Cogent Science in Context

The Science Wars, Argumentation Theory, and Habermas

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I

The Argumentative Turn in Science Studies

1

Science as Argumentative Practice

The normative framework I propose in this book links the assessment of expert claims with the notion of cogent scientific argumentation. The idea that scientific practices depend centrally on social processes of argumentation and not simply on experimentation, is, I believe, rather widely accepted. That argumentation can provide a sufficiently comprehensive framework in which to understand the sciences is a more ambitious assumption. In this chapter I provide some initial clarification of what I mean by science as a set of "argumentation practices." I also introduce the conceptual framework I employ in Parts I and II for analyzing scientific argumentation. After some preliminary orientation (sec. 1), I describe the "rhetorical turn," which led to the rhetoric of science, and the emergence of argumentation studies (secs. 2, 3). These developments in the study of rhetoric and argumentation led a number of theorists to propose a multiperspectival framework for the evaluation of argumentative practices; this framework, appropriately clarified, can serve as a heuristic for understanding developments in science studies (secs. 4, 5).

1 Scientific Inquiry and Argumentative Practices

Approaching scientific inquiry as an argumentative practice immediately suggests a possible objection, which I want to dispel at the outset. The objection goes as follows. Granted, there are occasional scientific controversies, and granted, science articles employ specific types of rhetoric and can be interpreted as arguments of one sort or another. But as a general framework, an argument-centered approach seems overly textual and abstract—just one

more variant on the old "science-as-knowledge" approach, which misses the materiality of "science-as-practice" (Pickering 1995; also 1992b). To press the point, one might ask whether arguments and argumentation capture the process of inquiry and "logics of discovery" that lie at the very heart of scientific knowledge-production. Must not an approach based on the assessment of scientific arguments ultimately reproduce—to be sure, in more complex and sophisticated terms—the old disjunction between context of discovery and logic of justification, and in such a way as to privilege that latter?

The short answer to the last question is "no." For the long answer, one must actually attempt to work out an argumentation-theoretic framework. But the short answer has a number of considerations in its favor already. As we shall see in the next section, the developments that shaped argumentation studies in recent decades are precisely of the sort that undermines a discovery–justification distinction, at least in the logical-empiricist sense. Rejecting formal logic as an adequate theory of argument, many argumentation theorists today strive to situate arguments in their practical contexts. Although they generally understand these contexts as discursive or intellectual, in the natural sciences we must also consider them *material* contexts: evidential arguments are typically about what one can do with materials in a laboratory, or about what one can observe in the physical world.

This does not mean that no distinction remains between scientific argumentation and experimentation. What it does mean is that argumentative practices in the sciences are partly material practices. Experimental practices of inquiry thus intertwine with argumentation, even at the very concrete level of contingent material "resistances" (Pickering 1995, 51; Galison 1997). The success of scientific arguments is measured by their relation to experimental practices and not simply by standards for the logical composition of articles. We can see this at a number of levels of scientific practice, beginning with the local research site or laboratory. As the novice scientist soon learns, one of the first challenges is to arrive at stable, reliable experimental methods and results in one's own laboratory: mastering the material situation, therefore, is partly constitutive of argument construction, for without reproducible results one has no evidence to report as reasons in support of one's hypothesis. At the very least, one must get one's instrumentation and observational methods to function properly. To a large extent, the daily work of bench-top science is oriented toward solving specific experimental problems, solutions that presuppose one has gained sufficient mastery of the relevant laboratory techniques to obtain

results that are both reproducible and trustworthy. Only if one answers such questions of detail—for example, in the area of pollutant testing, questions regarding such mundane details as the best sample size and reagent concentrations, possible interferences, optimal instrument settings, and so on—can one acquire the empirical evidence that can adequately support a conclusion. This daily struggle with the physical world in the laboratory or in the field is thus *oriented toward* the development or construction of an argument—indeed is part and parcel of the constructive process, where "construction" simply refers to putting together the evidence required to support a publishable result.

Experimentation ultimately aims beyond the lab, however: experimental practices are heavily oriented toward the production of public knowledge, and to reach that goal findings have to be presented in a convincing manner as publicly acceptable arguments (Ziman 1968). Here public acceptability is not measured by publication alone, but more pertinently by the usability of one's findings and arguments for the research of other scientists (cf. Hull 1988). The ongoing concern with classified military and corporate research testifies to the value of this traditional orientation.

The orientation of everyday laboratory practices toward the production of arguments is also evident in the development of a research proposal. Although one might consider the proposal itself as a kind of argument, here I am interested in the tacitly projected argument at which the proposal aims. To formulate a research proposal, the researcher generally must (a) identify a problem or question that is (or can be) of interest to other scientists (and perhaps certain groups of nonscientists) and (b) have an idea about how to go about answering the question or solving the problem (cf. Montgomery 2003, chap. 11). In identifying a question or problem, one commits oneself to arriving at some kind of conclusion; in proposing an approach or method, one commits oneself to some kind of argument that will support the conclusion that addresses the question.

The research proposal, in other words, is the first step in a process of constructing an argument that the researchers hope will have a place in a broader dialectic of inquiry within the subdiscipline or area of research. Thus the dialectic of inquiry that constitutes science as a substantive intellectual process—of research in response to a question, which in turn opens up further questions leading to further research—sets the argumentative context in which the proposal is supposed to make sense. Inquiry is dialectical insofar as it involves an interlocking series of substantive moves—communication of results or

arguments in one venue or another—in which later moves respond to or build on earlier ones. The series can be controversial, involving objections, replies, and rebuttals, but it can also have a more irenic character, involving a series of studies that gradually close in on establishing some result or hypothesis.

If we can understand the broader dialectic of scientific inquiry or progress as argumentative, and if we can understand inquiry within the laboratory or research team as part of argument construction (even if it is not only that), then there is no reason to split inquiry, the process of discovery, from scientific arguments and argumentation. Although an argumentation-theoretic framework provides a context in which to assess the cogency of scientific claims—and hence is in that sense a context of justification—the notion of argumentation I employ here takes in, as part of its substance, the discovery process itself.

2 The Rhetorical Turn

As I mentioned earlier, the area of research that goes by the name "rhetoric of science" has gone the farthest in applying argumentation theory to the study of science. But the rhetoric of science emerged as part of a broader "rhetorical turn" and the so-called new rhetoric associated with it. These developments were motivated by dissatisfaction with the positivist and logic-centered approaches in the study of inquiry and argument. Among philosophers, this movement was led by attempts to go beyond formal-logical analysis to the analysis of informal and noncompelling arguments (Perelman and Olbrechts-Tyteca 1969 [Paris ed. 1958]; Toulmin 1958; Naess 1966 [Oslo ed. 1947]). I will say more about these initiatives below, in connection with argumentation studies. Among rhetorical scholars and speech communication theorists, dissatisfaction centered on the rather wooden neo-Aristotelian mode of rhetorical criticism dominant in the mid-twentieth century (see Black 1978; Wenzel 1987, 103–104). In these fields, Kenneth Burke was a prime mover.

On the one hand, theorists who engaged in these developments desired a richer set of analytic tools and foci; in particular, they wanted to get beyond the neo-Aristotelian focus on the speaker's use of *logos*-centered rhetoric in narrow occasional contexts. For their part, philosophers wanted to bring in normative and hermeneutic perspectives that were more context-sensitive than logical analysis. On the other hand, the rhetorical turn also involved an extension of the focus of rhetorical analysis beyond its traditional subject matter of

civic discourse. Emboldened by Burke's idea that rhetoric operated wherever symbols were involved in communication to induce cooperation, rhetorical scholars turned their sights on a range of texts and domains, including science, which had been hitherto considered nonrhetorical (Simons 1989, 1990; Gross 1996; Pera and Shea 1991; Harris 1997). The rhetorical turn has led to interdisciplinary cooperation involving the disciplines of literary studies, composition, linguistics, sociology, history, philosophy, and communication studies.[1] As Klein (1996, 66–70) notices, the rhetorical turn has spawned a number of important "boundary concepts" ("discourse," "rhetoric," "text") that facilitate cross-fertilization. Even analytic philosophers of science have begun to take the rhetoric of science seriously (e.g., Kitcher 1995).

Among students of argument, the rhetorical turn has also been a site of contestation. In the perception of some scholars (e.g., Schiappa 1995; Kauffeld 2002), rhetoricians have tended to emphasize persuasive effect to the point of eschewing normative evaluation. This objection points to an ambiguity in the very idea of "rhetorical criticism" (cf. Lucas 1981): in what sense is it critical? According to Black (1978, 47, 77ff.), the old-style neo-Aristotelians tended to take the speaker's ends for granted, thereby focusing rhetorical criticism on the effectiveness of means. Indeed, much rhetorical criticism primarily explains why a given argument succeeded or failed with a given audience. But as some theorists have pointed out (including Black), rhetorical analysis does not necessitate such a restriction (Wenzel 1990; Leff 2002). One might, for example, take certain rhetorical means, such as appeal to emotion, and develop normative standards for distinguishing reasonable and unreasonable, and not merely effective or ineffective, rhetorical appeals (cf. Walton 1989, chap. 4; Tindale 1999). Thus a rhetoric of inquiry need not be at odds with ideals of objectivity (Keith and Cherwitz 1989).

Other critics have objected to the emphasis on the intentions and agency of the speaker to the disregard of other types of forces, such as deeper linguistic structures, that shape the speaker's discourse in unintended ways (e.g., Black 1978, 35; Gaonkar 1997a,b). However, the vast range of discourse-analytic methods now available for rhetorical criticism (see Sills and Jensen 1992) suggests that there are ways beyond this overemphasis on agency. Moreover, a study of the Sophists casts doubt on an overly strict association of rhetoric with the goal of persuasion (Tindale 2004, chap. 2). On a broad view, therefore, rhetoric studies "all the ways by which meaning is created symbolically among people" (Wenzel 1987, 106).

Still other scholars have expressed dissatisfaction with the overemphasis in the rhetoric of science on the analysis of particular texts and their construction—an imbalance that probably stems from the dominance of literary disciplines in the rhetorical turn. This dissatisfaction has generated interesting attempts to move beyond the textual product. For example, Myers (1990) and Blakeslee (2001) both examine argument construction as a social process in which authors shape their arguments in light of interaction with different audiences: journal editors and referees, members of other disciplines, and so on.

I mention one final criticism, which might also apply to argumentation studies and thus can serve as a transition to that topic. Gaonkar (1997a,b) targeted the globalizing move that extended rhetorical analysis to any discourse, including science. Specifically, he wondered whether the rhetoric of science, in its current form, genuinely illuminates scientific discourse rather than merely adding a veneer of useless new jargon to scientific arguments that are clear enough as they stand. For my purposes this challenge raises the question of how rhetorical analysis—or more generally, an argumentation studies framework—can help in the critical assessment of scientific arguments and claims. The answer must await later chapters.

3 Rhetoric and Argumentation Studies

The rhetorical turn and the emergence of argumentation studies share common origins, but that does not mean we should equate the two movements. As a field of study, argumentation theory involves a number of different ways of investigating argumentation, not all of which are rhetorical. Logicians, for example, are concerned with truth-preserving structures, not persuasion or discourse in context. Acknowledging this does not foreclose the possibility that for some purposes, the rhetorical perspective—given its holistic character and openness in principle to a wide range of analytic tools—might do best at bringing together these various perspectives into a unitary analysis of actual argumentation. To be sure, to avoid the problematic kind of holism described in the introduction, one should not, in employing the tools of another discipline, forthwith reduce that discipline to a subcategory of rhetoric. In light of such considerations, I use the term "rhetoric" to designate a specific perspective on science, albeit a perspective whose interpretation, scope, and relation to other perspectives vary according to different theories of science and thus remain an open question.

I use the term "argumentation studies," on the other hand, as an umbrella to cover the multidisciplinary complexity I briefly described in the introduction. This multifaceted study of argument goes back to the classical Greek traditions (logic, dialectic, rhetoric), but along with the rhetorical turn it experienced a rebirth in the mid-twentieth century (see Cox and Willard 1982; Wenzel 1979). Again, commentators typically cite Toulmin's *Uses of Argument* (1958) and Perelman and Olbrechts-Tyteca's *New Rhetoric* (1969; Paris ed., 1958) as leading the way. Toulmin maintained that most argumentation as it actually occurs in various fields such as law, science, and so forth is not analytical but "substantial," dependent on inductive moves governed by standards specific to the field of inquiry or institution. Perelman and Olbrechts-Tyteca likewise drew attention to context, in this case the rhetorical context as defined by the particular audience and its presuppositions. Thus, argumentation aims not at deductive demonstration but at gaining (or increasing) the adherence of an audience.[2] Because both initiatives linked the study of arguments with contextual awareness—in one case institutional, in the other rhetorical—they could not take the logician's purely formal approach to argument evaluation. To develop an account of good arguments, that is, theorists had to pay attention to the empirical details of the different contexts in which arguments occurred.

We can describe the shift initiated by Toulmin, Perelman and Olbrechts-Tyteca, as well as Arne Naess and others, as a move from formal to "informal" logics.[3] The move to informal logics was driven not only by theoretical concerns but also by broad dissatisfaction with the standard logic texts for teaching critical thinking: standard logical methods, many contended, were inadequate for understanding and teaching real argumentation (Govier 1987, chap. 1).[4] To get a sense of what "informal" means in this context, it helps to review the main uses of "formal."

The term "formal" admits of a range of meanings (van Eemeren et al. 1996, 236–245, 263–271; Johnson 2000, 119–120). For present purposes, I consider as paradigmatically formal those deductive logics that rely solely on an axiomatic syntax that abstracts from all content and context (e.g., Kyburg 1968). Barth and Krabbe (1982) designated deductive rule systems as "formal$_2$," in contrast to Plato's Forms ("formal$_1$") and rules of dialogical procedure ("formal$_3$"). As we shall see with logical empiricists such as Carl Hempel, one can also develop formal inductive logics that are purely syntactical (chap. 2). Such logics are both prescriptive and purely formal: they provide a set of rules

defining valid sentential entailments, and these rules operate independently of anything beyond the syntax itself and the formal semantics to which it may be linked.

Informal logics, on the other hand, introduce a certain amount of substantive *content* into the norms of argument assessment. Consequently, they allow argumentation theorists to handle a broader range of everyday argument forms in a less artificial manner: the vast range of argument forms that includes not only simple induction but also analogical arguments, inference to best explanation, casuistic reasoning, narrative, and so on. The inferential properties of such arguments depend on substance: one must understand the interrelated meanings of terms as well as background information that resists complete formalization.

To evaluate the substance of informal arguments, however, one must attend to the interpretive subtleties of arguments in their social *contexts*. Thus the shift to informal logic also involves a turn to the social practices of argumentation. Arguments—as premise–conclusion packages or claims supported by reasons or evidence—should thus be distinguished from "arguing" as a kind of social interaction (O'Keefe 1982). Many argumentation theorists now view arguments as the *products* that issue from the process of argumentation as a *social practice* (e.g., Johnson 2000). Still others distinguish three normative perspectives on argumentation: the logical product (open to both formal and informal approaches), the dialectical procedure or method, and the rhetorical process (Brockriede 1982; Wenzel 1990; Tindale 1999, 2004). Joseph Wenzel's elaboration of this framework has been particularly influential: "rhetoric helps us to understand and evaluate *arguing* as a natural process of persuasive communication; dialectic helps us to understand and evaluate *argumentation* as a cooperative method for making critical decisions; and logic helps us to understand and evaluate *arguments* as products people create when they argue" (Wenzel 1990, 9, my emphasis; see also Wenzel 1979, 1987).

This multidimensional framework has been widely accepted among argumentation theorists (though they tend to use the term "procedure" rather than "method"). The upshot is a loose alignment of the following triads, where each row represents one dimension of, or perspective on, argument that interpenetrates the other two:

rhetorical perspective	arguing	social process
dialectical perspective	argumentation	cooperative procedure
logical perspective	argument	product

The term "argument" has both a narrow and comprehensive usage here. As one dimension, "argument" refers to the package of reasons supporting a conclusion; as a multidimensional social practice, "argument" takes in all three dimensions. After drawing up the alignment, Wenzel (1990) characterizes each perspective in terms of its typical purposes, scope and focus, situation, resources, standards, and roles.

Wenzel (1979, 83, 85; 1990, 12) grants that these categories only "roughly" align, that the framework serves merely as hermeneutic starting point; moreover, these three perspectives are not exhaustive. The value of such "perspectivism," as I shall designate it, lies in its hermeneutic and evaluative breadth, and thus in its serviceability as a heuristic open to a range of approaches and foci that make up argumentation studies as a field. Although the three perspectives do not exhaust the approaches, they do seem to capture the central normative perspectives on argumentation. Perspectivism thus provides a kind of heuristic for reading developments in science studies over the last half-century, as I show in the next two chapters. Moreover, as a set of normative perspectives on argument evaluation, this framework might be taken as a multidimensional account of cogency: the different ways one can understand or assess the cogency of arguments.

Before pursuing these ideas, however, I want to tinker with the framework by introducing some further distinctions. In fact, there is considerable slippage between the columns above. After noticing some points of nonalignment, I suggest a more serviceable multidimensional heuristic.

4 Critical Analysis of the Perspectivist Alignment

To employ perspectivism as a heuristic, it helps to notice, and then repair, certain points at which the alignment of columns does not do justice to the actual practices of argument evaluation. I am not concerned so much with the middle column: "argument," "argumentation," and "arguing" strike me as far too fluid and interchangeable for marking technical distinctions. The two other triads (logic, dialectic, rhetoric; product, etc.) are more readily linked with operative distinctions in argumentation studies. However, their alignment is anything but tight. I first notice some points of slippage and suggest further distinctions in the framework, and then conclude, in the next section, with some broader clarifications of how I understand the framework as a heuristic.

Start with the most obvious loose spot, the alignment between logic and product. Even if we accept an informal pluralist logic that recognizes more

forms than deduction and induction, the logical perspective cannot bear the sole responsibility for assessing argument products, as Wenzel (1990, 19) recognizes. The logical assessment of an argument requires, at the least, that we first interpret a text as a set of reasons or grounds intended to support a claim or conclusion. That is, one must first analyze the argument content as having a determinate structure—as one or another kind of deduction, or as an inductive inference, or an analogy, narrative, and so on. If one is dealing with real arguments, this task requires a certain amount of rhetorical analysis: one must, for example, understand the particular audience context, shared tropes, figures, genre conventions, and so on (cf. Wenzel 1987, 108). Only then can one apply logical standards for appraising the degree of support provided for the claim. But one may not stop with that. Ralph Johnson (2000) has made a convincing case that appraisal of the product must also examine the argument in relation to existing counterarguments, further questions and consequences, and so on—what he refers to as the product's "dialectical tier." And why stop with a dialectical analysis of the product? To understand the persuasive force of arguments as products, one must return to the rhetorical perspective. It seems, then, that we can, and for some purposes must, apply each perspective to an assessment of the product.

Second, we should acknowledge some plasticity in the triad of product-procedure-process. The "product" that is subjected to logical analysis can vary, depending on one's theoretical interests. The word itself suggests a focus on the outcome of a completed process of argumentation. But argumentation theorists are also interested in the different arguments that arise on the way to that outcome. As reason-conclusion packages that can be assessed using the same methods used for assessing the final product, these intermediate arguments fall under a broader sense of "product." Moreover, what counts as the final product can differ with analytic perspective. Rhetorical scholars often train their methods on the actual substance of written articles, whereas logical empiricists construed the relevant product as a set of observation statements abstracted from context and placed in a (probabilistic) inductive relationship to a hypothesis. Similarly, if "procedure" refers to all the ways of critically testing and discussing hypotheses, then it should encompass laboratory procedures, meetings of a research team, referee procedures, conferences, published debates, and so on. Science as a social "process" likewise has both narrower and broader boundaries: process within the research team, within a subdiscipline or problem area, within a nation, and so on. Nor are process and

procedure so clearly demarcated: whereas one can at least identify the product as an entity (e.g., an article) distinct from the process, formal procedures and informal processes of arguing intertwine in ways that resist separation.

Third, notice that the dialectical perspective seems to include two kinds of methodical rules or procedures. As Wenzel defines it, "the dialectical perspective embraces all methodological, procedural approaches to organizing argumentative discussions. The focus . . . is on rules, standards, attitudes and behaviors that promote critical decision-making" (Wenzel 1990, 16). Wenzel seems primarily to have in mind institutionally defined procedures: "dialectical situations are consciously planned or designed. . . . [they] are often institutionalized by the creation of special forums, e.g., courtrooms, legislatures, and the regular meetings of learned societies" (ibid., 18; see also 22). This fits with the traditional association between dialectic and rules of debate (Rescher 1977). However, it leaves unclarified the relation between such institutional procedures and the natural dialectic of objection-and-reply in ordinary critical discussion. Theorists who propose dialectical models of dialogical argumentation have studied the latter context extensively (e.g., van Eemeren and Grootendorst 1992; Walton 1989, 1998). In fact, the largely tacit dialectical rules of ordinary discourse may play the more fundamental role, inasmuch as they provide the standpoint from which to criticize institutional procedures. Such criticism can lead to procedural reforms or even violations. In law, for example, a jury might consider a line of testimony relevant and thus disobey a judge's instruction to disregard it on procedural grounds.

The tacit rules that operate in ordinary critical discussion may have more in common with idealized conditions of rational discourse than institutionalized procedures. In fact, early on Wenzel (1979) construed the "ideal speech situation" elaborated by Habermas (1971/2001) as a contribution to the dialectical perspective.[5] We examine this idea more extensively in later chapters. To anticipate that discussion, the ideal speech situation is a regulative ideal rather than a fully realizable "situation"; as such, it involves a set of counterfactual "pragmatic presuppositions" of rational consensus. That is, if participants in argumentation are to consider a consensual outcome rational, then they must presuppose that the outcome has been (or could be) accepted by participants who took part as equals in an open discourse free of coercion or hidden compulsions (Habermas 1990, 89; 1993, 41–57). According to Habermas, such presuppositions constitute our tacit self-understanding as participants in any argumentative practice, and thus apply both to institu-

tionalized discourse and to our informal attempts at critical discussion in everyday life.

Institutionalized rules for the conduct of discussion and debate, however, differ from such idealizations. In contrast to pragmatic presuppositions, institutional procedures are contextually determinate—and often include mechanisms for reaching closure in the face of ongoing disagreement.[6] It is not that the name itself matters so much—whether we call an aspect of argumentation dialectical, rhetorical, or institutional—but that the analyses move at different levels of contextualization. They also involve different standards of criticism: a legal proceeding, for example, can be procedurally correct from the standpoint of legal standards, but involve subtle forms of coercion that violate an important dialectical idealization.

Fourth, notice that the rules governing formal procedures tend to be of two sorts. Some apply to the flow of speech acts and judgment of content, that is, what kinds of statements and questions each side may introduce, when certain argumentative moves may or must be made, which argument counts as stronger, or conclusive, and so on. Rules of formal debate tend to consist of such rules. But there are also rules that assign different roles to the various participants. In courtrooms, for example, we differentiate the roles of plaintiff and defendant, counsel or attorney, judge and jury. Presumably these role divisions are designed to foster an impartial critical testing of the claim under dispute. But again, we see two different kinds of standard here. The dialectic of content, or what we might call the "intellectual dialectic," is subject in the first instance to rules determined by inferential connections between statements, as well as by pragmatic and illocutionary obligations and commitments that different types of speech acts bring with them (e.g., in a debate, an objection calls for response; an assertion obligates one to provide justification if asked to do so). The dialectical rules that regulate the positioning of the participants, by contrast, pertain to persons: their attitudes, disposition, different powers and duties, and so on.

These complications—above all the slippage between the two triads—lead me to suggest that we simply break the one-to-one alignment between product-procedure-process and logic-dialectic-rhetoric. The first triad, let us say, designates different dimensions or elements that are woven together in argumentative practices. Each of the three dimensions is publicly available for investigation, that is, each dimension presents science studies with sites or data open to description and thus available for study, regardless of one's theoretical

orientation. Theoretical concerns might, of course, affect exactly how one describes or what one picks out for a given dimension (recall the different approaches to the product). We can understand then the logic-dialectic-rhetoric triad as different argumentation-theoretic perspectives that employ more or less distinct sets of analytic and evaluative tools for assessing the dimensions of argumentation. But we need not limit perspectives to the traditional three. Indeed, we might be able to handle some of the complications in the categories of dialectic and procedure by recognizing something like a social-institutional perspective. Such a perspective certainly plays a dominant role in science studies.

To be sure, this modification does not handle all the conceptual difficulties. As Blair (2005, 142) points out, one can easily find the same normative standard appearing in more than one perspective. There is also a potential problem of cross-perspectival conflicts that requires us to determine which perspective provides the overriding standards. The first difficulty I address in chapter 5 by showing how perspectives can be internally linked to each other; the second difficulty must await Part III.

5 A Heuristic Framework for Science Studies

I offer the above critical analysis as a way to bring the perspectivist framework closer to the kinds of analyses one finds in the study of scientific argumentation. By noticing such complications and making some additional distinctions and modifications, we render the framework more serviceable as a heuristic. Such a multidimensional/perspectival framework allows us to see how scholars bring different analytic perspectives to bear on science. These perspectival differences lead scholars to focus on different dimensions of science and to describe those dimensions differently. The different approaches to the product in logical empiricism and recent rhetoric of science provide one of the clearest examples of this. We should also expect differences in how theorists describe the procedures and processes of science. We need not settle the precise reference of these terms in advance, but can simply allow science studies scholars to speak for themselves about these dimensions and how they are to be described. In using argumentation studies this way, we allow the different approaches in science studies to further shape argumentation-theoretic categories, which are somewhat vague and ambiguous in any case. (In fact, this sort of feedback from science studies already informs the critical analysis in section

4 above.) In illuminating science studies, the argumentation-theoretic heuristic develops in ways that take us beyond Wenzel's model.

In other words, perspectivism as a heuristic framework does not function as an architectonic, a predefined grid into which we squeeze the various initiatives in science studies. Rather, I employ these categories primarily as a set of opening questions and boundary concepts that can illuminate developments in science studies and thereby foster contacts across disciplinary boundaries. As a heuristic, this framework has one direct specific questions such as the following to the theories, case studies, and proposals in science studies:

- What does the approach say about the products of science, and what does it say about the argumentative process—the various rule-governed procedures (experimental, dialogical, and institutional) and broader social processes—from which those products emerge?
- Which analytic-evaluative perspective(s) does the approach seem to take or possibly contribute to—logical, dialectical, rhetorical, social-institutional, or something else?
- To what extent does the theorist address normative issues, that is, provide us with standards for critical assessment, and how do these standards relate to the particularities of actual practices: to social-institutional contexts, culture, political interests, and the like?
- What conception of cogency does the approach employ or presuppose?

Each of these questions is open to further differentiation in light of findings.

As a set of questions, argumentation-theoretic categories have a role to play in interdisciplinary work: they supply relevant clues for spotting ways in which science studies contribute to the study of scientific inquiry as a set of argumentative practices. I do not mean that argumentation theory is what science studies are really about, unbeknownst to many of its practitioners. Rather, I want to notice potentially relevant work in science studies for understanding science as an argumentative process, thereby opening up sites of potentially fruitful interdisciplinary interplay between argumentation studies and science studies.

This heuristic is not entirely innocuous, as readers have no doubt already noticed. The introduction described some basic assumptions or ideas that inform the argumentation studies heuristic: the idea of a discriminating (non-skeptical) critical evaluation, the idea of scientific inquiry as involving argu-

mentative practices, and the idea of an interdisciplinary, multiperspectival study of science. Each involves some thin theoretical commitments that place specific tasks on the theorist and rule out certain alternatives.

First, as I understand it, the project of critically assessing scientific argumentation requires us to take the participant's point of view on argumentative practices seriously. The three traditional perspectives, at least, are those that experienced participants take toward their own argumentative practices: successful arguers are (more or less) aware that cogent arguments must be supported by good (logical) reasons and defended against (dialectical) challenges in a manner (rhetorically) persuasive to their interlocutors. As a critical theoretical stance, then, the perspectivist framework prohibits a global skepticism toward scientific argumentation in general. This does not necessarily require one to adopt a metaphysical realism, but it does require one to recognize certain argumentative obligations incumbent on participants (e.g., that serious objections to a claim call for a reply, that claims should be supported by good reasons). Thus the theorist must take a hermeneutic approach oriented toward disclosing the norms operative within scientific inquiry.

Second, the call for an interdisciplinary approach further constrains and clarifies the role of argumentation studies. If we are interested in interdisciplinary cooperation, then hegemonic claims for a particular discipline or perspective are counterproductive. In starting with argumentation studies as a framework, then, I do not claim that argumentation theory represents the master discipline, or that it exhausts everything there is to know about scientific inquiry. Rather, the idea is that argumentation-theoretic categories are particularly well suited for certain purposes, namely for pulling together a range of approaches and disciplines for the assessment of scientific argumentation. But each of these disciplines also enjoys its own stature, objects of study, and methods, which are not reducible to their function for argumentation studies.

The commitment to a comprehensive approach also means that we cannot accept reductionist claims on the part of a single perspective, focus, or discipline. Thus, certain skeptical approaches that dismiss or reduce the logical perspective to rhetoric, or to sociological explanation, are at odds with the argumentation studies framework I propose. This does not mean one cannot incorporate the empirical and descriptive findings of reductionist and skeptical approaches, but only that the specifically skeptical or reductionist thesis presents a challenge—one would presumably have to detach such theses from the

other aspects of the approach. How this is possible I explore in the postscript to Part II.

The use of such a multiperspectival framework raises questions about the coherence and integration of perspectives in a given assessment. How, if at all, are the various perspectives integrated into a critical assessment in any given case? And how does one manage to integrate, for purposes of assessment, the relevant science studies models and theories that may differ in important philosophical commitments? At the point of making an assessment in an actual case, one usually must accept some thicker theoretical commitments. Its thin theoretical commitments notwithstanding, argumentation studies as an interdisciplinary heuristic does not settle many of the substantive details of critical assessment.