposite direction. It presents a single articulation that can then be perceived to mean different things to different communities. It is therefore a clever use of ambiguity. Instead of solving, it merely appears to solve. She examines at length an example of this in Schrodinger's work, his use of one politically soothing,

ambiguous phrase--"other laws of physics"--to satisfy both reductionists and antireductionists. Schrodinger claimed that "living matter, while not eluding the 'laws of physics' as established up to date, is likely to involve 'other laws of physics' hitherto unknown, which, however, once they have been revealed, will form just as integral a part of this science as the former."

In the skillful hands of Schrodinger, such intentional ambiguity proved a tactic both clever and politic; but Wilson, Ceccarelli argues, used polysemy so clumsily in *Consilience* that he appeared two-faced. According to Ceccarelli, this is one of the three main causes of the failure of *Consilience* to achieve cross-disciplinary transformation. The second cause: Instead of ambiguating the laws of physics, Wilson opted for extreme reductionism, claiming that "all tangible phenomena, from the birth of stars to the workings of social institutions, are based on material processes that are ultimately reducible, however long and tortuous the sequences, to the laws of physics." The third cause: He opted for what Ceccarelli calls "a rhetoric of conquest" rather than "a rhetoric of negotiation." Ceccarelli notes that "The overwhelming majority of metaphors used by Wilson to describe interdisciplinarity established an image of one territory dominating another through an expansionist war." The scientists sound throughout like "heroic adventurers who seek to expand the domain of science into territory previously claimed by the social sciences and the humanities."

Curiously, Ceccarelli fails to address in any detail two rhetorical concerns that seem central to an inquiry into the reception of these books--writing style and the influence of the author's reputation.

Although *Shaping Science with Rhetoric* accomplishes a good deal that is new, interesting and (we can hope) generative of more far-reaching rhetorical work, the book is not always a pleasure to read. It suffers from having begun its life as a Ph.D. dissertation: Ceccarelli's own rhetorical task seems less one of communicating with an audience of peers than one of demonstrating to her professors that she knows her field. She has reason to have more faith in herself. She also demonstrates too little faith in her readers by constantly telling us what she is going to tell us or has already told us. Although chapters 1, 2, 4 and 6 woodenly "introduce" that which she will eventually tell us, chapters 3, 5 and 7 (one on each author) are gracefully written and filled with enlightening insights. They are the core contribution of the book.

Gopen, George D.

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**Source Citation** (MLA 8<sup>th</sup> Edition)

Gopen, George D. "Forging Alliances with Words. (Topical Reviews: Rhetoric)." *American Scientist*, vol. 90, no. 3, 2002, p. 276+.

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Accessed 5 Dec. 2019.

**Gale Document Number:** GALEIA85185156