REVIEW/COMPTE RENDU

Science: An Epitome of Democratic Politics

Lynette Hunter
University of Leeds

Fahnestock, Jeanne Rhetorical Figures in Science. *New York and Oxford: Oxford University Press, 1999. xiv + 234 pages.*

Gross, Alan The Rhetoric of Science, with a new preface by the author. *Cambridge, Mass. and London: Harvard University Press, 1990/1996. xxxiii + 248 pages.*

Hasian, Marouf The Rhetoric of Eugenics in Anglo-American Thought. *Athens, Georgia and London: The University of Georgia Press, 1966. x + 265 pages.*

Taylor, Charles Defining Science: A Rhetoric of Demarcation. *Madison and London: University of Wisconsin Press, 1996. vii + 294 pages.*

This eclectic grouping of books should effectively remind us of the growing scope of the rhetoric of science. At the same time each one displays an insistent focus on the concept of community and science, and on rhetorical constitution. Implicitly this vocabulary is derived from the elaboration of "constitution" in various discourse studies based in culture, gender, race, ability and so on, and these books address a larger issue, that of the difference between ideological and rhetorical constitution. Since the history of rhetoric is largely a history of changing responses to an enlarging democratic base, the emphasis of the commentary that follows will be upon the contribution these books make to understanding more fully the relation between science and the public upon whom it works its effects in a world moving away from nationally funded and regulated science to the deregulation of funding by global private enterprise.

Charles Alan Taylor's *Defining Science* argues that practising scientists need to understand that science is rhetorical. The core work is to explore the ways in which scientists demarcate their research and practical areas as "science," and the argument is that other approaches to the rhetoric of science have deplored its taken-for-granted ontological solidity while not taking enough account of the way scientists often recognize science as unstable, but take culture and society for granted. Indeed he suggests that scientists construct the demarcations around their closed worlds on purpose, to insist on epistemic authority, but that in an institution where science increasingly commands technological and economic authority, if not political authority as well, those closed worlds change in function. They become not simply strategies for knowing certain things (i.e., things as certain), but, as rhetoric tells us, potentially unethical strategies for excluding the public from the technological, economic, and political implications of science. Taylor argues with a passionate edge for scientists to recognize the rhetorical constitution of science which foregrounds how it is "practically tied to communal life." He quotes Michael Leff on the way science "finds its habitation only in the particular" (Leff, 1987, p. 7). The opening chapter presents science as an ecosystem that is not there because of "ontological difference" but because of "contextual connectedness" (p. 7), that must be regrounded "into a broader social analysis in which the constraints of ethical and political practice reflexively influence the nature and operation of scientific practices" (pp. 16–7).

The procedure of the book is to review studies of science in recent philosophy (chapter 2), sociology (chapter 3), and rhetoric (chapter 4), before going on to two discrete explorations of the rhetorical ecosystems of creationism and of cold fusion chapters 5 and 6). Reviewing philosophy, Taylor rehearses a fairly well-known background to studies in the history and philosophy of science, that is topically situated through his choices, which include: Empiricism (that originary myth), Popper, Lakatos, Kuhn, Toulmin, Holton; and which move significantly to: Rouse, Laudan and Fuller. Commentaries on the latter three encourage the argument to expand into the interrelation between politics, philosophy and the demarcation of science. As a series of statements, the argument here clearly indicates where Taylor wants to end up: 1) "the *communicative process itself is the main source of cognitive change*" (pp. 54–5, quoting Fuller); 2) science is social process and not "clearly demarcated from other social practices" (p. 55); 3) science has no "natural integrity" that would grant it "ethnocentric authority" (p. 56); and 4) (quoting Fuller) "'knowledge production should proceed only insofar as public participation is possible'" (Fuller, 1993, xviii). Having set this target, the book now has to get there.

Reviewing sociology is not as productive, although the overview is varied and full of helpful notes on writers such as Merton, Ziman, Mulkay, Latour, Woolgar and Yearley, and concludes with a grace note on historians such as Shapin and Schaffer. The burden of analysis is to present most of these studies as ignorant of rhetoric and textual materiality. Beyond Taylor's commentary is a notion of a symbolic mediation of rhetoric that he derives from Kenneth Burke. Hence the rhetoric of science is not "just words" overlaid on sociological practice, but the way symbolic constructions that constitute scientific definition and demarcation are made material. The critique lays the ground for the ensuing overview of rhetorical studies, which emphasize the communal interaction of science and the public, and which allow Taylor to describe science as an ecosystem that could become a "communal enterprise" (102). The analysis groups rhetoricians of science into those with a philosophic or epistemic set, and those with a more political orientation trying to reclaim the public sphere. Commentaries are made on Gross, Weimer, McGuire and Melia, Wander, Goodnight and Farrell, Hare and Lynne, and Holmquist.

What emerges from the analysis of rhetorical studies is the need for the public to become more educated in and aware of the rhetoric of science. In a sense this is a peculiar place to end up in a book arguing that *scientists* need to be more aware of the rhetorical, but it is also the only sensible place to end up given the focus on communication, social process and public participation. It is during this chapter that Taylor makes a crucial point about the need for "global scientific principles" to give way to "local judgments" (126). This entails the public adopting strategies for reading science that "(dis)empower various ecosystems" and allow for a model that will bring science into a world of civic action. However, he acknowledges that the current public rhetorics of science are "not good foundations" for doing so.

When the book moves on to its two case studies, of creation science and of cold fusion, it is the failure of public strategies that dominates demarcation issues. After noting that creation science is given room in a surprisingly large number of educational programs, Taylor argues that this is so because it behaves in the way that the (as-yet uneducated) public expects of science: it claims authority, certainty, and empirical proof. In contrast, mainstream science has moved to the position where it does not claim certainty to the same extent as it did. The result is that while traditional science has reacted by trying to demarcate creation science outside science, the public still responds to it positively because it has a "populist ideographic commitment" to verificationism (141). The analysis is persuasive but there is not enough background textual material related to the "public" to anchor the argument. Similarly with the case study on cold fusion: although we are told that a variety of texts will be used,

including newspapers, Senate-hearing transcripts, and journals, there are, in effect, relatively few that are subjected to the detailed analysis that would give us a clearer idea of the "public."

Even if we put a positive gloss on "public" and take it as referring to "education" in the debate about creation science and to "government" in the debate about cold fusion, there simply isn't enough detail to explain why the demarcation by traditional science of the cold fusion experiments as "outside science", should be believed or disbelieved by those outside the scientific community. In other words the case studies are acute about the skill with which the scientific community demarcates areas as inside or outside science, but fail to offer sufficient grounds for the public's participation (or not). Given that the book plans to look at what scientists ought to do to break down the barriers between their work and the public, not to erect them, and given that the analysis of rhetorical studies demonstrates the need for public education in the rhetorical understanding of science, the case studies, while interesting in themselves, do not do what they set out to do.

The social processes illuminated here are those that go on between and among scientific communities, but not between those communities and a more general public. The former appears to be what Taylor starts by investigating, and it is significant that the slippage to more general public rhetoric occurs, because his own rhetorical analysis argues that it should be foregrounded. He concludes that to understand better the "intrinsically social nature of scientific practice," we must get rid of the taken-for-granted; try to articulate the tacit in scientific practice; position the "expertise" of scientists as short-term; deal with the "naïve" public understanding of science; and break down the barriers between the public and the closed technical world. This book essentially deals with the first element only. What the analysis makes clear is that science doesn't want to be seen as unstable or it will lose the trust of the public, but more important is that, without that trust, science will also lose its funding.

The problem here is that "public" is too large and amorphous a category. Science attempts to control demarcation not only because of the general public, but because of (among other considerations) political support, government funding, and ideological approval. Science has, in other words, many "publics." One of the most interesting, that is touched on but not pursued in the case study on cold fusion, is the "public" of private global enterprise that increasingly provides funding for science practice. Whereas the government may have paternalistically obscured the funding patterns for science for many years, there are now substantial reasons for putting into place precisely the kind of mechanisms that will allow for public participation in the regulation of scientific practice, because the development and funding of science is no longer in the hands of someone accountable. If governments are to continue as the

accepted regulators of national science development, despite the fact that they are increasingly being displaced by private enterprise funding sources, they will need to open up channels for public comment to put into place a better education for the understanding of science, so that they can make reasoned and legitimated decisions.

Defining Science argues convincingly that science is not relativist but rhetorically constituted. But what does this mean? After all, Taylor's elaboration of it in a quotation from Peters and Rothenbuler, "'The symbolic performative and discursive production of reality is ... a given of human society and expertise'" (1989, p. 24), sounds close to the performative of discourse studies (see Butler, 1993). Alan Gross, in his introduction to the new edition of *The Rhetoric of Science*, begins with the assertion that relativism for him means "constructing a position in which rhetorical interaction is constitutive of knowledge" (p. xi). Presumably to defend himself from the charge of reducing science to "mere words" he also notes that epistemological and ethical relativism are "products of situated rhetorical interaction" (p. xxvii), but he goes on to say that as such, the interaction evades issues of social justice (p. xxvii). Now rhetoric is there precisely to engage issues of social justice. It may be that Gross misses this point because he also states that classical rhetoric does not recognize that it is an "effect of causes outside the realm of classical rhetoric" (p. xix), which is a fundamental misunderstanding. Aristotle pointed out that rhetoric that took place within closed systems was a particular kind of rhetoric, inappropriate for social or political argument, and could only belong to self-selecting cultures of knowledge. In any event, the progress of the slightly defensive tone of Gross' new introduction highlights one of the basic assumptions of the book: "Style in science is not a window on reality, but the vehicle of an ideology that systematically misdescribes experimental and observational events" (p. 84). While Gross is a passionate advocate for a democratic understanding of and participation in science, he still works within a worldview that believes in the possibility of true communication. In a central positioning of the style of science he notes that each scientific paper "exhibits terminological stability" yet the "set of all scientific papers undermines" this stability, hence there is a metaphysical contradiction in science. Within metaphysics, understood as ideologically bound and systematically coherent, the contradiction does exist, and this is because western metaphysics since the seventeenth century has worked with an idea of language as inadequate to communication rather than with the rhetorical understanding of language as limited. Inadequate language will always "misdescribe" because it is defined to do so. In rhetoric, language has a different agenda which requires social negotiation.

The analysis of the rhetoric of science here attacks science on its own terms, as unable to deliver truth and therefore relativist: something that historians and philosophers of science, if not many enlightened scientists, have been saying for a long

time. As noted above, rhetoric has always recognized this as a special case of argument within closed systems. But the moment argument moves into the social and democratic, language has to negotiate. Without situated interaction there can be no democratic participation. Social justice is dependent on situated interaction, not just within groups of scientists themselves, but among the groups that make up their locality — community, institution, region, nation. This is the signal difference made in rhetoric between plausible interaction and probable interaction. The plausible keeps closed and does evade social justice, while the probable requires negotiations across difference and is at the heart of democratic process.

Yet again: what does it mean to be constituted rhetorically? Perhaps a brief look at ideological constitution will clarify matters. It is odd that Taylor doesn't look at Foucauldian concepts of ideology, particularly the later Foucault who moved from an over-determined model of ideology-subject representations, to a more communal model of local disruptions of those representations. To be constituted ideologically, as the early Foucault, and as Judith Butler points out, is to be subject to the representations that ideology, the ethos of the nation state, allows to its citizens, and to a lesser extent to be subject to the embodiments cast by the shadow of those representations. The subjects in this model are the private, autonomous, isolated individuals on whose willingness to subject themselves capitalism rests. By contrast rhetorical constitution requires negotiation between the situated individual and their local (immediate, regional, national) communities, in which work on probably-the-best arguments for decisions and actions initiates agency. The individual here is precisely not isolated, private and autonomous, but a person defined in terms of a community. Discourse studies as field draws blindly on the agency of situated communication, and explores the extent to which ideological representations can be contested and possibly shifted.

When we look at the public understanding of science, we need at the least to differentiate between the situated, the discursive, and the ideological publics involved. As the philosophical extensions of epistemology rooted in Wittgenstein's perceptions of negotiation and justificatory relations (see Tanesini, 1994), have developed into situated knowledge as an alternative to traditional epistemology, so too do the rhetorics of these publics need differentiating. One of the problems Gross may be gesturing toward in his brief comments on classical rhetoric, is that it was not formulated to deal with an enfranchised public. It may be that this significant shortcoming also partly explains the curious derailing of Taylor's discussion of the public. However, I would agree that if science is to be democratized it will be by way of a new understanding of the rhetoric of public participation in the powers of local, national and global action.

The Rhetoric of Eugenics, by Marouf Hasian, is a worthy attempt to apply the theory of ideographs to the history of eugenics and genetics. In so doing, it draws on McGee (1980) and Condit (1990), and essays a new development in rhetorical strategy, one that studies the way that groups of people challenge powerful ideological representations by using less powerful but still legitimated representations. Ideographs are warrants for assent, and are related by Hasian to myth, narrative and metaphor. They are an influential rather than causal force in facilitating social change (p. 8), and bring together symbolic and material change as reality in a manner again reminiscent of Kenneth Burke. Significantly, the ideographic approach looks at how the public actually voices its concerns, rather than the "way the masses failed to live up to" some rationalist standard. Ideographs appear here as one of the devices by which discourse draws from the situated and inflects ideology. Hasian points out a central tenet of situated knowledge, that marginalized communities can note contradictions in traditional tales and see oppression where subjects belonging to the status quo assume only the taken-for-granted. Given our current exploitation by gene therapies, this book is invaluable. In contrast to most of the books on the rhetoric of science, it does not shirk the extraordinary labour of trawling through newspapers, newsletters, handbills, accounts of civic and national displays, diary entries and journals, to find evidence of public response. In its way, it offers a study of the demarcation of genetics as a science from eugenics as politics in the early twentieth century, and tries to pursue that analysis into the present day. The former is lucid, full of information and examples for which teachers of the histories of science and of rhetoric should be enormously grateful. Hasian charts a course from the popularization of eugenics as an explanatory model for class that works as well for the rich as for the poor, as well for the privileged as for the socially conscious, through its contests with increasingly hard-line genetics. Case studies are drawn from, among many others, the Scouts, African-American communities, women's communities, Roman Catholics, and groups of liberal and socialist politicians and activists. The overall argument, which suggests that these groups successfully worked against hard-line genetics policies of segregation, selective breeding, enforced sterilization and termination, until the Nazi experiments of the 1930s brought the hard-liners to a halt, is an extraordinary story of public commitment and agency.

The book is not without contention, often deriving from the generalization endemic to ideographic analysis, and it would have been helpful to have some detailed personal study to get a sense of the negotiations between individual and community in the rhetoric of the situated knowledge involved, but as it stands, it is a substantive achievement. Where it weakens is in its final analysis of the contemporary rhetoric of eugenics and genetics. Despite useful commentary on the construction of an underclass,

on the abuse of issues of violence and race, and on the probable reinforcement of women as defined by reproduction, Hasian cannot find the public counterargument to contemporary genetics. Like Taylor, in the case studies here Hasian is acute about the rhetoric of the scientific community. The study of the Human Genome Project (HGP) demonstrates how it carefully excludes public participation, has co-opted the eugenics arguments, and systematically reduces all disagreement, including refusal to submit to gene therapy, to ignorance and primitivism. Perhaps there is no counterargument. But then, many people still claim this of the early twentieth century, and Hasian shows conclusively that this was not the case. So perhaps we cannot see it yet. Perhaps the "ethnic cleansing" being carried out around the world will coalesce the counterargument in the way that the Nazi death camps did.

More likely, the problem lies in the deregulation of science, its dispersal around the globe into "second-stage science," and the speed with which it advances. Much of the HGP is funded by private enterprise. The government is discouraged from independent assessment and evaluation of social and ethical implications because the HGP has put money aside just for these issues (p. 143). Second-stage science means that teams of scientists are working only on one small part of a larger project and cannot themselves necessarily evaluate the implications of the whole, let alone make those implications clear to their publics. In effect, no one may know the implications, or, those funding the research may guess at them, but need to protect their secrecy in order to make more money out of them. And, of course, modern genetics could effect changes in one generation that earlier genetics would have taken several generations to change. The grounds upon which science is carried out are changing radically, as are the grounds of politics: after all, in the early twentieth century many countries of the world did not have public participation in democracy. Since then we have moved not only to national enfranchisement, but through to a world where nations are subject to global finance, just as individuals used to be subject to government supported capitalism. The obscured assumption behind all of these books, is that change will only come from the situated knowledge of individual and community and its practices being brought to bear on discursive structures, either national or global. Hence it is surprising that not one of them turns to the philosophical site where it is being discussed in terms of science: the critiques of science made by Harding, Code, et al. (see S. Harding, 1991, L. Code, 1995). However, in Jeanne Fahnstock's *Rhetorical Figures in Science*, we do at least get a glimpse of a detailed example of the rhetoric of situated communication, and a plethora of highly suggestive analyses of less situated work. But first, it should be said, this book is a major contribution to studies in rheto-

ric, language and communication. It will prove illuminating for a wide readership, not only those interested in the rhetoric of science. In effect, its location in science is fortuitous if salutary.

Fahnestock starts off with a warning: that although rhetoric is both formal and historical, the book is more concerned with formal elements that take us to the generic skills of argument regardless of subject matter. But there is no need to worry. Fahnestock's notion of focus on the formal is inextricably bound to the historical. The final cap to the book, a study of the formation of the discursive community of people working on electricity from 1600 to 1750, is the most detailed account. Yet all the way through, the longer analyses of, say, Darwin's *Origin of the Species*, Bacon's *Novum Organum*, or Pasteur's laboratory writings, are also placed within an historical context. What the focus on the formal does, is foreground the history of the rhetorical elements. As the title suggests, the figures of rhetoric are the centre of attention, and the primary achievement of the book is carefully to elucidate the argumentative potential of a small group of formally recognizable figures: antithesis, incrementum and gradatio, antimetabole and chiasmus, and ploce and polyptoton. Over the past 50 years, there has been an enormous emphasis on the argumentative potential of metaphor, not the least in science; and there has been a smaller but distinct move to claim argumentative potential for the figures in general. However, Fahnestock, by limiting the study to these formally recognizable figures, has produced by far the most persuasive and sophisticated analysis to date. The analysis takes place in the context of science for three reasons: science writing is supposed to be clear, yet the argument may be embedded in obscured figures; more interestingly, scientific arguments are often visual, and hence can relate to the figures in a different way; and finally, more predictably, to insist on the presence of rhetoric in science.

The opening chapter rehearses a move to be found throughout the rest. It begins with a scan through definitions of the figures from Aristotle, to Cicero and Quintilian, to Hermogenes, to Erasmus, Melancthon and Peacham, to more recent commentators such as Sister Joseph, Kenneth Burke, and Olbrects-Tyteca and Perelman. The list is not static; at various times it introduces Blair, Campbell and Whateley, or Puttenham, or Ogden, Piaget and Biblical exegesis: the list is wide and long. Of particular importance are the frequent specific studies that draw together Aristotle's *Rhetoric*, with the *Topics* and the *Categories*. Viewing these as interconnected texts is vital for an understanding of classical rhetoric, as historians of rhetoric know, yet the focus on the figures yields refreshing and compelling evidence for the fruitfulness of the strategy. That the *Politics* is not also brought to bear, indicates the boundaries within which Fahnestock self-consciously works.

That intractable problem of how to distinguish figures from "normal" language is dealt with by recognizing that all language may be functionally figural, and that the normal begins to mean the most synchronically acceptable use. The current feeling that the difference between figural and literal as a big either/or switch is seen as a reduction from Biblical fourfold allegory and particularly popular among modern critics who model reading on cryptography, on searching for hidden rather than intended meaning (p. 17). The argument proceeds by defining the figures in general as neither ornament nor "value-added," but as "epitomes of lines of reasoning" with iconic status (p. 23). In the initial stages of proving this hypothesis, Fahnestock draws on Thomas Conley's suggestion that enthymeme is precisely style as argument, and difficult to comprehend except in context (p. 29). The concept of enthymeme as not only a "missing part" but also a "capper," "that moment in the text when the argument is most directly and emphatically expressed by the syntax and word choice" (p. 30), surfaces repeatedly throughout the text

Significantly, this definition ensures that despite the focus on the formal, context is never lost. For example, in the specific analysis of antithesis, unpicking the implications of Aristotle's *Rhetoric*, chapter 3, on prose style, different kinds of opposites are elaborated, which in turn prompts the distinction between contextually bound notions of opposites: "natural" opposites, in the sense given above of "normal," and local opposites, which are specific to communities and more narrowly definable in time and place. This then gives way to the distinctions in the *Categories* between contraries, contradictions and correlatives (p. 48), and to parallel structures in the *Topics* and how they can be combined to generate "reputable opinion" (p. 51). Yet the whole is framed by the cautionary note that "Whenever specific examples are involved, the cultural boundaries of plausibility begin to show" (p. 52). Like every honest rhetor, Fahnestock never fails to remind us of the limit to the inquiry, and my own next question beyond this limit would be that we need not only to point out the cultural boundaries that indicate the limit of credence for any argument, but also to look at what gives arguments credence within the culture.

For nearly every figure, the section of the text dealing with the argumentative uses of that figure, suggests precisely this. For incrementum or gradatio, subjects ordered by degree must belong to the same category in the perception of arguer and audience. Once established, this may construct "participation ... to establish membership" (p. 95), or to reach completion, or to "fill in the gaps." They can invite the audience to perceive ways that elements can be brought together and how they can be pushed apart. Similarly, because antimetabole preserves parallelism and repetition it gains in predictive power, "the invitation it offers readers to anticipate how the figure should be completed" (p. 124); conversely loose antimetaboles indicate uncer-

tainty about causal connections (p. 125). Or figures of repetition offer an 'aural glue'; readers are "invited to detect the patterns superimposed by these repetitions, creating potential mini-schemes of organization across a text" (p. 158).

What complicates the picture is the argument, from grounds Fahnestock provides, that the perception of form, as form, is social and cultural. Therefore this group of seven figures are those our society sees as formal as well as functional. Other societies may see our function-only figures as formal. In fact, there is an explicit example of this given in terms of gradatio (p. 94). In itself, the slippage could simply be accepted, but the book goes on to argue rather more delicately that opposition, simultaneity, and identity "must express a more primitive underlying conceptual pattern that somehow satisfies the mind" (p. 134) and is allied to "vaguer notions of perceptual and aesthetic balance" in the arts and architecture. Indeed natural or constructed bilateral symmetry can "apparently convey a sense of completeness" (p. 135). More problematically, in a statement intended to demystify the way "grammatical migration" can create premises for argument, the text calls on Aristotle's "machinery of common sense" (p. 171) that "most people follow most of the time". Unfortunately, as anthropologists, ethnologists, psychologists, and others know, this is a highly contentious area, and the book doesn't have the range of reference for it to offer enough support.

Similarly, the case for the figures as argument is lured into the territory of "inspiration." Just as other studies have at great length promoted metaphor as a figure capable of initiating a creative leap to different understanding, Fahnestock claims the same for many of these figures. Faraday's interest in both visual and verbal antimetabole is held to have "inspired" him to recognize the reverse direction of electromagnetism. Perhaps this is merely a co-opting of a successful vocabulary. However, it can also reaffirm the romantic concept of individual genius that the communities of knowledge illustrated in the book contradict.

The final extended example of the discursive field of electricity alluded to above offers, through its detail, a study of how people come to articulate understanding that is not yet in place: in other words, rhetorical strategies appropriate to this community, for speaking about different not-yet-said ideas, the tacit understanding of scientific practice that most rhetoricians avoid discussing. Fahnestock elegantly and with evident but engagingly restrained humour, gives us a sense of the way webs of significance are constructed through the use of individual words, and their deployment through figures as argument. The study is an extended example of the process behind every argumentative figure in the book, and is particularly important because it reminds us of the local and situated interactions that are necessary for change. The other books, reviewed above, work largely with ethos and pathos, which have been

elaborated for audiences working with ideas of the "same" which inexorably move toward the plausible. The situated interactions that are documented here, allow us to follow the process of probable stance that works with difference.

What we do when we work on articulation is ill-defined. Most rhetorical study is concerned with representations and with ethos presentation like that of the HGP. Over the last few years contemporary rhetoric has realized that it has a responsibility to the demands of an enfranchised democracy, enfranchised with respect to science, as well as politics in general. The particular responsibility is to distinguish between the articulation that results from an individual negotiating within a community, and the representations bound to institutional and ideological requirements. Many people in the past have turned to poetics when dealing with articulation, but in the current climate, where most theories of poetics are transcendental, concepts of articulation are fundamentally tied to an autonomous individual rather that the individual in a community. Rhetoric is, of course, primarily about social communication, and can offer other ways of addressing the issue.

Fahnstock's work is much larger than the rhetoric of science because it argues for the figures as central to articulation, and encourages us to think about figural reasoning as a mode that differentiates it from representation. After all, communities cannot form without reasoned communication. Yet logically "correct" or identifiable/identifying structures imply a groundwork of "the same." For example, she draws a distinction between logical contradiction in which the terms are oppositional and cancel each other out (p. 48), and contraries of words like "clean" which have a number of tangential directions such as "dirty" or "corrupt." When the book elaborates on Ogden's notion of scales and cuts, there is a delicate piece of manoeuvering around the idea of intermediates within opposites, which logic works to exclude (p. 73). The section on the reciprocal causality conveyed by antimetabole points out that the reader is probably not looking for a missing premise, as in logic, but awaiting pattern completion or satisfaction (p. 151). Just so, the exact repetitions of ploche make little sense as logic. "Caesar was Caesar" is reduced to tautology by logic, but as a figure that the reader recognizes as exploiting potential difference, repetition generates subtle variations of significance. Enthymeme infuses the entire structure of *Figures of Science.* It is the epitome of figural reasoning.

Throughout, Fahnestock gives examples of rhetorical construction that are ideological and local, and range from the representative to the discursive to articulation. To do so needs social and historical context, and the book gives just enough of this to make rhetorical sense. Yet while what Fahnestock does is important, for she gives a version of how science is actually practised by individuals, there is a larger context. We need to get a better sense of how science as contemporary laboratory cul-

ture negotiates within a "local" environment. We need a better sense of how that inserts itself into the ideology of government, transnational private enterprise and current models of scientific expertise. And we need a better sense of the power relations specific to today. It may be significant that Fahnestock's examples from contemporary science are often ideological and discursive.

What these books indicate as a group is not only the enormous amount of work that needs to be done in the rhetoric of science, but each in its own way opens up a different set of strategies crucial to the development of societies worldwide. Studies in the rhetoric of science have at the moment a central place because they analyze the intersection of texts and practices that for many years have been taken by the public as neutral and authoritative. The rhetorical analysis of science not only problematizes this ethos/pathos relationship and wakes us up to the different needs of today, but becomes in itself an epitome for the analysis of political systems that also claim neutrality and authority in the face of newly enfranchised publics. Science has often been a "best-case scenario" for political philosophers. But these days, with the rhetoric of science increasingly being foregrounded, it offers a way of understanding the shortcomings and the alternatives in "democratic" structures.

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