

**WHITHER THE "TWO CULTURES":
ANOTHER VOLLEY IN THE "SCIENCE WARS"**

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The disputes between the defenders of "truth", "objectivity", "reason", and "Western Civilization" and the protagonists of "values", "relativism", and "multiculturalism" have reached trench-warfare proportions over the past two decades. The recent polemical evaluation of the work of Portuguese sociologist Boaventura de Sousa Santos (2001), *Um Discurso sobre as Ciências*,¹ by physicist António Manuel Baptista (2002) in his *O Discurso Pós-Moderno Contra a Ciência: Obscurantismo e Irresponsabilidade*, is yet another volley in what has come to be known as the "science wars". The science wars, however, are associated with a larger series of concerns, the "culture wars". These, often acrimonious, discussions are more than a simple struggle between the old and the new, between the modern and the postmodern. They belong to a long history of debate and outright conflict in the modern world over how valid knowledge may be produced, what are the grounds and the domain of its authority, who may speak in its voice, and thus what courses of social action may be considered legitimate.

At the end of the seventeenth century, just as the questions of universalism and particularism, civilization and culture, were being argued in the "Battles of the Books" in what we would now consider the humanities in France and England, Isaac Newton was working out a rationalist model, combining mathematical representation and empirical observation, for the

¹ For the preparation of this article, I have used the English version of Santos's text published in *Review*, XV, 1, Winter, 1992, 9-47.

analysis of physical reality based on universal natural laws applicable in the disciplines that would come to be known as the sciences. It linked the particular facts that were the product of observation through and with the universal facts of time-reversible mathematical equations. The solution allowed for prediction, and would eventually succeed thereby in jettisoning value-laden, thus relativist, explanatory modes. By the turn of the nineteenth century, Laplace could state of God that he did not need that hypothesis. Nonetheless, the adequacy of science *tout court*--its pretensions of truth and objectivity and their association with progress--remained an object of controversy. In the English-speaking world, one would recall the Tory Radical opposition to industrial society and the "dismal science" and the exchange between the liberal-humanist critic Matthew Arnold and the apologist for the physical sciences T.H. Huxley during the nineteenth century and a mid-twentieth-century dispute similar to this latter between the literary critic H.R. Leavis and the physicist C.P. Snow who coined the term, the "two cultures", to describe the seemingly unbridgeable gulf between the sciences and the humanities.

Esteem for science, and its adoptive sibling, technology reached its apogee after 1945, but began to falter by the 1960's. In 1962 Thomas Kuhn published his *The Structure of Scientific Revolutions* that, in spite of his later misgivings, by "suggesting the fallacy of viewing scientific knowledge as absolute, objective, and universal ... opened the door to a new epistemological understanding of science that had the potential to undermine its privileged status". Up until the beginning of the 1960's, the norms of universalism, communism, disinterestedness, and organized skepticism that Robert Merton had identified as hallmarks of science and scientific practice were accepted as an accurate description of the way science actually operated, moreover, operated most effectively and efficiently. Critics from a wide spectrum of disciplines and social locations now began to suggest that Merton's norms, if they had ever characterized

scientific practice, no longer did, or should, for many scientists. Specifically, areas singled out included the "sacrifice of humaneness" (including indictments of the military-industrial complex and the anti-nuclear and ban-the-bomb movements), "environmental insults" (Carson's *Silent Spring* appeared in 1962), "male" science, political co-optation (a critique emanating from both the right and the left that cited science as not objective enough), peer review (its shortcomings), and evolution (by the scientific creationists) (Trachtman and Perrucci 2000: 8-9, 14-23).

In this atmosphere, it is well to remember that it was trained scientists like Kuhn, Paul Feyerabend and Stephen Toulmin who carried out much of the original work that led to the establishment of the new field in the history and sociology of science targeted by Baptista.² The resulting move to apply the scientific method to science itself solidified in the form of the "strong program" in the sociology of scientific knowledge defined by David Bloor in 1976.³ It would be causal ("concerned with the conditions which bring about belief or states of knowledge"), impartial ("with respect to truth and falsity, rationality or irrationality, success or failure"), symmetrical (with the "same types of cause explain[ing], say, true and false beliefs"), and reflexive ("its patterns of explanation would have to be applicable to sociology itself") (Bloor 1991[1976]: 7). The SSK project

set out to construct an "anti-epistemology," to break down the legitimacy of the distinction

² Although not perfectly synonymous: SSK, "sociology of scientific knowledge"; SST, "science and technology studies"; "social studies of science"; or simply "science studies". The new field met with extraordinary success and rapidly developed a significant, and influential if controversial, literature (see Shapin 1995).

³ In company with the Empirical Program of Relativism (Harry Collins) and Actor-Network Theory (Bruno Latour).

between "contexts of discovery and justification," and to develop an anti-individualistic and anti-empiricist framework for the sociology of knowledge in which "social factors" counted not as contaminants but as constitutive of the very idea of scientific knowledge ... in opposition to philosophical rationalism, foundationalism, essentialism, and, to a lesser extent, realism (Shapin 1995: 297).

The dilemma of and challenge to dualism and the insistence on both the collective nature and local contingency of knowledge formation and reproduction figured prominently in science studies from the beginning.⁴ It was highlighted in work that characteristically crossed multiple disciplinary boundaries to investigate at the most basic level how scientific knowledge is made (detailed ethnographic studies: e.g., Latour and Woolgar 1986[1979]; Knorr Cetina 1981; Lynch 1985) and how its claims are defended and institutionalized (including the structure and historical construction of the rhetoric and politics and power relations legitimating and sustaining public knowledge: e.g., Shapin and Schaeffer 1985; Shapin 1994). The field has now developed to include analyses that offer alternative visions of what "science" should or could be

⁴ Underlining the problematic role of the "social"--not to be conceived as "a 'dimension,' an 'influence,' or a 'factor' to be juxtaposed with the 'factors' of evidence and rationality", Latour and Woolgar removed the term from the sub-title of the second, 1986, edition of their 1979 *Laboratory Life: The Social Construction of Scientific Facts*. As Shapin further observes, SSK's "claim was that 'the social dimension' of knowledge needed to be attended to in order to understand what counts as a fact of discovery, what inferences are made from facts, what is regarded as rational or proper conduct, how objectivity is recognized, and how the credibility of claims is assessed. The target here was not at all the legitimacy of scientific knowledge but the legitimacy of individualist frameworks for interpreting scientific knowledge" (1995: 300).

and how it might relate to the larger world of social relations.

By the early 1990's, with sciences studies well established, it had become "apparent that some scientists felt sufficiently threatened that they were impelled to go public with a defense of the rationality and the benevolence of science and an attack on what they viewed as uninformed, biased, and unwarranted criticism" (Trachtman and Perrucci 2000: 24). This "going public", and the chronology of the science wars proper, may well be taken to begin in 1992 with attacks directed primarily at the strong social constructivist and relativist bent of SSK. Two books were prominent in bringing to public attention the work of the group of historians, philosophers and sociologists who had been involved in reconceptualizing many common views about the nature of science: the physicist Steven Weinberg's *Dreams of a Final Theory: The Search for the Fundamental Laws of Nature*, and biologist Lewis Wolpert's, *The Unnatural Nature of Science: Why Science Does Not Make (Common) Sense*. For Wolpert, the bone of contention is relativism, to which he replies that "[s]cientists can be very proud to be naïve realists" (1993: 117). This is also Weinberg's position, and certainly a major concern of Baptista today: "A Sociologia do Conhecimento Científico (SSK) e uma actividade de grupos de sociólogos que têm procurado relativizar o conhecimento científico como se este fosse apenas um conjunto de regras convencionalmente aceites pelos cientistas numa dada época e cultura sócio-política" (2002: 34). It should be noted, however, that there was opposition to social constructivism even among some science studies scholars, a fact that is still often overlooked.

The issues came to a head with the "defense" mounted on a wide front in 1994 by the publication of *Higher Superstition: The Academic Left and its Quarrels with Science*, by Paul Gross, a biologist at the University of Virginia, and Norman Levitt, a mathematician at Rutgers University. Their scattershot attack was directed at a broad "academic left" of feminist theory,

postmodern philosophy, deconstruction, deep ecology--and the way it "dislikes science", that is, not just the uses to which science is put, but

to the social structures through which science is institutionalized, to the system of education by which professional scientists are produced, and to a mentality that is taken, rightly or wrongly, as characteristic of scientists. Most surprisingly, there is open hostility toward the *actual content* of scientific knowledge and toward the assumption, which one might have supposed universal among educated people, that scientific knowledge is reasonably reliable and rests on a sound methodology (Gross and Levitt 1994: 6, 2).

The authors touched a chord in the scientific community despite the fact that the book itself stands as a monument to the very type of intellectual dilettantism it attacked. Nonetheless, many still make common cause with this line of reasoning as evidenced by Baptista's evaluation of their work and his characterization of Santos's text as "um discurso contra a Ciência" (2002: 52). In an analysis of the "reading" given the work of Jacques Derrida by Gross and Levitt, Arkady Plotnitsky (who has both scientific and literary credentials) wrote that

[i]n general, scholarly problems of monumental proportions are, to use the language of topology, found in the immediate vicinity of just about every point of *Higher Superstition*. It is not so much embarrassing errors even as egregious as that of the misreading of "*topique differantielle*" as differential topology, that are most crucial (we all make mistakes, sometimes absurd mistakes), but the intellectually and scholarly inadmissible practices and attitudes that pervade--and **define**--this sadly irresponsible book. Gross and Levitt's warning concerning "threats to the essential grace and comity of scholarship and the academic life" (ix) becomes, in one of many bizarre ironies of the book, its self-description. ... The tragedy is that so many scientists, including some among the best

scientists, have taken it seriously and accepted its arguments, and even adopted its unacceptable attitudes (1997: par. 9, emphasis in original).

The exchanges that ensued made plain just how fundamental the issues were, and not simply that C.P. Snow's two cultures of scientists and non-scientists still could not communicate with one another.

The National Association of Scholars joined in the responses to the supposed "anti-science" threat (see Holton 1993 on the "dangers" of irrationalism) with two conferences arranged in 1994. The "Science in American Life" exhibit arranged by the American Chemical Society, which incorporated criticism of science, prompted an exchange between Tom Gieryn (1996) and Paul Gross (1996). Harry Collins and Lewis Wolpert confronted one another directly at the British Association for the Advancement of Science in 1994 and Steve Fuller organized a follow-up to this conference that sought some mutual understanding but ended with disappointing results (see Fuller 2000). Gross and Levitt themselves proved unforthcoming during the debate on the content of their book at the Society for Social Studies of Science Annual meeting in 1995. The meeting was punctuated, however, with an unseemly exchange over Donna Haraway's, and other feminist critics', scientific credentials. In 1995, the New York Academy of Sciences sponsored a conference entitled "The Flight from Science and Reason" that engaged the questions raised in *Higher Superstition* by a long list of defenders of science against such "science bashers" as constructivists, deconstructionists, creationists, feminists, Afro-centrists, and radical environmentalists ("ecosentimentalists") (Gross, Levitt and Lewis 1996).

What so far was missing was a concerted response to Gross and Levitt, and their "pro-science" supporters. The editors of *Social Text* took on this project in 1996 with a special issue

dedicated to the science wars. What the editors of the journal did not know was that the physicist, Alan Sokal, inspired by his reading of *Higher Superstition*, was involved in an "actively sustained" conspiracy to deceive the journal into publishing his "Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity" in which he "parodied postmodern stylistic conventions and derived politically correct conclusions from an esoteric subfield of science" (Segerstråle 2000b).⁵ Sokal exposed the hoax in his "A Physicist Experiments with Cultural Studies", which appeared almost concurrently in *Lingua Franca*, characterizing the article as combining "nonsense" and "silliness". For those who were taken in by Sokal and those they represented it was an extraordinary breach of intellectual ethics and scholarly integrity; for those making common cause with Sokal (and Gross and Levitt et al), it forcefully demonstrated his point of declining "standards of rigor in the academic community" (Weinberg 1996: 11) and specifically the intellectual laxness of those it was designed to attack. This group proved notoriously difficult to define, however, given the diversity of the cultural studies community and the conflation of cultural studies with science studies as the debates played out.

In particular, the pro-science fighters were concerned to protect some "true" idea of science against what they considered "false" representations. For Ullica Segerstråle, they seemed not "to recognize the right of other academics to do their own interpretations of science within the particular frameworks of their own disciplines"; the problem was, naturally, that this work

⁵ The original article, the *Lingua Franca* revelation, responses, reactions in the press (domestic and foreign), and longer essays and colloquies on the "affair" are conveniently collected in Editors of *Lingua Franca* (2000); Ross (1996b) is an expanded version of the special issue of *Social Text* without the Sokal piece.

never stayed within the confines of specialist disciplines but became a part of undergraduate curricula and the larger public understanding of science (2000a: 21). In another venue, Segerstråle relates this to an internal struggle within the political left (recalling the culture wars, as we shall see): the older left of Gross, Levitt and Sokal "equates science with reliable knowledge, a tool in the struggle for social justice. ... In contrast, the cultural Left equates science with power that can be used for social oppression of minorities. For them, therefore, science criticism is a way to liberation" and it comes down to, as Bruce Robbins and Andrew Ross have asked, whether nonscientists would "have some say in the decision-making process of the professional scientific community" (2000b).

Unfortunately, the fall-out over the Sokal affair obscured Ross's own take on the science wars: in his "Introduction" to the *Social Text* collection, he treats the science wars as a "second front" in the "holy Culture Wars" (1996a: 6), and suggests a conjunctural explanation for the controversy, especially near-term decline in governmental support, including funding cuts, for big science (cancellation of the Superconducting Supercollider and closing of the Congressional Office of Technology Assessment) that others have noted. However, this is not just a turf-battle over the allocation of scarce research dollars and Ross's analysis also presents a longer-term interpretation of the science wars that situate the only real resolution in a shift in the process privileging formal rationality to one favoring substantive concerns:

The rise in technoskepticism, then, parallels a crisis in industrialization which is often mistaken for a crisis of the environment. ... [T]he remoteness of scientific knowledge from the social and physical environments in which it will come to be measured and utilized is as irrational as anything we might imagine, and downright hazardous when it involves materials that can only be properly tested in the open environment. ... [D]emonstrating the

socially constructed nature of the scientist's knowledge ... may help to demystify, but it must be joined by insistence on methodological reform--to involve the local experience of users in the research process from the outset and to ensure that the process is shaped less by a manufacturer's interests than by the needs of communities affected by the product.

This is the way that leads from cultural relativism to social rationality (1996a: 2, 3-4).

Ross also sets the "relativism" argument in a material, spatial, context and links it positively with "diversity":

Once it is acknowledge that the West does not have a monopoly on all the good scientific ideas in the world, or that reason, divorced from value, is not everywhere and always a productive human principle, then we should expect to see some self-modification of the universalist claims maintained on behalf of empirical rationality. ... This is the way that leads from relativism to diversity (Ross 1996a: 4).

Indeed, Segerstråle argues that most "constructivist sociologists (unlike their postmodern or cultural studies colleagues) are not primarily interested in values and ideology; they see themselves as epistemological radicals" (2000b). As Sandra Harding had earlier insisted:

There is plenty of science still to be done once physics is invited and permitted to step down and take its place as one human social activity among many others. What kinds of knowledge about the empirical world do we need in order to live at all, and to live more reasonably with each other on this planet from this moment on? Who should make up the "we" who answers this question (Harding 1992: 20)?

In their large-scale survey, Leon Trachtman and Robert Perrucci found that rather than any "General Cynicism" about science, work in science studies has not strained the estimation of the social worth of science to the general public: "despite the concerns of science's spokes people,

the battle over social constructivism is a minor in-house academic quarrel with essentially no public following and is likely to have little impact on public understanding, public appreciation or public funding of science" (2000: 166, 167). However, this study does show that knowledge is socially situated and that "[w]hat may be emerging in this contentious debate about how knowledge is produced and used is a recognition that truth will have to be negotiated by an expanded pool of consequential actors with the right to speak" (2000: 168).

In this sense, the "science wars" may seem to be nothing more than a specifically focused instance of the more generalized "culture wars" and the two do share several characteristics. First, the themes of the debates constituting the science wars, like those of the culture wars, have a long history and resonate across national and linguistic borders. Second, as the institutions of knowledge formation opened up to previously excluded groups as a result of the upheavals of the 1960's, entrenched theoretical and methodological perspectives found it more and more difficult to dismiss the critiques and their overtly political agendas that were now mounted from within the institutions themselves. It became clear to many involved that any review of the premises of knowledge formation amounted to an evaluation of the structure of social relations as well. This dimension of the culture wars was replicated in the science wars. Finally, the disputes in both arenas, if indeed there are two, were polarized and the tone exacerbated by a series of publications defending what had been, up to the 1960's, the dominant positions.

Instances of debates over history and historical amnesia, language, education and the "canon", including their gendered and racial/ethnic foundations and the power relations insuring their reproduction, may be observed throughout the world. These "cultural" mechanisms have become centers of controversy due to their common functions, especially as techniques through which "nation" and "nationalism" take form as consequences of the construction of "otherness"

and its attendant struggles positioning groups on the hierarchy of the world division of labor. As Gregory Jay notes, "many nations are trying to find a way to balance the claims of individuality, ethnic or racial solidarity, democracy, economic development, women's liberation, and nationalism" (Jay 1997: 60, 62). Although the major themes of the contemporary "culture wars" are not limited to the United States, it has been here where these controversies have been grouped under a single rubric. Heated discussions associated with nationalism, patriotism, the role of religion and race, and ethnic and gender relations have developed around the same dilemmas over who-gets-what in terms of how-we-see-the-world as are evidenced abroad. In the United States, however, there has been a clear articulation of the mechanisms relating putatively universal ideals and the particularist context in which they function. Furthermore, the range of conflicts associated with the culture wars here, including the family, art, religion, education, law and politics, is such that according to John Davison Hunter, the culture wars touch "virtually all Americans" (1991: xi). Hunter's 1991 book, entitled simply *Culture Wars*, did much to popularize the term and crystallize the issues. And all of the parties to such debates as those focused on homosexuality and the family, abortion and health care (or the content of schooling in science, a central issue for Baptists), seem to have identified the issues as having a long-term component that speaks to the reproduction of social norms through education. What should be included in textbooks, especially how are specific narratives of the past associated with a particular vision of public culture legitimating specific hierarchies in the present and therefore what might be possible to imagine for the future? Should private schools be publicly funded and, in particular, what are the implications of imposing collective support for sectarian agendas?

All have understood that differing positions imply value-laden choices, thus are profoundly political in nature and speak to clear but contested power relations in a struggle for

control, even though they may take the form of arguments over truth and relativism, tolerance and prejudice. As the agendas directing values, morality and acceptable conduct that are set at the top eventually redirect programs in the elementary and secondary schools, it should be of no surprise that debates have tended to implicate the content of higher education and the organizing and legitimating role of the university: as symbolic system (the "canon") and as material practice (access or gate-keeping, disciplinary/departmental structures, and pedagogical and research organization).

University reform, not the least of which involved the curriculum, stands as an enduring legacy of the 1960's. The culture wars have been bound up with the struggle over these reforms and especially the teaching of American Literature, that is, the traditional canon reopened to new and, to some, often disconcerting interpretations, as well as the canon itself destabilized and redefined by a series of new inclusions and exclusions, when it has not be abolished altogether. Whether linked to the canon, classroom experimentation, or more generally to race and gender studies, the reforms have certainly come under attack in a whole series of doom-and-gloom writings. Two works stand out, however: Allan Bloom's 1987 *Closing of the American Mind: How Higher Education Has Failed Democracy and Impoverished the Souls of Today's Students* and E.D. Hirsch's 1988 *Cultural Literacy: What Every American Needs to Know*. These and their like presented an agenda for and outlined the purpose of shaping public schooling and higher education in ways that "abstracted equity from excellence and cultural criticism from the discourse of social responsibility" (Giroux 1992: 123). As many critics immediately realized, Hirsch's "culture" was unproblematic because he had removed it from the dynamics of its construction in struggle and power. Barbara Herrnstein Smith stated that from a position of high institutional authority,

Cultural Literacy (book, list, term, and concept) does a very good job of obscuring the nation's very real educational problems and assuring the American public, many of whom are naturally happy to hear it, that those problems (along with other social and economic ills, both real and imaginary, from poverty and unemployment to "cultural fragmentation" and the "competitive edge" of the Japanese) are caused primarily by befuddled education professors and school administrators following what scientists have shown to be the incorrect principles of progressive education and, consequently, can be solved by school reforms that require no funding, entail no social or political changes, create no uncomfortable feelings for anyone except teachers and school administrators, and do not touch the structures of a single American institution, including its school system (1992: 88-9).

It was in this context of the crusade to create "a narrowly specific cultural capital [as] the normative *referent* for everyone, but [to remain] the *property* of a small and powerful caste that is linguistically and ethnically unified" that the Stanford curriculum debate (and many such in universities all over the United States) was played out during the mid-1980s. At Stanford a limited reform was passed in 1988 but the vision that critics of reform presented proved to be well-entrenched: on the one hand, one of the decline of civilization and the loss of the shared values on which the unity of community, all diversities erased, rested, and on the other hand, the politicization of the "ivory tower", the erstwhile value-neutral ideal of the university. But any sense of contemporary cultural fragmentation can only be supposed on the presumption of a prior unity. What Hirsch, "in an illegitimate analogy between language and culture ... refers to as 'the national culture' ... is nothing but a *particular* (egregiously classbound and otherwise parochial) set of items of 'knowledge' that Hirsch himself privileges and that he *wants* the state

educational system to make 'standard'" (Smith 1992: 77, 78). Remark, for instance, that who controls that specific representational form we call "history" and to what end has been a matter of serious controversy over the past decade, although one must acknowledge again that this is not new, and the university is again at the center of struggles over what, or whose, history is recognized as authoritative and propagated as grounds for legitimate social action.

The curriculum, in fact, is a historically specific narrative and pedagogy a particular form of cultural politics. However, when this historical dimension is taken into consideration, the contemporary culture wars appear as a post-1968 conjunctural moment (see Lee 1996) in a long-term trend (see Dejean 1997). Neither the intellectual arrangements nor the institutional organization of the structures of knowledge were able to successfully negotiate the outcomes of the challenges of the 1960's. And now, once students graduate, it is apparent that the promise of a better life for all who go through the system cannot be kept in a world ultimately ruled by the law of value. Thus, the university, in this case especially education in the humanities, has always been a political instrument.

The arguments over the politically suspect politicization of the university that pitted those that viewed the realm of knowledge and its institutions as loci of struggle against those that upheld "truth" achieved through value-neutrality as the ideal of scholarship seemed paradoxical in the light of actual practice. As Gerald Graff contends:

It is the academic left that has arguably made the major contributions to scholarship in literary studies over the past three decades, profoundly affecting fields as remote from literature as law, architecture, anthropology, and the social sciences. Yet it is the right that defends the virtues of disinterested scholarship, while the left debunks disinterestedness in the name of politics and power. The producers of the best objective

scholarship defend partisanship, while the defenders of objectivity produce mostly partisan political polemics (1995: 308).

The paradox is further compounded when the trajectories of "theory" and "identity politics" are considered.

Theory, whether loosely characterized as poststructuralism or deconstruction, unmasked the power relations inherent in the Arnoldian high-culture aesthetic, anathema on the right, but also tended to result in formal analyses of "texts", of whatever type, disengaged from concrete political agendas, roundly criticized on the left. According to Joan Scott, "[o]n the right, there are denunciations of the nihilism of theory, which, it is said, will leave us orphans without cultural patrimony. On the left, theory is indicted for its impracticality: it does not connect to 'real life' or 'lived experience' and so cannot lead directly to politics, to revolution, or at least to social reform." Scott goes on to point out that "[i]n the attack on 'theory,' right and left clear the field of all possible critiques of their foundational premises; with those intact, they can fight safely and familiarly among themselves" (1995: 301).

Unlike the antiessentialism of poststructuralism, identity politics presupposes foundations making the point that without presuppositions there can be no action on the part of the marginalized. According to Stuart Hall, the poor fit between theory and practice opens up an opportunity for rethinking the terms of the debate. For identity politics, even in the form of "strategic essentialism",

sees difference as 'their traditions versus ours', not in a positional way, but in a mutually exclusive, autonomous and self-sufficient one. And it is therefore unable to grasp the dialogic strategies and hybrid forms essential to the diaspora aesthetic. A movement beyond this essentialism is not an aesthetic or critical strategy without a cultural politics,

without a marking of difference. It is not simply re-articulation and re-appropriation for the sake of it. What it evades is the essentializing of difference into two mutually opposed either/ors ... replac[ing] the 'or' with the potentiality or the possibility of an 'and'. That is the logic of coupling rather than the logic of a binary opposition. ... The essentializing moment is weak because it naturalizes and de-historicizes difference, mistaking what is historical and cultural for what is natural, biological, and genetic (Hall 1996: 472).

At issue today is the epistemological basis of the representational apparatus that has characterized our understanding of the social world over the long term. As Stuart Hall's analysis suggests, the outcome of the contemporary controversies may have profound consequences for the dichotomous thinking, and particularly the divorce of facts from values, that has formed the basis of the epistemology, the "geoculture" of the modern world-system as it has developed over the past five centuries (see Lee 2000 and Lee and Wallerstein 2001). In this case it is "civilization"- "culture"--the first universal, implicit in the term as it was deployed by Lynne Cheney (1988), and the second, particularist--that is in question. "What the political correctness debate and related phenomena display, symptomatically, is precisely the connection between representation in the field of knowledge and representation in the fields of society and politics." Far from the "orthodox" versus "progressive" elements that Hunter postulated, the protagonists of the culture wars simply cannot be shoehorned into "either/or" groups, of whatever stripe. Moreover, it is the impression that "academics are producing *a body of different truths* that threaten certain traditional value systems and institutions" (Jay 1997: 31) that has engendered the backlash of the culture wars. In this sense, Hall's analysis suggests that the conjunctural moment of the culture wars is also a point of structural crisis leading to a restructuring in the field of

knowledge--the delegitimation of the principle of the excluded middle and the implicit call for a relational conception of human reality.

But the epistemological status of dichotomous thinking is constitutive of and constituted by the role of the natural sciences in the modern world and their location at the privileged pole of the structures of knowledge that has become the object of contention in the science wars; indeed, this is a key issue for both Santos and Baptista. Baptista writes:

E o jogo da vida em sociedade, a que os sociólogos se dedicam, é completamente diferente do jogo da ciência que, quanto muito, chega apenas ás fronteiras da sociologia e da filosofia que são mais permeáveis, ao contrário do que eles, infelizmente, pensam, do lado da ciência. Não se vê como os êxitos numa actividade podem ser comensuráveis com os alcançados na outra. Nunca uma *verdade sociológica* pode ter (por definição) a robustez de uma *verdade científica*. Nunca uma *verdade científica* pode afectar tanto os valores e comportamento de indivíduos e de comunidades como uma *verdade sociológica*, ainda que muito menos robusta, e ainda mais incompleta do que a científica (2002: 91).

Santos, on the other hand hails the collapse of putatively transhistorical binaries such as "nature/culture, natural/artificial, animate/inanimate, mind/matter, observer/observed, subjective/objective, and animal/person" and asserts that non-dualistic knowledge characterizes the emerging paradigm (1992: 32).

Thus, the science wars are not simply a special case of the culture wars and a plea for more democracy and value-consideration in decision-making in the context of the innate inequalities that are part of the all-encompassing corporate climate, but rather indicate the importance of the questions focusing on the epistemological status of the sciences that have

come into play. This only becomes clear, however, when we realize that what the science warriors seem not to have adequately considered, and what surveys like those of Trachtman and Perucci fail to capture, is that "epistemological radicalism" now extends to the sciences, especially to those involved in what has come to be known as "complexity studies" (see Lee 1992).⁶ The combination of the conviction that there is a "real" world and that the future is "determined" by the past, but that that future is nonetheless unpredictable (time itself is thus "creative"), and the parallel assaults on dualism challenge the epistemological status of the sciences as discoverers, guardians and purveyors of authoritative knowledge, truth, by redefining what it means to describe the evolution of natural systems. Already in 1986 Sir James Lighthill, in his capacity as President of the International Union of Theoretical and Applied Mechanics, felt compelled to apologize on behalf of "practitioners of mechanics ... for having misled the general educated public by spreading ideas about the determinism of systems satisfying Newton's laws of motion [implying complete predictability] that, after 1960, were to be proved incorrect" (1986: 38). Indeed, as Santos writes, "[i]n place of eternity, we now have history; in place of determinism, unpredictability; in place of mechanicism, interpenetration, spontaneity, irreversibility, and evolution; in place of order, disorder; in place of necessity, creativity and contingency" (1992: 25). This amounts to overturning the dominant model shaping our understanding of the natural world and the human world as well, renders moot the

⁶ As Ilya Prigogine has noted, the "sciences are not the reflection of a static rationality to be resisted or submitted to; they are furthering understanding in the same way as are human activities taken as a whole" (Prigogine 1988: 3) and goes so far as to state that "I believe that what we do today depends on our image of the future, rather than the future depending on what we do today" (Prigogine in Snell and Yevtushenko 1992: 28).

"contradiction" between determinism and free will, impinges directly on the manner in which scholars make claims for the legitimacy of their interpretations of social reality, and underscores the covert, long-term structural, nature of the debates, now to include Santos and Baptista, that have come to be known as the "Science Wars" and the "Culture Wars". Though "total", what Santos calls "post-modern knowledge ... is knowledge about the conditions of possibility of human action projected into the world from local time-spaces" (1992: 38) to which the arena of "[p]lay, theater, text, or biography" (1992: 36) no longer seems so foreign, and suggests how Baptista's exclusion of Weber, Pareto, Marx and Durkheim from a single pantheon that includes Smith, Ricardo, Lavoisier, Darwin, Humboldt, Planck and Poincaré (2002: 53) has begun to look increasingly artificial and counter-productive.

In sum, on the one hand, the collapse of the two cultures is a reality that no rearguard action can check. On the other hand, this connotes an open future. This open future and the reintegration of facts and values in the construction of authoritative knowledge, a consequence of "complexity studies", entails the ethical imperative of scholars to imagine and bring into being, contingent on Santos's "conditions of possibility", a reorganization of the structures of knowledge that will lead to a more substantively rational world.

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