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State of the Art Twenty Years On: Reflections

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State of the Art Twenty Years On: Reflections

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> Looking back as well as I can at my character during my school life, the only qualities which at this period promised well for the future, were, that I had strong and diversified tastes, much zeal for whatever interested me, and a keen pleasure in understanding any complex subject or thing.
>
> —Charles Darwin, *Autobiography*

Each of our papers is bullish on invention, and each offers constructive ideas for how we might best focus our efforts to advance scholarship in the rhetoric of science and technology. Lawrence Prelli's reflections on the growing importance of visual communication in the rhetoric of science share much in common with Celeste Condit's paper, but her warning of the space between where we are now and where we need to be to safely move our enterprise forward captures a theme common to all of our papers. David Depew and John Lyne address similar concerns while also providing a compact summation of the intellectual terrain that lies before us.

Lawrence Prelli, "The Prospect of Invention in Rhetorical Studies of Science, Technology, and Medicine"

Lawrence Prelli's summation of the state and direction of rhetoric of science scholarship advances the analysis of invention and innovation common to all our papers. Prelli's paper sketches a field grounded in tradition, building on its prior achievements, expanding to new areas of study, and remaining civically engaged. Prelli sees no crisis facing our studies but only the need to further augment an enterprise that has already proven its capacity to critique scientific texts, illuminate their persuasive dynamics, and develop new insights by refining its multi-faceted angles of vision. Prelli organizes his account of the rhetoric of science, technology, and medicine primarily, though not exclusively, according to invention, style, the Burkean arsenal, argumentation, and commonplaces. Although Prelli's general canon-centered account initially sets to one side the issues currently challenging the rhetoric of science and technology that variously concern Condit and Ceccarelli, these issues break through almost on their own at various points in his paper.

Uniting Invention and Style

Prelli's opening paragraph on invention, in which he draws on the recent work of Joanna Hartelius and before her Floyd Anderson and Charles Kneupper, underscores that the intellectual home of rhetorical study is invention. For Prelli, as for Harris as well as Depew and Lyne, rhetoric is a knowledge-generating enterprise. A careful reader can clearly see that the formal analytic approaches in the rhetoric of science, technology, and medicine that Prelli sets forth is not a list. Rather, it is an argument and a scholarly agenda for reversing rhetoric's reputation as a handmaiden, whether of philosophy or science, and for aggressively presenting it as a source of conceptual innovation and advance in science as well as in practical reason.

In his second paragraph, Prelli mentions his own current work-in-progress on competing visions of ecology in the early twentieth century and the different metaphors that grounded them. Particularly intriguing in his comments on the interplay of various of Burke's master tropes operating in this discourse is their power to reveal "the imaginative origins" (this issue) of what later came to be regarded as technical perspectives—indeed as mere data. Prelli's project of raising to life dead metaphors and to set before our eyes how they were not, after all, inevitable but imaginative possibilities in an initial scene of contestation promises to expand our understanding of the heavy epistemic work done by "style" in technical science and its inseparability from argument.

Dramatism and Delivery

Shifting to dramatism, Prelli briefly notes that the area is under-developed. He cites work by Meisenbach and by Beck to demonstrate dramatism's utility in illuminating the discourses of medicine. Turning to argument in general, irrespective of whether informed by metaphor or Burke's master tropes or dramatism, Prelli (this issue) notes how recent work by Keränen and by Wynn shows how argument has "participated in the establishment and change of sciences historically." Moving beyond the enumeration of studies by canonical or Burkean types, Prelli notes the emerging interest in the rhetoric of visual displays and cites the current innovative work of a number of rhetoric of science scholars. Though Prelli does not use the canonical term "delivery," he highlights its increasing importance—particularly in an age of computer-generated visuals and graphics of science as performance.

Institutional Pressures and Interdisciplinary Engagement

In his account of "commonplaces," Prelli shows himself as concerned with the cultural context in which scholarship in the rhetoric of science now finds itself. Where Condit sees a threat from unnamed outside corporate forces, Prelli comes close to naming them and sees them already in the upper administration using innocent-sounding technical sphere terminology to compromise or privatize public education—particularly liberal education. That Prelli makes no special point about the efficacy of rhetorical analysis as critical therapy for the disorders of the day suggests how securely for him the rhetoric of science is, of course and already, a civic art with a public responsibility for critique. Prelli and Condit then

share a vision for engaged scholarship in the rhetoric of science. This places their view in tension with the more cautionary temper of Depew and Lyne in their remarks in "Need We All Be Unified?" (this issue) and shows a common recognition that rhetoric of science study inevitably—and consequentially for its future credibility—abuts politics.

Prelli's final segment on interdisciplinary engagement parallels the themes of Condit and Ceccarelli (this issue), but unlike them Prelli raises no issue of the respective need for a change of direction or a faster realization of an acknowledged goal. If I read him correctly, Prelli sees the rhetoric of science and technology as playing an increasing role in the places where the public and technical spheres intersect. This increased role takes on significance as the interdisciplinary associations made in pursuing our studies and the sheer force of their pertinence create opportunities of their own.

I note a tension between Prelli's formalist terminology—whether from the traditional rhetorical canon or from Burke—and the situation-rich approach that Depew and Lyne find so potent, and I believe this to tension to be a strength of scholarship in the rhetoric of science. Prelli, for example, early in his paper speaks of two approaches to invention—one based on style and the other on argument. A formalist armamentarium, whether classical or Burkean, and an analytic approach grounded in the situated particulars of argumentative contexts can and do go together. (Bringing them together, of course, requires practical judgment and rhetorical/critical art.) In his previous work and in his current paper, Prelli shows how argument and style work cooperatively. Why, then, speak of them as though they were two different types of study?

My point is that we need to be mindful of our own tendency, following what I believe is an unfortunate legacy both of modernity and of the rhetorical tradition itself, to separate argument from style. If, in fact, they are functionally separate, as Prelli's typology of studies would indicate, why do we as a field tolerate a separation that works against our strenuous efforts to abolish the modernist form/content dichotomy that has made it so difficult for the cognitive force of invention to be recognized? I am merely repeating here the point Mike Leff (1983) argued nearly thirty years ago in "Topical Invention and Metaphoric Interaction." Leff began his essay with a citation from Burke's *Rhetoric of Motives*: "the Aristotelian topics shift so imperceptibly between ideas and images that you wonder how the two realms could ever come to be at odds" (Leff, p. 214). Two pages later, Leff used a metaphor to deliver one of the best, and most argumentatively cogent, lines of his essay: "topical method enables us to anticipate and appreciate a denouement; metaphor gives us a seat in the theater" (p. 216).[1] As the work of Fahnestock and Prelli each has

[1] That Leff's essay makes use of an essay by the anthropologist Loren Eisely to show the fit between topical argument and style (pp. 224-227), makes his point all the more appropriate for students of the rhetoric of science.

shown, style and argument are integrated on the level of practice. To advance the case for invention that in this paper and in his earlier and on-going work Prelli so well articulates, we need to place the tradition which separated these approaches on a path toward extinction.

Celeste Condit, "Globalization and Purpose"

Bridging Divides

In her opening two sections, Celeste Condit (this issue) worries about the direction of studies in the rhetoric of science—and equally or more so, she is concerned about the state of the contemporary university and the forces that currently challenge it. David Depew and John Lyne (this issue) note the symmetry between her call for unity within and the threat from without, and they respond with nuanced agreement in a larger context of concern for distance from overt partisanship and a reminder of the salvific Darwinian virtues of variety. Various themes even in the first, and more somber, half of Condit's paper—concern to blunt anti-science sentiment in rhetoric of science studies, the need to better appreciate science and better integrate our rhetorical criticism with the methods of social science and expand our horizons—in principle seem negotiable through the persuasiveness of exemplary studies and greater internal dialogue. As for choosing one or another explicit path around which to organize our studies—this is another matter.

Traditionally in our most supple art, refusing stark choices in favor of negotiating contested boundaries has proven productive.[2] The same has been true in our recent disciplinary history. By the early 1990s, what had seemed as clear alternatives for rhetorical criticism—the ideology-focused program of Michael Calvin McGee (see, e.g., McGee, 1984) and the close reading approach of Michael Leff (1992)—had developed into a constructive tension. Michael Pfau's (2005) *The Political Style of Conspiracy: Chase, Sumner and Lincoln* provides a good example of how the inventional strategy of bridging distinct perspectives can produce conceptual benefits greater than would have been possible from either perspective taken as an exclusive focus.

International Perspectives, Global Prospects

In the second and more ecumenical part of her paper, "An Academic Route: Internationalization," Condit's concrete proposal for strengthening what has been an underdeveloped theme in our literature is easily compatible with the initiatives of the other papers. Condit proposes that ARST scholars move beyond the Anglo-European context of most studies in the rhetoric of science (in which she graciously and forthrightly includes her own) to examine the rhetorical and social dimensions of

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[2] Probably the most famous example is Cicero's refusal in *De Oratore* to disavow Aristotle's *Rhetoric*. However, in his own approach to the subject, Aristotle's preoccupation with whether rhetoric was an "art" was largely irrelevant (Leff, 1986).

science in Africa, Asia and South America. Citing the work of Paroske (2009) on Mbeki and the AIDS crisis in South Africa and of Xiao (1995) on the reception of Darwinism in China, she notes that a promising if small number of studies in our field have already pioneered this theme. Her suggestions for a global expansion of rhetoric of science horizons, and a closer integration with social science, seem timely, welcome, and productive.

Condit's emphasis (this issue) on the need to "notice continuities and discontinuities among the humanities, natural sciences, and social science" seems essential to the success of any rhetoric of science project. Her suggestion that we adopt a perspective aimed at "improving the richness of life for human beings while protecting the natural world around us" (this issue) can certainly be an implicit guiding aim of our studies even if it is not the explicit given aim. The pan-world-perspective she favors would seem highly likely to occasion a changed understanding of how culture and nature reciprocally shape one another and to accelerate movement away from Eurocentric supercessionist models of science that are based on ever-receding memories of the Enlightenment.

Stephen Toulmin (2001, pp. 61-62) gives an example, highly relevant to Condit's project, of the scientific development of "miracle rice." Toulmin explains how the Balinese government in the 1970s and 1980s, with the advice of technical experts in Milan, Italy and Seoul, South Korea, discouraged the traditional farming practices associated with "water temples." The traditional Buddhist practice of using such "temples" to allocate water to local plots on a complex schedule developed over 800 years was abolished in favor a science-based, cost-effective procedure for making Bali self-sufficient in producing an important staple. But when within two years the fields were infested with pests and farmers had to buy ever newer and pest-resistant strains, the farmers pressured the government to return to the old irrigation system. The foreign experts recommended pesticide and regarded the protest as religious obscurantism.

In the end, the water temple system was restored, but on the basis of a compromise between the old system and the water needs of the newer strains of rice. In a way invisible to Western engineering, agriculture, and economics, the waterways and practices associated with the temples were part of "the material infrastructure of Balinese culture" and had "succeeded in minimizing the exposure of native crops to insects, disease, drought, flood and other natural enemies" (Toulmin, 2001, p. 62). The moral of the story, as Toulmin notes, is not to decry science but, in keeping with what I take to be Condit's point, to enable us, using multi-disciplinary perspectives, to attend to local culture, its language, rituals and context-rich ways of knowing. Meera Nanda (2003) tells parallel stories of science and the modernizing process in India, while Susan Jasanoff (2004) and her coauthors bring similar stories from Europe, America, Africa and the Caribbean. Anne Fadiman (1997) likewise brings the theme of the science/religion/medicine/multi-culture interface close to home in her account of the interchange between Hmong and Western medicine in California.

Condit's testimony to the inspiration she has received from encounters with scholars from other parts of the world is itself a powerful reason in favor of her proposal. Despite differences over how unified we need to be or how closely any particular research proposal should be linked to an overt political agenda, her suggestion of a pan-world perspective melds well with the interdisciplinary and horizon-expanding thrust of all our papers. Seen in this light, Condit's proposal seems an excellent and still largely novel avenue for advancing Depew and Lyne's recommendation that we encourage colleagues in science studies to make greater use of the resources of the rhetorical tradition while taking full advantage ourselves of the opening of the social-discursive turn in science studies.

David Depew and John Lyne, "The Productivity of Scientific Rhetoric"

Many of the topics addressed in "The Productivity of Scientific Rhetoric," (Depew & Lyne, this issue) are presaged by Prelli and by the emphasis he gives to the analytic cash-value of the rhetorical tradition, especially invention, and of Burke's pentadic and master tropic riffs upon it. The concerns of Condit that our scholarship have an impact are also addressed by their paper. What is distinctive in Depew and Lyne is their compact summation of the unique situation, challenges, and horizon of opportunity in which the rhetoric of science and technology now finds itself.

In the assessment of Depew and Lyne, we are happily located between more established disciplines—and find ourselves at a most opportune moment. Given the turn away from the emphasis on logic and mathematics in the history and philosophy of science and toward discourse and culture in these same studies, our historical focus on audience and rhetorical choice could not be more timely or more potentially consequential. No less than their lay counterparts, scientific audiences respond to rhetorical choices "embedded" in scientific discourse. Far from being decorative or of the surface, style and all the elements of the rhetorical armamentarium are epistemic and productive of scientific knowledge. In the view of Depew and Lyne, if we have but the wit and restraint to make the most of the combination of our traditional resources, novel position, and historic moment, we may be on the cusp of a significant disciplinary advance centered in invention.

The Place of Rhetoric in the Discursive Turn

Particularly important for their first section (and, in fact, for the structuring of their entire paper) are Depew and Lyne's inter-related questions "whether the social-discursive turn in the study of science has taken full advantage of rhetorical theory and criticism" and "whether we rhetoricians of science have taken full advantage of the opening created by the broader discursive-social turn to articulate, deploy, and advertise our distinctive yet varied approach" (this issue).

In answer to the first question, Depew and Lyne find a close ally in Bruno Latour and see his billing of rhetoric in his studies of science as

explicit and exemplary. But Depew and Lyne find Latour compromised by his inventional exuberance in enfranchising non-humans in a great parliament of deliberation. Depew and Lyne display a greater sense than Latour of the rhetoric of science as a performing art and in their assessment that Latour's problem is not knowing when to stop. Latour's parliament of beings hyperbole has cast doubt upon his otherwise exemplary emphasis on context thereby blunting his message that there is an alternative to a radical social constructivism. A rhetoric of science performance that would build upon Latour's strengths yet avoid his weaknesses would begin with a rich, yet disciplined, view of context and of the multi-faced character of argument.

Depew and Lyne have no doubt that ARST rhetoricians have the wherewithal to produce an account of context even richer than Latour's. They list 16 different approaches to ARST studies in their opening section and—pointing with pride to what Condit views with alarm—suggest that a diversity of perspectives (rather than programmatic unity) will enable us to carry further forward what the best of our fellow travelers in other fields are capable of advancing only up to a point. "Rhetoric is opportunistic and unruly, and we cast our nets where we think the fishing is good," they write (this issue). To extend their theme of the disciplined use of a diverse but common repertoire, the rhetorician of science is not limited to being a purse-seiner but should aspire to be "the complete angler" whose tackle box is well stocked with lures for a broad variety of waters, species, locales, topographic-hydrographic confluences and occasions (this issue).

Depew and Lyne's assessment of the high promise of the rhetorician of science's combination of opportunism, diverse foci and disciplined knowledge of where and how to fish and when to cut bait, coupled with their sympathetic critique of Latour "leads us to the contentious claim that rhetoric of science contextualizes science better than does sociology of science, because the former tends to reduce arguments to context rather than defining context by argument" (this issue).

Demarcation as Focal Point for Rhetoric of Science

Combining Burke's pentad as a way of tracking agency with "Tom Goodnight's threefold distinction between personal, technical, and public spheres of discourse," Depew and Lyne (this issue) prepare the way for the detailed support of their thesis in the middle sections of their paper. One final point of framing places in relief that grounds of their confidence that the diversity of foci in the rhetoric of science is compatible with a rough unity in its overall explanatory ambitions:

> If there is one theorem that we rhetoricians of science have sustained . . . it is that demarcation or boundary-work between science and society, between science, non-science, junk science and pseudo-science, and between various scientific fields themselves is irreducibly rhetorical (this issue).

The demarcationist gospel, though a gift that promises to keep on giving for rhetoricians of science, is, as with its paradigmatic original, bad news before it is good news, sad news before it is glad news (Buechner, 1977).

Even when thoroughly understood, the "essentially contested" character of demarcation is a source of on-going anxiety between and within Goodnight's public and technical spheres. Depew and Lyne put the paradox of this good news/bad news, blessing/curse for rhetorical studies frankly:

> the main implication of recognizing that demarcation is essentially rhetorical is both inescapable and difficult to hear even for some of its supporters" (this issue).

When the Public Sphere Meets the Technical One

The difficulty, of course, is that a truly rhetorical perspective on science reveals that the well-advertised capacity of science to correct itself is largely mythic, that it at the very least has glaring exceptions, and, that at very best, is vastly oversold. Not only do disciplines leak at the seams, demarcation disputes are handled through cross-sphere influences—some of which are subtle and some of which are not. And indeed for democracy, many of them are downright embarrassing. To support their thesis that the public sphere has the ability to correct the technical sphere, Depew and Lyne offer the example of the successful opposition of the Catholic Church in the 1920s and 1930s to eugenics. In their view, the vigorous public sphere opposition of the church "inspired criticism in technical ones that eventually destroyed the genetics arguments on which eugenics was predicated" (this issue).

Three things need to be said about this representative anecdote (perhaps "representative antidote" would be a happier term).

First, the same example also legitimates public sphere religious opposition to stem cell research, popular skepticism of climate change science, belief that immunization shots in school lead to autism, popular interest in intelligent design, European skepticism about genetically modified organisms, skepticism about AIDS research, and a veritable Pandora's box of other examples of public sphere distrust of technical science.

Second, in the conceptual economy of the paper, especially in the "Embedded Rhetoricity and "Inventing on All Cylinders" sections, confidence in the essential soundness of public sphere argumentation is necessary to blunt the "pessimistic induction" of post-moderns once they realize, particularly in the case of biology, how thoroughly rhetorical is the process by which this and similar historical sciences acquire knowledge. One has to have a very robust faith indeed in the essential soundness of public deliberation for Depew and Lyne's instructive and deeply embedded rhetorical examples to work—that is, for these examples not to be read as a form of deconstructing scientific authority but as reconstructing it on a deliberative/argumentational basis. It is difficult to see how the eugenics example—even when boosted by their example of Martin Luther King's call for justice—can do other than reinforce the "pessimistic induction" it is meant to allay.

Third, to defend philosophically-robust public sphere contestation of topics on which the technical sphere has spoken—that is, to do more than acknowledge a first amendment right to freedom of expression—is

something that technical sphere representatives will almost certainly hear as the anti-science sentiments of yet another group of social constructivists and not as the voice of pro-science scholars who are also pro-democracy. Clearly, such a charge against Depew and Lyne would be mistaken, but it is a misunderstanding to which their position, and that of our general endeavor, is open.

In sum, Depew and Lyne's essay, which expertly and inspirationally captures our moment and prospects, seems to rest upon a paradox: a paper that consistently warns against associating the rhetoric of science with political stances itself rests on a political analogy. Their analogy between confidence in a presumably good-policy-producing public sphere and the capacity of a technical sphere shaped by rhetorical invention and context-centered persuasive argument to produce good science seems dangerously close to what Steve Fuller, as opposed to Chris Mooney, has called "Republican science"—of which Depew and Lyne seem wary. In Fuller's (2000) words, "Republicanism represents the Ideal State in that it allows people to speak their minds with impunity" (p. 11).

A Modern Constitution

As I read their paper, Depew and Lyne also seem to favor a science in which cross-sphere discussion and persuasion with and by "untutored publics" (this issue) sets the norms governing, or at least mediating, the personal, public and technical spheres. It would seem that Depew and Lyne's assessment of our historical situation is correct, and they have done us the service of confronting us with its consequences. The autonomy of science on the positivist technical sphere model (arguably the model of *Science—The Endless Frontier*) and James Madison's parallel argument in the *Federalist Papers* for the Constitutional separation of powers have enjoyed similar fates.[3] The fate of positivism is now commonplace. As Richard Neustadt (1980) says of the Constitution's separating of powers, "It did nothing of the sort. Rather it created a government of separated institutions sharing powers" (p. 29).

Change "spheres" to "powers" and Depew and Lyne have described the constitution of public and technical policy formation in the post-positivist, post-modern world. It is difficult to exaggerate how much the ambitious and potentially productive research program they propose rests upon, to borrow Condit's image, minding the very considerable gap between current evidence and a convincing demonstration of public sphere rationality in addressing the excesses of the technical sphere—or in providing confidence in scientific argumentation once the rhetorical basis of that argumentation is made clear.[4]

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[3] Madison wrote: "This policy of supplying by opposite and rival interests, the defect of better motives, might be traced through the whole system of human affairs, private as well as public" (1982, pp. 261-5).

[4] On the other hand, overcoming this difficulty would have very significant implications not only for our understanding of science but of rhetoric itself. Stanley Fish's (1989) celebrated account of rhetoric properly stresses the contrast between depth and surface, substance vs.

In answering the above closely related points, Depew and Lyne are not without resource. Goodnight, as they note, develops Habermas who sought to imagine how the public/technical sphere boundary might be mediated. The complex pathways and reciprocal relations among the private, public and technical spheres suggests, as Depew and Lyne allude, various potentially enriching complications. But unlike Habermas who strives to filter out "distorted communication" through ideal speech situations, Depew and Lyne sound very much as if they were of the opposite persuasion. They seem as though they were inclined to celebrate the messiness, complexities, and attendant risks to epistemic sanitation that are entailed in the discursive ecologies of a rough and tumble rhetorical republic. Their example of the victory of the Catholic Church over eugenics, though morally justified, was an exercise in political power that seems to sanction a populist political model of how the public sphere/technical sphere might be policed. On the other hand, their view that this example shows how issues in the popular public sphere can "[inspire] criticism in technical ones" (this issue) could imply an elitist model of filtration—though I do not believe this interpretation captures the full complexity of their view.

By contrast, Philip Kitcher (2001, 2011), arguably the leading philosopher on the relation between science and democracy, shares Habermas' concern for strenuous regimes of public sphere/technical sphere mediation. In each of his two books on science and democracy, Kitcher seems to favor specially constructed forums for lay/expert deliberation that, for the most part, our common political culture has yet to evolve.[5] For Kitcher, Depew and Lyne's eugenics example, and quite possibly my own previous views on the educational merits of debate on Darwin and Intelligent Design, would probably be candidates for illustrating "vulgar democracy" of which, needless to say, Kitcher does not approve.[6] Kitcher's aim, like that of Depew and Lyne, myself, and many members of ARST, is a rapprochement between the democratic ideal of deliberation in the interest of the common good (including the interests of the poor and marginalized) and the claims of truth. That Kitcher has written two books on virtually the same subject that do not claim to have the answer to the question of the appropriate mediation underscores how challenging and timely are the issues that Depew and Lyne raise. It also shows how opportune, as they rightly stress, is the moment for inter-disciplinary studies exploring the interrelation between the discourses of the personal, technical, and public spheres.

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insubstantiality. The success of the projects of Randy Harris and of Depew and Lyne would require a significant refiguring of this historic divide.

[5] On Habermas (2001), see note #2 p. 172, Chapter 8, "Constraints on Free Inquiry," which concerns the history of life, biomedical technology, genetically modified organisms and climate change.

[6] See Kitcher (2011, especially pp. 113, 126, 128, 140, 177, 220, 221).

Where To From Here?

We have in all our essays a stimulating set of proposals, a daunting set of problems, and some varied and potentially fruitful inventional resources. Perhaps Neustadt's description of the institutional reality of the Constitution (despite the common mistaken interpretation of it—sanctified by the *Federalist Papers* no less) might possibly provide a useful analogy for rhetoricians of science to develop in buffering the shock that recognition of the inability of science to autonomously manage its own affairs and the necessary for its inter-action with popular opinion inevitably creates. At very least, the ambiguities in Depew and Lyne's eugenics example, coupled with its importance not only for their case but also for analogous issues of gaps or intersections raised by Condit and Prelli, underscore the need for ARST scholars to focus on democratic demarcations.

If the faith in public sphere rationality common to the civic tradition of rhetoric is to prove justified in the era in which the rhetorical character of science becomes increasingly evident, ARST scholars should be well positioned to understand the issues involved; to help create the needed relations of mutual trust; and to nurture personal, public and technical sphere contexts in which reasoned deliberation about science and its implications can occur. We have work to do. With some inventional skill and some active inter-disciplinary diplomacy, I am confident that our society's twenty-year experiment in the rhetoric of science—which seeks in its own context to reaffirm and reanimate the aspirations of those august figures who thought a democratic republic would support science and the arts (U.S. Constitution)—will continue to specialize, diversify, and flourish.

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