SCIENCE AS NARRATIVE:
ALAN SOKAL'S CRITIQUE OF POSTMODERNISM

by

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submitted in partial fulfilment of the requirements
for the degree of

MASTER OF ARTS

in the subject of

ENGLISH

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: PROF IA RABINOWITZ

JANUARY 2000

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Summary

Alan Sokal has questioned the postmodern assertion that 'science is...a "myth", a "narration"...a "social construction"' (1998: x). This dissertation examines his reasons for rejecting this allegedly postmodern declaration. Firstly, it suggests that the basis for Sokal's contention that a 'true' world exists beyond one's awareness of it extends to an attack on modern philosophy, and is not limited to its postmodern component. Then, it describes defences of the 'linguistic construction' of science as thinly veiled attempts at emulating scientific discourses. In a more speculative vein, the dissertation goes on to evaluate claims made against science in terms of its connection to warfare; its insensitivity to mythology, and its generally misdirected values. It is in terms of value that the dissertation detects an analogous relationship between the discourses of mythology and science. Finally, a playful 'postmodern' reading is attempted of Sokal's use of fiction in establishing the truth of his assertions.

Key Terms: Alan Sokal; Postmodernism; postmodern; science; truth; epistemology, relativism, mythology; value; philosophy; literary theory, fictional realities
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PART ONE: EVIDENCE

1. Preface

In 1996, Alan Sokal, professor of physics at New York University, perpetrated a hoax in the name of rationality. In other words, he lied in order to reveal the truth. Hoping to sustain a 'scientific' belief in an objective, empirical reality, Sokal set out to discredit radical relativistic views and the abuse of scientific terminology by cultural theorists. His was an ostensibly political motivation, in that he considered deconstruction an enemy of the Left, since it seemed to him to neutralise claims made by a materialist philosophy, such as his own. Instead of entering into an open debate with proponents of postmodern theory, Sokal set about -- in Trojan horse style -- infiltrating their ranks by immersing himself in the codes of postmodern analysis. After having submerged himself in the signifiers operative in postmodern circles, he then wrote an article apparently endorsing and praising the views which he considered anathema. This article, 'Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity', was subsequently accepted and published by the journal Social Text (Spring/Summer, 1996). Ironically (and ideally, for Sokal's purposes) it ended up in a particular issue entitled 'Science Wars' which purported to attack the views Sokal, in fact, claims to hold. Once Sokal revealed that his article parodied views he considered nonsensical, he drew an enormous amount of attention to a debate which has been continuing for at least since Descartes doubted common sense notions of external reality. It is to this debate that this dissertation hopes to make a contribution.
2. Introduction

In the wake of the furious support Sokal gleaned from what has become known as 'The Sokal Affair', he has published a book, with Jean Bricmont, entitled *Fashionable Nonsense: Postmodern Intellectuals' Abuse of Science* (1998). In this book, Sokal makes plain the reasons which motivated the perpetration of his hoax. He gives more than enough substantiating evidence for his claims against specific theorists, and also attacks a more general relativistic trend in contemporary thinking in the humanities. The aim of the book is thus two-fold: first, to expose venerated postmodern theorists' misappropriation of scientific terminology:

We wanted to explain, in non-technical terms, why the quotes are absurd or, in many cases, simply meaningless, and we wanted also to discuss the cultural circumstances that enabled these discourses to achieve such renown and to remain, thus far, unexposed. (ix)*

In employing the word 'unexposed', it seems almost as though Sokal feels that a deliberate act of subterfuge has occurred, that certain intellectuals have been consciously deceptive and have intentionally misled their students. Although he claims that this question of deliberate fraud is not 'of great interest' (6), the implication also arises in the French title of the book, *Impostures Intellectuelles* (1997). Should this be true, it is a harsh charge indeed. The Makgoba affair at the University of the Witwatersrand a few years ago highlighted how seriously an academic community considered a breach of trust on a bureaucratic level. What Sokal is charging these intellectuals with is surely a great deal worse than fabricating credentials; it is fabricating facts, that is, truth, the substance of knowledge, and is tantamount to an enormous betrayal of the trust which a

*It must be pointed out that not only 'postmodern' intellectuals have been accused of misusing science. As early as 1969, Peter Medawar complained about the 'non sequiturs, digressions, paradoxes, impressive sounding references to Godel, Wittgenstein and topology, "in" jokes which annoyed him about some of the work by cultural theorists. (Pluto's Republic, 1984:52)
society unwittingly places in the people who teach it what to believe. On the other hand, Stanley Fish (1996), John Krige (1998) and John Sturrock (1998) have claimed that it is Sokal who has betrayed the trust of the cultural establishment, and that his 'Bad Joke', in Fish's words, will result in not only cultural theorists suspicion of anything issuing from a scientific pen.

Particular people, then, are one of two objects of attack in the book. Sokal claims that the theorists he deals with -- Lacan, Kristeva, Irigaray, Latour, Baudrillard, Deleuze & Guattari, and Virilio -- use terminology which they simply do not understand, in order to appear erudite (4), and in so doing mislead their audiences. And yet, Sokal wonders whether these thinkers are not perhaps misled themselves as to the nature of reality. In other words, the 'extreme abuses' of science might be only a superficial indication of a deep-rooted misconception, and it is this second enemy which is Sakai's primary target. This is a beast known as 'epistemic relativism', which is identified in

the idea...that modern science is nothing more than a “myth”, a “narration” or a “social construction” among many others. (x)

I have no intention of arguing for or against Sokal's science. Unqualified as I am, I must take on trust his criticism of certain misuses of science. Perhaps the only excuse which could be made for these theorists is that they were playfully exploring new uses and analogies of words. In trying to distance themselves from dogma, they deliberately attempted to pass beyond the fringes, not only of science, but also of grammar. * Since they were attempting to shake the foundations of belief, they were trying to be as speculative as possible, and in their experiments with different modes of truth, they often resorted to an intensely subjective analysis of understanding. It might then be Sokal's mistake that he misinterpreted

*Eric Lott in his Village Voice article 'Blinded by Science' (December, 1998) puts it succinctly: I'm like, Their science is iffy? You shoulda seen their grammar.
speculative writing as representing an account of factual knowledge. Whatever the case may be, perhaps Sokal is right. Perhaps they should not have invoked scientific meanings they were unsure of. Perhaps they should not have tried to popularise scientific and mathematical concepts which they did not entirely understand. I will take Sokal's word for it that in the use of certain analogies and descriptions for their theories, these philosophers were, quite simply, wrong. I believe, however, that I can support certain claims made by relativism, be it epistemic or otherwise.

In the statement I have selected from Sokal's book he makes three denials. He denies that science is a narration, a myth, or a social construction. He includes the radical thesis that science is considered 'nothing more than' these three by the thinkers he critiques. But surely no postmodern thinker worth his stripes would claim that any practice is 'nothing more than' anything at all, since part of the postmodern project is precisely to promote multiplicity and to admit that no truth is ever finalised. I will focus, thus, only on the three comparisons Sokal rejects. At no point do I attest that there are no other forms of truth besides these three. I think that to try to defend science as a 'social construction' is unnecessary and irrelevant, as I will try to show in chapter four. I do, however, find it worthwhile to contest Sokal's assertion that science is not a narrative, and to question the implication that science is exempt from valuation systems applicable to mythology and literature. In a somewhat more speculative vein, I will take a look, then, at some of the consequences and implications of the attestation that a reality exists beyond the social construction of language, pausing particularly at what is meant by the value of truth. But first, in order to establish a sense of the variables within which this dissertation will be operating, and to attempt a closer definition of exactly what it is Sokal is criticizing, I would like to rephrase Sokal's question in philosophical terms and to consider similar notions which have been presented by other proponents of modern western philosophy.
3. A Philosophical Overview of Sokal's Argument

3 (a) Modern Philosophy's Preoccupation with the Mind

Sokal implies that the outrageous claims made by modern French philosophers are a new phenomenon. In his interview with Julian Baggini he describes the first two paragraphs of his hoax (sans the 'high-faluting language') as claiming that 'Most western intellectuals used to believe that there exists a real world, but now we know better' (1998). It seems that Sokal's view is that western philosophy has generally always been a reasonable, straight-forward, common-sense affair until the advent of this pesky Postmodern (and predominantly French) crowd. In this section, however, I will try to show how the radical claims made by contemporary philosophers are hardly new, and how they present rather the logical outcome of modern philosophy itself, of which a great many proponents have been English. If this can be shown to be true, it means that Sokal's diatribe is not so much against a particular brand of philosophy, as against the very practice of philosophizing.

Traditionally, the history of modern philosophy begins with Rene Descartes who signified a shift from the medieval method by stating categorically that what philosophy should concern itself with, indeed, the only thing with which it could sincerely occupy its time, was the study of the process of thinking, the examination of mental operations and mediations, and not the external world. For Descartes, it seems perfectly reasonable to doubt the existence of all physical reality. This is precisely the sort of idea which makes Sokal shudder, and yet it forms an integral part of the process by which Descartes proves his existence to himself as homo cogito. Perhaps one could draw a distinction in that the object of modern philosophy has been defined as 'thought' or 'knowledge' or 'what the mind knows', in contrast to ancient concerns which seemed more explicitly to be about a comprehensive reality existing outside of the mind, which the mind is partial to
only by means of divine revelation. Similarly, medieval philosophy served as a handmaiden to theology, which was considered to be the only science. But with Descartes, the entire focus of philosophical thinking shifts from what is 'out there' (in the Universe or in the mind of God) to what is 'in here' (inside the individual). As Alfred North Whitehead writes in *Science and the Modern World* (1925):

> The Ancient world takes its stand upon the drama of the universe, the Modern world upon the inward drama of the soul. (141)

After Descartes, John Locke might be considered to be taking Sokal's stance against the idea that the only certainties are internal machinations of the mind. He insists, after all, on the certainty of empirical beliefs and discredits innate ideas when he describes all knowledge as originating from sensations produced by a real external world. And yet Locke's focus of study still remains the mind and its perceptions, the *tabula rasa* upon which the world is writ. After Locke, Bishop Berkeley took another step and reasoned that, since we are aware only of our sensations, and not directly of an external object, it follows that nothing exists unless we perceive it. Berkeley's *esse est percipi* moves closer to the postmodern version, that is, the view that our contacts with an outside world are not direct, but rely exclusively on mediated perceptions. Since Berkeley needed to maintain the religious views of his employer, however, it was left to David Hume to follow through this train of thought to its logical conclusion and provide the clinching argument, which was to deny existence to anything but perception itself. This is exactly the view which Sokal cannot credit, which he see as delusory and damaging to the scientific enterprise. Yet what seems like a solipsistic, pessimistic, defeatist, unrealistic, downright silly attitude to Sokal is, for Hume, an expression only of the status of our knowledge and not of its content. In other words one could very well believe in great truths expressed by literature, or even control natural forces by means of science, though neither belief can be venerated as ultimate or seen to exist in itself, since all knowledge is an abstraction of our reaction to experience,
and no knowledge is in its own right revealed to be reasonable, rational, or self-evident, as was the knowledge alluded to by Plato, for instance.

It seems that Hume is thoroughly representative of all the unreasonable, irresponsible beliefs despised by Sokal. For example, he does not regard reason as a proof in its own right. He does not concede that Newton's law of cause and effect can be invoked to reveal to us as obvious the belief in a real external world, since

not only our reason fails us in the discovery of the ultimate connexion of causes and effects, but even after experience has inform'd us of their constant conjunction, 'tis impossible for us to satisfy ourselves by our reason, why we should extend that experience beyond those particular instances, which have fallen under our observation. We suppose, but we are never able to prove, that there must be a resemblance betwixt those objects, of which we have had experience, and those which lie beyond the reach of our discovery.

(A Treatise of Human Nature Book One, in Strathern, 1994: 63)

Furthermore:

our reason neither does, nor is it possible it ever shou'd, upon any supposition, give us any assurance of the continu'd and distinct existence of body. That opinion must be entirely owing to the imagination. (67)

Hume here shows inclinations towards the Romanticist line, particularly Blake's, that imagination, rather than reason, provides us with our knowledge of reality. What Hume suggests in this passage is that reason is an effect of habit. Since we are habitual creatures, it follows that we were able to predict certain actions and behaviour on the experience and assumption of continuous reification, and because our learning consists of pattern formations. It is one thing, however, to 'suppose' that certain events will follow (even if this ability lends us a certain power and ability to manipulate the world) and quite another to believe that
reason is a self-evident, immovable principle which can be relied upon to reveal established truth. Hume also opposes the notion that reality and representation are easily commensurable. This is the famous argument which postmodernists are so fond of repeating (which many falsely ascribe as originating with Saussure), that reality and its representation are not 'one to one':

as long as we take our perceptions and objects to be the same, we can never infer the existence of the one from that of the other, nor form any argument from the relation of cause and effect... (66)

Consequently, if perceptions and objects are not the same things, then it does not make sense to say that a scientific description provides an accurate portrayal of the way things really are. The postmodern view, following on from these arguments, focuses on the crucial aspect of mediation which must occur between a hypothetical 'outside world' and an awareness made possible by a description of that world. David Bohm makes the following assessment in an essay called 'Postmodern Science and a Postmodern World' (1988):

evidently the whole world, both society and nature, is internally related to our thinking processes through enfolding in our consciousness. For the content of our thought is just the world as we perceive it and know it... (The Re-enchantment of Science; Postmodern Proposals, 1988: 67)

According to many theorists labelled as postmodern, including Richard Rorty, J. Hillis Miller and Paul de Man, the only expression of perception occurs in the form of a language, and it is this which allows theorists to see all structures as primarily linguistic, and eventually narrative. Narratology is employed here as a coherent semiotic system which describes a temporary totality. Whereas the scientific enterprise, since Bacon, has been concerned primarily in examining 'the world and all that is in it', philosophy has occupied itself rather with the mind and its meanings. What Sokal may resent, then, is the infringement of the property of
philosophy (the mind) on the domain of science (the world). Yet it does not make sense for him to criticise philosophers for preferring mind over matter, since this is simply a job description.
3 (b) Ways in which Philosophy has tried to Emulate Science

In the previous chapter, I have tried to give an indication of the beginnings of modern philosophy, and to show how, from the very start, it has largely concerned itself predominantly with the operations of the mind as an entity distinct from matter. This view seems to reach a high point with Hume. But what has happened to philosophy since then? It would be incorrect to imagine that it has simply maintained these views consistently and at some point quietly begun calling itself postmodern; far from it. The history of modern philosophy is one of conflict and disagreement: between Russell and Whitehead, Ayer and Austin, Positivists and Existentialists, Analytical Philosophers and Postmodernists. I would hesitate to postulate any kind of unity to the enterprise, and yet I would like to identify what I consider to have been an ecumenic consideration since the time of Hume. This is namely the attempt by philosophy to draw credence from the astounding successes enjoyed by the natural sciences in terms of their ability to predict phenomenon and, later, their ability to alter human societies by means of technology. Newton and Hume were contemporaries, and I would venture to propose that a crucial shift in ideological authority occurred during their time, and that philosophy has never regained its former standing. The great regard which Hume had for Newton was never, to my knowledge, reciprocated by Newton.*

With the advent of the machine age and the industrial revolution instigated by Newton's discovery of the laws of motion, science proved its worth in terms of what it could practically accomplish. At the same time, pure philosophy was becoming less and less useful. After Hume's blow to the faith in epistemological certainty, the great systems built up by the German philosophers Kant and Hegel attempted to rescue the notion of structure, to find reasons for foundation in the

*In The History of England, Hume writes: 'In Newton this island may boast of having produced the greatest and rarest genius that ever rose for the ornament and instruction of the species' (in Strathern, 1994: 71).
midst of scepticism. I suspect, however, that it was already too late. Kant changed his tune on reading Hume, and went on to make the radical claim that 'Reason has insight only into that which it produces after a plan of its own.' (in Ritchie, 1958:5). Later on, Nietzsche saw his fellow countrymen's gargantuan efforts at erecting immovable edifices of thought as misguided attempts to prove the impossible, and he wrote that there 'was more sense in a page of Hume than in the entire works of Hegel' (Strathem, 1996: 58). Nietzsche, considered by many to be the forefather of Postmodernism, then continued the 'hard-line' thinking which Hume had introduced, and which has consequently, via Heidegger, led to speculation about the end of metaphysics, and ultimately the end of philosophy.

It seems that Russell, and then Wittgenstein, attempted to apply a rigidly scientific method to their studies about language and truth. Russell begins, for instance with the basic building blocks of an 'Object Language', upon which higher concepts are based (An Inquiry into Meaning and Truth, [1940] 1980: 62-77), and Wittgenstein tried to strip philosophical language of all its allusions to what is not self evident in his Tractatus Logico-Philosophicus (1971). In so doing, both downplayed the role of metaphysics in philosophy. In both cases, these analytic philosophers, following on from Fichte, attempted a scientific approach to philosophy which rooted it in logic, mathematics and, to a certain extent, in physics. Perhaps philosophy has been borrowing concepts from the more successful sciences for a lot longer than Sokal imagines.

Hume may have provided a pinnacle of extreme scepticism, precisely at the historical juncture when Newton provided scientific progress with a workable basis. One sees it in shifting name changes: initially, science was called natural philosophy, but now it is philosophy which forms part of the human sciences.
Perhaps the Sokal case makes clear that scientists do not care to hear from philosophers, nor from anyone else who may seek to question their methods or values. Whitehead makes the radical statement that the modern scientific enterprise is 'based upon a naive faith':

What reasoning it has wanted, has been borrowed from mathematics which is a surviving relic of Greek rationalism, following the deductive method. In other words, it has never cared to justify its faith or to explain its meanings; and has remained blandly indifferent to its refutation by Hume. (17)

The rationalism upon which science is based is thus no obvious outflow of a transparent, inductive methodology, but is rooted rather in the mystical Greek conviction in the immutability of mathematics. I would venture to suggest that instead of trying to emulate the natural sciences, philosophy could do worse than to return to the peculiarly human aspects of its study, instead of on the laws of logical coherence. What I mean by human aspects are discussed by the very subjects which the Royal Society, the first scientific institution, refused to handle, namely the 'unnatural' subjects of 'Divinity, Metaphysics, Morals, Politics, Grammar, Rhetoric' (Holton, G.J. 1973:18). In trying to mimic the hard sciences, philosophy may well have been responsible for its own decline.*

My first examination of Sokal's critique, then, has been to view it in its historical context. From the diachronic, I turn now to the synchronic, to an evaluation of social aspects, which is where the defence of much contemporary theory rests.

*In the nineteenth century, the spectacular success of science was thought to be reproduceable in the human sciences. For example, Freud writes in 'The Future of an Illusion'(1928) that the illusion of religion is bound to disappear whereas psychiatry will remain, since it is a science. It is interesting that in the twentieth century, a number of Nobel prize winning physicists such as Murray Gellman, Richard Feynman and Peter Medawar, have expressed their contempt for the idea that psychiatry might represent a science. It may be possible that the attempts of theorists to 'scientise' their work by recourse to theories of social construction may have hampered what value they might have offered.
4. The Sociological Defence of Narrative as Truth

As I have mentioned in the last chapter, it is possible that there exists a diminution in social standing which might make some philosophers feel subservient to scientists. Perhaps this has created a backlash responsible for claims made about the priority of culture over science. Is this the cultural critics simply 'getting their own back'? Or is it possibly an indication of a significant shift in thinking, a move away from materialism, equal in importance to its initial embrace?

The idea that science can be captured by the study of society has been taken to various degrees of extremity, and concerns the ability of social theories to encapsulate scientific thinking in a matrixed web of analyses. This view makes both science and literature sociological enterprises, since both are seen as expressions of culture. *This is a domain which has proved most fruitful (or profitable) to students wishing to study science from a philosophical or literary perspective. It is also a field in which certain assumptions are belaboured beyond belief. One finds a great many books, articles and conference papers saying very much the same thing. What they are saying is that since both science and literature are cultural phenomena, they can therefore both be seen as born of culture and conflated to a similar paradigm. I have selected three representatives of this pervasive view which in certain circles had, at least until Sokal's parody, become entrenched as dogma. The three I have settled on, selected more or less at random, are George Levine, Katheline N. Hayles, and, new kid on the block, Damien Broderick. The first two are both prominent enough to have been selected as editors of collections, thereby serving as representative purveyors of the ideology I mean to bemoan. In The Architecture of Babel (1994) Broderick quotes extensively from both of them.

*I prefer the word 'sociological' to 'political', although this mode of discourse often makes these interchangeable.
N. Katherine Hayles edits a book called *Chaos and Order: Complex Dynamics in Literature and Science* (1991). In her introductory essay, she writes of the great diversity which exists between the essays on science and literature presented here. She yet manages to trace what she refers to as a 'common theme', and this is namely 'that science and literature are not above or apart from their culture but embedded within it' (30). In a previous book *Chaos Bound: Orderly disorder in Contemporary Literature and Science* (1990), Hayles forged a similar link between literature and science 'because the concerns underlying them are highly charged within a prevailing cultural context' (xi). Similarly, in *One Culture: Essays in Science and Literature* (1987), George Levine claims that the series of essays 'will not take a position', and yet he does make plain a rather strong stance, a bond of common assumptions, which all the essays in the collection share, the most important of these being 'that science and literature are two alternative but related expressions of a culture's values, assumptions, and intellectual frameworks' (vii).

This is precisely the sort of view Sokal contests in that he denies that scientific truth can have anything to do with cultural frameworks. He cannot believe that 'the truth or falsity of a statement is relative to an individual or to a social group' (1998:51). He would have us believe rather that scientific practice, that is, cognitive, epistemic knowledge, has nothing to do with cultural values and assumptions, but only with truth. Levine, however, insists that both literature and science must be understood in terms of 'the pressures...exercised by social, political, aesthetic, psychological, and biographical forces' (vii). Yet is this not the same as scientists saying that life cannot be understood except in terms of the forces of biology, physics, astronomy, and so on? Each seeks to encompass the other in their own terms. Peculiarly, each view can be rationally and logically defended in terms of cause and effect, depending on what one designates as causal.
Since it is unlikely that Levine is here referring to the ancient Hindu principle of Karma, it seems reasonable to assume that he is drawing on Newton's scientific formulation of the laws of cause and effect, or, more than likely, referring to the immutable absolutes of mathematics, as mentioned in the quote from Whitehead on page twelve. He is thus, somewhat ironically, utilising a scientific method to back up his assertion that culture is more influential, and more pervasive, than science. Here I must agree with Sokal when he contends that the reason for this imposition of cultural theory on science is entirely self-serving. Since science, with its claims to reasonable certainty, seems a lot more stable than the study of a society perpetually in flux, it is quite possible that cultural theorists wishing to stabilise their own disciplines have sought credibility from the rule-abiding nature of scientific discourses, as Sokal writes about Lacan and Latour, who 'imagine, perhaps, that they can exploit the prestige of the natural sciences in order to give their own discourse a veneer of rigour' (5). A few pages on, he drives home his most probably accurate assumption that the natural sciences are more prestigious enterprises than the rest, when he discusses the reasons why cultural theorists have felt the need to incorporate scientific theories into their arguments. He writes that

the analogies are between well-established theories (in the natural sciences) and theories too vague to be tested empirically...one cannot help but suspect that the function of these analogies is to hide the weaknesses of the vaguer theory. (10)

As I mentioned in the closing paragraphs of the previous chapter, it may be that the human sciences are trying to emulate the natural sciences because of the spectacular success which the scientific way of thinking has enjoyed since its emancipation by Newton. It is the overwhelming confidence in this sort of sentiment which led C.P. Snow to proclaim in his famous 'Two Cultures' speech that 'Scientists are the most important occupational group in the world today.' (Public Affairs, 1971: 187). Similarly, Sokal writes 'There is no doubt that natural
sciences enjoy an enormous prestige' (193). The attempt by Levine et al. to subsume scientific discourses may then, paradoxically, be an indication of the greater regard they have for scientific methods than for those previously practised by the group of disciplines now known as the human sciences. Similarly, John Krige writes in 'Cannon-Fodder for the Science Wars':

The effort by some French intellectuals in the 1970s to imbue their analyses with concepts and procedures imported from the study of nature was often symptomatic of an uncritical admiration for mathematics and physics. Seeking new ways to probe complex phenomena, these intellectuals tended to place an excessive faith in science. (1998:49-50)

If cultural intellectuals had been more critical of scientific theories, as Krige suggests they should have been, they would not have attempted mimicking a scientific discourse. They would also have been the first to pick up Sokal's spoof. It is ironic, then, that Sokal, in trying to underline the importance of the scientific enterprise, has most likely detracted from cultural theorists' faithful admiration.

And yet, is it not possible to provide an understanding of both the natural and the human sciences which does not radically hierarchise the one above the other? Some very sensible, moderate statements have been made to this effect by Peter Medawar (Pluto's Republic, 1984: 60) and Aldous Huxley (disparaged by Leavis in 'Scientism and Literarism', T.L.S. 1970: 441) who both oppose the need to construe these disciplines as inferior products of the other. They question the need to support and endorse either 'poetism' and 'literarism' on the one hand, or 'scientism' on the other, as if they were school football teams. Medawar describes 'scientism' as 'the belief that science will soon know all the answers', and 'poetism' as 'the belief that imaginative insight and a mysteriously privileged sensibility can tell us all the answers that are truly worthy of being sought or being known' (60). Both are extreme propositions, and neither is necessary. Petty one-upmanship does
credit to no discipline. It is a point in his favour that Levine acknowledges that

Literature has been unable to avoid science because science asserts an epistemological authority so powerful that it can determine even how we allow ourselves to imagine the world.... (8)

If we live in a scientific world and 'imagine the world' scientifically, then it makes sense for literary theorists and philosophers to borrow paradigms from social sciences such as anthropology, sociology and politics, since these are considerably more 'scientific' than literary speculation in that these fields deal directly with the examination of social phenomena, something which only the most fervent of communist literatures has thus far attempted. They also emulate scientific methods in setting up research proposals and systematically testing hypothesis.

Owing to pioneering ideas instigated by Ferdinand de Saussure and Claude Levi-Strauss, the study of the structure of language has taken priority not only in sociological investigations, but in all attempts at comprehending meaning. It may be true that myths are structures embedded by means of language within a community and that science is also cultural in the sense that it is expressed in language, and yet perpetually defining the entrenchment, embeddedness, and enmeshment of belief in language can also lead to solipsistic conundrums impossible to escape. To say that all meaning resides in language may very well be a true description of the state of knowledge, but it may well be too broad and sweeping a statement to be of much practical good, as are many statements which contain the adolescent 'all' or 'nothing'. If everything is Text, if everything is Culture, then the words 'Text' and 'Culture' soon become distinctly hollow. If science is part of a cultural context as C.P Snow, in Two Cultures (1957) suggested it should be, and as George Levine, in One Culture (1987), suggests that it is, then one must have a clear idea of what one means by 'culture' before this can begin to have any meaning. All human endeavours, enterprises, artifacts, and
actions may well be part of a set called 'all human endeavours', which may also be called 'cultural', but then to say that science is a cultural activity and literature is a cultural activity and philosophy and politics and ikebana are all cultural activities -- this is neither meaningful nor useful. In other words, I am suggesting here that discourses which attempt to endlessly analyse the situatedness of science in culture are not conducive to the study of either, since this point cannot be developed any further.

The application of this principle, however, can be endlessly explored. This is the reason why I appreciate the more tangible ventures of someone like Umberto Eco more than the vagaries of the three thinkers with which I began this chapter, though all of these deal with symbolic systems and codes. For example, in Travels in Hyper-Reality (1986), and Serendipities: Language and Lunacy (1999), Eco deals with semiotics by means of a practical 'hands on' approach, and brilliantly illustrates displays of systems of signs and symbols in societies. This seems to me preferable to bland statements such as the one already quoted by Hayles, that 'science and literature are not above or apart from their culture but embedded within it' (30). Eco never explicitly states this claim, possibly since it is an assumption he takes for granted; his later work focuses, instead, on illustrations of ways in which culture has actually operated, instead of reiterating ways in which it might be construed. Similarly, an exercise which I find of great interest is the economic study of precisely where funding for scientific endeavours comes from, and an examination of the institutions which are actually driving scientific discoveries, rather than abstract, obtuse configurations of how science relates to society. This is precisely the sort of thing, for example, that Randall Albury looks at in his book The Politics of Objectivity (1983), wherein one learns of the structure of research grants and how certain fields of inquiry are given a great deal more funding because of the visibility they acquire in political campaigns. These political motivations are quite blatant and have little to do with sinister, covert,
power practices such as those suggested by Foucault et al. In his book, Albury shows, for example, how irrationally and emotionally the scientific community behaved when they tried to ban Velikovsky and boycotted his publisher (26). He also quotes Merton, who

has shown for example, how the results of "almost all modern scientific researches" are selectively more useful to large, wealthy organizations than they are to ordinary people. (49)

Here is a practical, meaningful investigation of the sociology of science which focuses on actual events rather than abstract formulations. Given the uncertainties which language inevitably presents, surely it is preferable to strive for clarity, rather than revelling in the fact that no knowledge is entirely certain.
PART TWO: SPECULATION

5. Introduction to Part Two

In the first part of this dissertation, I have tried to go about things in a more or less 'scientific' way. In other words, I have tried to explore Sokal's criticism and its defence in terms of what some academics, intellectuals and theorists have written about it. I have attempted to systematize this information into a pattern by first defining operative variables, and then examining instances in which these variables occur. It seems that 'scientific' in the social sciences means systematized, coherent, and logical; the 'system' being defined by the parameters established by authorities. This is another way in which studies in the humanities pay homage to the evident superiority of the hard sciences.

Sokal states that there are different types of knowledge. For example, he separates cognitive/epistemic truth from moral/ethical and aesthetic understandings (52). It seems that though certainty can be attained in the first type, he reserves judgement on the other two. This seems to imply, then, that ethical considerations should not be allowed to interfere with the search for epistemic truth, whose meaning and value remain stable irrespective of moral or aesthetic concerns. Similarly, in his last book, The Physicists (1981), C.P. Snow writes that

There is no need for an extrinsic scientific criticism, because criticism is inherent in the process itself. (3-4)

Such a belief seems to me extremely dangerous, and is a reflection of the power which science is capable of holding over those with an unassuming faith in its validity.
Ifor Evans has remarked:

This dominance of science was inconceivable three centuries ago, but it has now grown to so absolute a power that all in our lives relates to it. Our religion, even among the devout, enters less into our daily lives than the result and influence of scientific investigations.

(Literature and Science, 1954: 8)

And in The Four Dimensions of Philosophy (1993), Mortimer J. Adler writes:

We live in a culture in which science, along with its applications in ever more powerful technology, predominates....The glorification and adulation of science give the word “scientific” its eulogistic connotation....The adjective “scientific” has almost become a synonym for “excellent” -- for “trustworthy” and “reliable”. (49)

In this section, I wish to launch a critique on the common assumptions expressed here, which rule that science is a self-evidently worthwhile enterprise. I would like to take my own advice and attempt a rather more speculative, subjective approach to the issues which Sokal raises.* I will first briefly consider similarities between methodologies of scientific and aesthetic discoveries, before making the attempt to elucidate some of the assumptions of value which the scientific enterprise takes for granted. These are assumptions which are at odds with its professed status as an unimpeachable, neutral process.

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*I readily admit, however, that it is quite impossible within the present context to withdraw entirely from the demands of centrality and coherence necessitated by the format which encapsulates this dissertation.
6. Discovery & Verification: Methodologies of Science & Literature

...dreams, hypnagogic images, and other forms of unconscious intuitions proved decisive in the discoveries of dozens of scientists and mathematicians...among them Ampere, Gauss, Kekule, Leibnitz, Poincare, Fechner, Otto Loewi, Planck, Einstein, to mention only a few. (Arthur Koestler in Medawar, 1984b: 259)

...in the idiosyncratic process of inventing scientific theories, all methods are in principle admissible- deduction, induction, analogy, intuition even hallucination- and the only real criterion is pragmatic. (Alan Sokal & Jean Bricmont, Fashionable Nonsense, 1998:81)

The subjective experience, the aesthetic satisfaction, seems exactly the same as the satisfaction one gets from writing a poem or a novel, or composing a piece of music. I don't think anyone has succeeded in distinguishing between the two. (C.P. Snow, The Physicists, 1981:182)

A methodology of scientific invention may loosely be grouped into two categories: hypothesis and verification. The first part of this method, the process of discovery, does not seem to be restricted to a specific form. Induction, that is, Aristotle's method of predicting general phenomena from the impartial observation of particulars, has been rejected by Peter Medawar as a fail-safe method by which any intelligent, hard-working person might be able to discover truths about the world. In Pluto's Republic (1984), Medawar agrees with his mentor, Karl Popper, who 'regards the inductive process of thought as a myth' (36). He claims, rather, that there are countless means by which scientists have arrived at their hypotheses.

As Sokal points out, however, it is not hypothesis, but verifiability, the justification of a new theory, which defines a process as scientific (206). He
endorses Popper's formulation of falsifiability as a criterion for what distinguishes an adequate, that is, 'scientific' hypothesis from a whimsical conjecture. Yet, is the speculative part of science, the hypothetical, intuitive (one is tempted to say 'mysterious') notion of new ideas to which Medawar, Koestler, Sokal and Snow refer, is this not also very much a part of science, and a crucial part at that? It would make no sense to exclude the unsystematic, chaotic work until it is verified, since speculation is an integral part of scientific discovery. Scientific notions exist first of all as ideas which then become workable hypothesis. As Snow suggests, one might consider the initial phases of scientific endeavour as sharing a creative element with literary invention, in that there seems to be no more reason for the appearance of a scientific idea than there is for the occurrence of a literary notion.

Perhaps the narratives of both science and literature contain alternating phases of discovery and verification, in that writing needs to be deemed valuable by a certain set of authorities, such as critics, academics and adjudication panels before being deemed to be of literary merit. On a superficial level, the systems with which science and literature operate are similar, both consisting of a process by which someone sets to work within a given system and attempts to exceed that system, before relying on the support and justification of peers to authenticate the exception as a new rule. In both cases 'narrative structure' can be taken to mean the system within which either operates.
7. Truth and Value in Science and Mythology

7 (a) Science, Speed & Warfare

The full and earnest cultivation of science - the knowledge of causes is that to which we have to look for the protection of our race...
(E. Ray Lankester, Degeneration: A Chapter in Darwinism, 1880)

Will the world be better and happier in the new century? To us it seems that the answer should unquestionably be in the affirmative. Scientific progress tends to moral advancement.
A moment's reflection will show that aerial navigation, rapid transit, the electroscope and other inventions will all tend to make crime and war more difficult, while improved social conditions will make them less attractive.
(W.J. Wintle Life in our new century: The most striking of New inventions 1901)

One hundred years on and with a century of lamentably scientific warfare in between, the above quotations might seem laughable were they not so tragic. It is possible that the mid-century peak of the atom bomb signalled a watershed for the faith and trust which it was possible to invest in science. In Asimov's New Guide to Science (1987), he writes that 'Since the second world war, strong feelings of outright hostility toward science' (15) have been on the rise.

It does seem, to even the most casual of observers, that a great many scientific innovations and inventions have come about during wartime. Is this coincidental? What does it reveal about science and the values it eschews? According to Sokal, it doesn't mean very much at all. He reaches this conclusion, once again, by dividing up realms of knowledge. In 'What the Social Text Affair Does and Does Not Prove' he defines five categories: Ontology, Epistemology, Sociology of Knowledge, Individual Ethics and Social ethics. He refutes Sandra Harding's criticism of science's overt support and furtherance of warfare by saying that
The militaristic orientation of American science has quite simply no bearing whatsoever on the ontological question, and only under a wildly implausible scenario could it have any bearing on the epistemological question. (7)

Sokal is not the first to divide knowledge up into categories, but it is false to assume that taxonomies of knowledge are self-evident, since there are many different hierarchies which have been suggested. For example, in Kierkegaard's tripartite division introduced in Either - Or and elaborated in his Concluding Unscientific Postscript (1941: 261) he identifies three spheres -- the aesthetic, the ethical and the religious, of which the religious is the most important. According to Kierkegaard, living in any one of these spheres alters one's perceptions of reality, and he posits his own belief that the religious sphere is the most valuable. This contrasts sharply with what seems to be SolGtl's assumption that scientific truth is the most important sphere of truth since it cannot be affected by the others. Taking his reasoning a step further, one might be persuaded of the conclusion that scientific truth is thus the only form which influences other domains of truth.

Sokal makes the claim that science is free from all values other than the epistemic value of truth; it is objective, impartial and impervious to all other concerns. Since Sokal's defence of science rests on impartiality and verifiability, it must of necessity be a-political, and a-moral, since it cannot become involved in stances. Furthermore, if it is disallowed a particular perspective, then science could not possibly be permitted a political agenda, which casts doubt on the ability of Sokal's hoax to further his 'main concern', which, he claims, is precisely political (269). In other words, if Sokal is right in his assumption that scientific discourse is free from partiality, then his political arguments carry no weight. On the other hand, if he concedes that science is valuable in that it can improve the life and well-being of humanity, then he cannot claim it to be disinterested!
It seems that the scientific enterprise experiences a great deal of difficulty when it attempts to involve itself in ethical issues, since any claim to radical neutrality effectively excludes any biases, be they metaphysical, ethical, moral, or religious. Terms such as 'justice', 'goodwill', 'equality' and so on, simply make no sense in scientific discourses, and as soon as these are invoked one is entering another arena, a different plane altogether, perhaps that of philosophy. As Mortimer J. Adler writes, 'Science is not reflexive...as soon as scientists talk about science they are being philosophical' (1993: viii). It is understandable then that the move away from a dogmatic adherence to scientific unimpeachability (an ethical move) may well be regarded as threatening to the scientific community.

So it does not seem as though Sokal can escape the philosophical implications of the value of science which he proposes. Snow has less difficulty in endorsing this kind of standpoint, and he proclaims quite clearly that science is invaluable to a country. It is because of this that he criticises England and America for not encouraging and supporting their science students to the same extent as what the Soviet Union does, or did. In his 'Two Cultures' speech, he quotes statistics showing that in the year before his talk, that is 1956, the Soviet Union produced more mathematicians, engineers and other scientists than England and America put together (Public Affairs, 1971, 34-5). This, said Snow, is laudable, since only science promises a better world for all. And yet, almost fifty years on, it seems that Snow was wrong. The Marxist faith in matter has subsequently been subverted by ideology. Science could not save the Soviets. One may argue that the science of the Soviet Union was not 'pure' in that it was totalitarian, and not democratic.

* If it were the case that certain truths were in arguably true, that via rationality one must simply come to accept certain givens, then Sokal's book would have persuaded everyone who read it. In other words, if objectivity were so obvious, we would soon all believe in it as the foundation for all other truths. Theology, arts and other departments would soon find themselves without clientele. Medawar discredits this idea of truth when he criticises the notion that inductive methods of reasoning automatically lead one to an awareness of truth (1984b: 36).
Yet, as the last president of the Soviet Academy of Sciences, Gurii Marchuk noted, science is anything but democratic, since truth is not decided by majority vote (in Totalitarian Science and Technology, Josephson, 1996:2). In the same book, Josephson goes on to show exactly how much faith the Nazis and Soviets also had in the ability of science to grant them the domination of the world. So what exactly is this nationalistic value which science grants? C.P. Snow writes that the second world war changed the role of many scientists, and that

A large number of physicists became soldiers-not-in-uniform. So they have remained, in the advanced sciences, ever since. (1981: 185)

Snow hardly sees this as a negative indication of the role of science at all; far from it. He posits it as another vindication of the necessity of science. Science has became essential to the defence of a nation.* But besides the overt ability science grants a nation in developing more powerful, more threatening weapons, there are other, more subtle aims which are also related to warfare. It does seem that science carries with it also less explicit valuation systems; for example, it may be apparent that science values measurement, yet not so obvious that science values speed. Science, in the case of medicine, also values extending life-span. So science is looking for specific answers to specific questions. Science does not pose general questions such as 'how does the world work?' Instead, it occupies itself with very specific searches, such as 'how can this process be quickened?' Science provides answers only to very particular questions. I have mentioned two values -- speed and longevity -- which at first seem to be commensurable, in that speed may be seen as contributing to 'living longer' by 'living more'. However, I would like to

*Are attack and defence not possibly part of the same process? Were one to consider that the fundamental motion of the universe is in the most simple terms, a pulling rather than a pushing, one might concede that in attraction, seduction, lies as great a strength as in force and aggression. Perhaps all functional devices contain a potential energy which tends to orientate their possessors towards their actualization. In these terms, the possession of a firearm creates danger rather than preventing it, and making 'defensive' weapons is still war-mongering.
postulate another meaning, another value, for the importance of speed, which is that 'Speed is the essence of war' (Sun Tzu, *The Art of War*, 1963: 134).

There are other examples which illustrate the connection between speed, technology and warfare. Perhaps the most obvious comes from Marinetti's technophilic Manifesto:

> We intend to sing the love of danger, the habit of energy and fearlessness... We say the world's magnificence has been enriched by a new beauty: the beauty of speed...we will glorify war -- the world's only hygiene... ('The Founding and Manifesto of Futurism', 1909)

Paul Virilio summarizes the movement: 'Futurism in fact comes from a single art-that of war and its essence, speed.' (*Speed and Politics*, 1986:62). Of our own day he writes: 'The loss of material space leads to the government of nothing but time' (141) and 'The Violence of speed has become both the location and the law, the world's destiny and its destination' (151). Sokal complains in his chapter on Virilio that he is has no idea of the basic laws of motion and acceleration in his forays into the meanings of speed (169-175). Yet why should what is surely also a conceptual term like 'speed' remain the exclusive domain of scientists? I would submit that a critique of science is absolutely vital, and perhaps especially from non-scientists, who are able to view the processes which science inculcates from a deliberately un-objective perspective, one that is explicitly humane. One may even go as far as saying that it is the duty of philosophers to commit a sustained onslaught on the values of science for this very purpose, in order to expose the underlying, covert, and often-times dangerous assumptions embedded within its seemingly impenetrable structure. As Arnold Arnold says:

> Modern Science and technologies are corrupt...because many scientists refuse to face the consequences of their work or make value judgements about its possible applications. (*The Corrupted Sciences*, 1992: 21)
I would like to cite a third aspect of this rather radical thesis that science is directly implicated in the values of warfare, though I admit that this one may be slightly more tenuous than those already mentioned. In *The Masters of Truth in Archaic Greece* (1996), Marcel Detienne states that there can be little argument that 'scientific language, in the form in which it is most widely known today, originated in Greece' (8). However, first *Aletheia* -- the truth -- had to change from being 'a privilege reserved for certain persons' (9), that is 'the diviner, the bard, and the king of justice' (16). Scientific thinking only became possible once the hoplite reform permitted the 'emergence of “equal and similar” soldier citizens':

at this point, dialogue -- secular speech that acts on others, that persuades and refers to the affairs of the group -- began to gain ground....the military assembly...conferred the equal right to speech on all members of the warrior class. (17)

Perhaps this may be considered a spurious, coincidental discovery, that the speech which made the beginnings of science possible, the opportunity of doubting the divine, began in the context of a warrior class. It does illustrate, however, the hypothetical thesis of this chapter, that at least one of the values of science is intimately linked with one of the foremost values of war. Science wishes to speed life up, but unfortunately, as a sign on the highway between Pretoria and Warmbaths proclaims: 'Speed Kills'.

Once it has been affirmed that one discursive community is as good as another, that the narrative of science holds no privilege over the narratives of superstition, the newly minted cultural critic can actually revel in his ignorance of deep scientific ideas.

The point is not to debunk science or to "deconstruct" it in order to show it is merely fiction.... The point is to show science as a social process, to bring it down to earth, to remove the halo from its head.
(Stanley Aronowitz, *Dissent*, Winter, 1997: 107-110)

Far from encouraging ignorance, as Gross and Levitt suggest, I would contend that the recognition of science as a discursive narrative advocates the necessity of finding out more about other ways of knowing. It is, in fact, an appeal to a greater variety of knowledge; certainly not ignorance. There are a great many systems of belief which are 'unscientific'. Are these beliefs not to be taken seriously? Is the value they suggest to be piteously brushed aside? In a personal capacity, from only the evidence which my own experience has afforded me, I can claim as personally truthful, to greater and lesser extents, a number of unscientific systems. These include the I-Ching, Tarot cards, Yoga, Meditation, Numerology, Astrology, the Tao's yin/yang, and Hinduism's Brahma/Vishnu/Shiva divide. Every one of these systems has proved to me, at certain junctures, to contain beneficial insights and positive experiences I can only describe as actual, as real, as true. On the other hand, there are systems which, by the same token, I would have to discredit as fraudulent or detrimental. Amongst these I would place Palmistry, Mediums, Psychology and Monism. This little subjective exercise is simply to indicate that my life would have been a great deal less interesting were I to have only subscribed to rigidly scientific views on what is true. I would have had to, at the outset, discredit all mystical systems which allude to subjective truths rather than to what is objectively knowable. This does not mean that I discredit science or claim that it
is false. I do maintain, however, that there are many other truths besides the empirically verifiable.

The idea that science could be considered a form of mythology has links to one of the leading lights in the postmodern century, namely the anthropologist Levi-Strauss, who, following on from Saussure's split between signifier and signified, insisted on a relaxation of the stranglehold which Western Science held over all the many other cultures in the world, which it effected by means of its rigid interpretations of them. Instead of trying to understand foreign cultures, most early anthropological classifications came from either missionaries seeking to convert heathens, or capitalists hoping to enslave barbarians. There was little by way of understanding. Levi-Strauss tried to unshackle the beliefs and values of other (non-western) cultures from this subservience to western domination by interpretation, and he did this by attempting to examine these cultures in terms of their own internal structures, in other words, in terms of their own stories, instead of European narratives.

Many contemporary historicists may now concede that it was wrong for people from one belief system to impose their greed and their religious convictions so painfully on other cultures -- that it was wrong of Marco Polo, and the Conquistadors, and the Inquisition. And yet it still seems perfectly permissible, even desirable, to impose scientific beliefs on other cultures. One may adopt the Hindu's standpoint that it was wrong of the Pope to travel recently to Delhi with conversion on his agenda, and yet there is little protest when electricity is forced on Indonesian Islands, education and clothing compelled onto Amazon basin Indians, and radios and telephones pressed into Kwa Zulu Natal. Many of these peoples desire the intrusion of scientific inventions into their communities. Yet, they must first be persuaded that the beliefs and values of the first (top-best) world are more desirable than their traditional beliefs. This is an area in which
Postmodernism may be able to unearth a number of assumptions in the same way that it has opened up enormous fields of inquiry by shifting the focus of anthropological studies from the observed to the observer. For example, is desire not a primary axiom of the consumerist enterprise? Could it not be postulated that rural communities need to first be taught the desires of the urban technocrat before they can hope to have them fulfilled? These are relevant questions which are veiled behind the assumption that an increase in ease made possible by technology is inevitably 'good for you'.

I'd like to return to the specifics of Sokal's statement against epistemic relativism wherein he contests the idea that science is a form of mythology. Mythology is easily understood as a form of narration: it is a story which explains the world in certain terms; it is a world view which knits together the fabric of visible reality by means most often invisible. At the outset, this does sound like it might work as a description of science, but Sokal will have none of it, because science is true and stories are not. Before Sokal's contention that science is no myth, Peter Medawar wrote in *The Limits of Science* (1984) that he is 'not at all in sympathy with those modern anthropologists who regard myth and science as alternate explanatory structures of the same stature' (89). This is because, as he states rather bluntly, 'Myths are for the most part buncombe' (90).

In 'A Plea for Reason, Evidence and Logic' (1997), Sokal illustrates the predominant truth of scientific questions over the mythological by referring to a contention between the Zuni, a north American tribe, and certain anthropologists who wanted to establish where this tribe originally came from. Though he states 'I don't want to address here the ethical aspects of the controversy...but only the epistemic issue', the two are directly related in that the controversy would culminate in a decision as to which of two groups gained control over ten-thousand-year-old human remains. Sokal poses the rhetorical question of whether
scientists are really to believe the tall stories of the Zuni's myth's of origin, or whether they should look to the material evidence. An almost identical conflict is held up for ridicule in Richard Dawkins's most recent book, Unweaving the Rainbow (1998). Here Dawkins presents the case of Kennewick Man as a demonstration of how irrational mythological beliefs hamper the progression of science (19-21).

Kennewick Man was discovered in 1996 and carbon-dated as being older than nine thousand years. This information was of great interest to anthropologists, since it might be used to establish the proof of a theory that Native Americans originally migrated across the Bering Strait from Iceland. However, other ethnic groups -- the Umatilla and Yakama Indians of North America, and the Asatru folk Assembly, a Nordic Sect -- were excited by the discovery of the skeleton for other reasons. These non-scientific believers in mythology wanted to hold religious ceremonies over the bones and respectfully bury them. The main contention then was between scientists and mythologists, and who should get the bones. Each group wanted different answers from this skeleton, each were asking different questions. The archeologists and anthropologists were keen to submit the skeleton to a barrage of tests, after which they would most likely have displayed it in a museum as evidence of an historical reality. The mythologists, on the other hand, wanted to submit the skeleton to a series of ceremonies and then bury it. The Indians were not interested in the scientists' questions of migration, since they believed their myths which claimed they have always been in America, and did not come from anywhere else. The anthropologists were not interested in the mythologists' ceremonies, since they most likely felt, like Medawar, that myths were 'so much buncombe'. Dawkins makes fun of these beliefs, since, to him, the only important facts concern where and when migrations occurred, not fanciful stories about gods and what not. Where then lies the truth? Which value system should have priority? Postmodern anthropologists would say that the mythologists
views are as true as the scientists', whereas Dawkins claims this is not and that science provides the only adequate explanation of actuality. However, it simply will not do for him to say that the views propagated by the myths are not true, since they are all too clearly true for those believing in them. He can say that for him it does not make sense, but it is completely impossible for him to claim that these are not sensible views for the Yakama tribe.

There is only one skeleton -- that is true -- but clearly there are different values attributed to it. So what is at stake here, is not so much a question of truth, as of value. The value which the skeleton serves for the scientists is an abstract value in terms of how it might corroborate their story of the history of humanity. In itself the skeleton is only an instrument, a means by which to establish certain facts. If they could have obtained the DNA and carbon necessary from some other object it would have served as well. For the mythologists, however, the skeleton has an intrinsic value as an ancient being who actually lived many moons ago. In other words, the skeleton describes a real person who had certain knowledge which might now have been lost, and who is respected for his mystical, irretrievable wisdom. The reverence for the skeleton is thus also a reflection of the reverence the tribes-people feel for themselves, for humanity, for the life force which inhabits all creatures, and for the gulf of time which separates them from their past. I personally find it ludicrous to deride such a necessary and deep-seated spiritual belief for the sake of the confirmation of a chart.*

There is a fundamental difference here in what knowledge means, what its value is. For the scientists it is valuable to pinpoint time and space, to draw maps. Yet how does this knowledge compare with the truth experienced by the Yakama? Theirs is an altogether different type of truth which claims that it humanity's duty to

*Perhaps a compromise might be reached whereby the bones could be tested and then handed over to spiritual authorities. This may be a 'postmodern' solution which hopes to reconcile differing versions of the truth.
revere the past in an emotional (spiritual?) way.

Similarly, environmentalism can never form part of the objective, empirical truth Sokal wants to raise as supreme, since it concerns ethics, and ethics, as I have tried repeatedly to demonstrate, can play no part in the objective science Sokal upholds. Recently, the television news showed comments by Canadian locals about a woman who has now occupied a thousand-year-old Redwood for more than two years in order to prevent a logging company from chopping it down. All the commentators interviewed about the situation were derisory, and referred to her either as crazy, or, quite simply, as a law breaker. The illegal aspect of her occupation rests firmly on objective facts, that is, in legal documents, and the argument that her behaviour is unlawful is incontestable. One could say the same of the Yamaka: what they are contesting does not make sense from a scientific viewpoint, and their views are illegal in terms of the laws erected by science. And yet, the occupation of a redwood does make sense in terms of a context which refuses to accept the rights of a human logging company to destroy anything they choose for financial gain. It would be impossible for an empirical scientific world view to describe the necessity of a spiritual regard and utter awe for such an primitive life form. Similarly with the Zuni: to them it is an infringement of an experiential, emotional knowledge of the earth and man's occupation of it to reduce the discovery of such ancient bones to a statistic, a comprehensible set of figures, a comfortable equation. Perhaps there is also a difference here in the configuration of time in terms of numbers and eras, on the one hand, and the awareness of time, in terms of awe, on the other. If scientific truth is regarded as dependant on a specific frame of reference, then certain assumptions can be challenged, but if it is claimed that science does not require any referential basis besides its own self evident truth, then this allows it a license to run rampant.
Dawkins makes it clear that, for him, true and false are unambiguous terms. For instance, he writes:

If I tell you that humans and chimpanzees share a common ancestor, you may doubt the truth of my statement and search (in vain) for evidence that it is false. But we both know what it would mean for it to be true, and what it would mean for it to be false. (21)

I could not disagree more with this last sentence, since it would be far from clear what such a truth might mean. It could, in fact, quite clearly mean two diametrically opposite things. For example, it could mean that since we evolved faster and further than apes and exceeded their capabilities, we are thus better creatures than them and may experiment on them for our own ends; or it could mean that since we are so closely related, hurting them would be like harming one's family. These are extremely different meanings, arising from a sense of value, and not from an awareness of the facts, which remain the same. One meaning claims that human life is more valuable than chimpanzee life, the other that it is not. It will not do then for Sokal to so simply delineate different types of truth as he does (aesthetic / ethical / cognitive) and to assume that they have no bearing on each other.

These then are two distinct and incommensurable views. On the one hand, there are scientists, like Sokal and Dawkins who, though paying lip service to different types of truth, state explicitly that they are concerned with only one of these types, namely that kind that has to do with an objective, external, epistemically verifiable world. This, according to the scientists, is the only truth knowable. An integral part of this view is the notion that there is only one truth. On the other hand, one has Postmodern theorists who say that there are as many truths as there are interpretations. However, far from being whimsical or arbitrary, these truths depend on experience, tradition, language and other factors. Since truth can only be understood as an interpretation, an 'external' objective reality can never be truly
comprehended as separate from a system of values. As Richard Rorty says: 'The world is out there, but descriptions of the world are not' (in Levine, 1993: 4). Postmodernists, for the most part, do not deny the existence of an external world, and it is very unlikely that any one of them has claimed, as Sokal did in his hoax, that 'physical “reality”...is at bottom a social and linguistic construct' (213), yet they would claim that the linguistic construct is all we know, so it makes no sense to talk of a physical reality as if it is separated from the terms used to describe it.

Myths are also a form of interpretation. They are a diagnoses of the world. They too describe causes and effects. The case for scientific discourse as a narrative similar to mythology rests on the values which truths have for communities. Myths have their roots in actuality, they have to do with facts like the ocean, the weather, the pride of man, and so on, and the interpretation of these facts does make perfect sense within a specific system of mythology and its subsequent values. On this level I would concur, then, that the meaning of science as a world view is very similar to that of the meaning gained from a belief in mythology, since both serve explanatory purposes. As Francois Jacob writes: 'myth and science fulfil similar functions: they both provide human beings with a representation of the world and of the forces that are supposed to govern it. They both fit the limits of what is considered as possible' (in Open Fields, 1996: 177).

In 'A Plea for Reason, Evidence and Logic' Sokal quotes David Whiteis as seeing Postmodernism as 'anti-rationalist' and 'anti-thinking'. He also has Larry Laudan describing it as an 'anti-intellectual' movement. In the light of the commentary on the mythological issue, it seems plausible to say that the hard-line scientific approach is clearly (even proudly) unemotional and anti-feeling in that its judgements will not be clouded by sympathies like compassion. I would like to turn now to the issue of subjective value, that imminently human attribute, and contrast it with the ideal of scientific objectivity.
In the self-same book in which Medowar makes the claim that myths are 'buncombe' (The Limits of Science), he does concede that there are certain questions which science is not equipped to answer. For instance, science cannot answer all important questions.

It is not to science...but to metaphysics, imaginative literature or religion that we must turn for answers to questions having to do with first and last things. (60)

These are surely significant questions, if not more serious than many of the questions with which science occupies itself. Ardent supporters of mythologies today, such as Pagans*, Shintoes and Hindus, may not necessarily understand their myths as being literally true, yet their symbolic stories are surely considered to present a truth greater than the literal. Again, it is values which determine the truths one seeks out as important, not the truths themselves. A young zebra grows into an adult zebra by eating grass, not because of the grass, but because of its 'zebraness'. A basic value which science claims for itself, is stated here by Searle:

Since the seventeenth century, educated people in the West have come to accept an absolutely basic metaphysical presupposition: Reality is Objective.

Placing as much emphasis as he does on an empirically testable truth poses an immediate problem for any assessment of Sokal's view. This problem with the model that he presents is that he has made it impossible to reply to it except by

* It may not be too far-fetched to imagine that science itself is a form of paganism, since it believes in a world of nature, matter, seasons, bodies, motion, energy etc. -- all aspects which concern worshippers of the earth.
means of his own epistemological terms. According to Bertrand Russell, in *The Problems of Philosophy* ([1912], 1999), every theory of truth must also contain within it a theory of falsehood, which is its opposite (70). Consequently, if truth is objective, falsehood must be subjective, so no theory arising from 'within', so to speak, can be true. The problem is that all value comes from an internal source. Value is imparted subjectively, not in terms of a system's external structure. If one wishes to determine the value of a game of cricket, it makes no sense to analyse the ball, the field, or the rules: one must look to the participants and the spectators. In preceding chapters I have suggested some specific values with which science may concern itself, values which lead to the truths science seeks out. I would like to consider now more general values of objectivity and action, and contrast these to values mythological systems embrace.

In a remarkable book, *The Monk and the Philosopher*, (1998) a dialogue takes place between Jean-Francois Revel, author and professor of philosophy,* and his son, Matthieu Ricard, a Buddhist monk. The entire book consists of a congenial discussion between the two, in which the norms and assumptions of western science and philosophy are contrasted and compared to Buddhist beliefs. Revel gives a compact summary of what may be described as the mission of science:

> When I say the West's been a civilization of action, I'm thinking of the transformation of the world by knowledge of its laws. I'm thinking of technological invention, I'm thinking of the invention of the steam engine, the use of electricity, the invention of the telescope and the microscope, the use of nuclear energy -- for better or for worse....All that comes from the West. So acting on the world isn't just a matter of having some spiritual influence on people like oneself, but of real change in the very substance of the world we live in....Buddhism says that action of that sort on the world, in the end, is superfluous, doesn't it? At any rate, it was never something Buddhist societies developed. (133-4)

*Kevin Mulligan in his TLS review of *Intellectual Impostures*, (1998, May 1) lists Jean-Francois Revel as part of the small band of French thinkers who preceded Sokal in his rationalist critique of Postmodernism. It is fitting, then, to have him represent Sokal's views so cogently.
To which his son replies:

Western efficiency is a major contribution to minor needs...experience shows that such progress only solves the secondary problems. You can travel faster, see further, go up higher, go down lower, and so on....By all means, let's live a longer life thanks to medical progress, and use it wisely thanks to spiritual values....But on the other side, a civilization oriented almost exclusively towards that form of action on the world clearly lacks something essential that material progress can never bring -- indeed, it's not what it's designed to do....That lack appears clearly in the confusion so many minds are plunged into, in the violence that reigns in the inner cities, in the selfishness that governs so many human relationships, in the sad resignation of all those spending their last years in old people's homes, and in the despair of suicide. If spiritual values stop being an inspiration for a society, material progress becomes a sort of facade that masks the pointlessness of life. Of course to live longer is to profit from an increased opportunity of giving meaning to life, but if you neglect that opportunity...the value of human life becomes altogether artificial. (134-5)

The aspirations of science, the values it attempts, do not seem to stretch beyond the conception of a meaning beyond usefulness. Certainly the values of science do not extend to the values of spirituality with which religious myths are imbiber. A society such as the one operative in the west has spent a great deal of time on very specific implements, that is, military technology, increasing lifespan, and all the other points already mentioned, whereas Buddhist societies have developed entirely different technologies, such as the technology of meditation. Whilst the one was developing the Eiffel Tower, the radio, the car, the other was perfecting the prayer wheel, the singing bowl, and the Llama's lightning rod.

Scientists like Medawar, and philosophers like Wittgenstein, may say that they do not ever wish to disparage religious or metaphysical views, and that they can comprehend the need for mythology and spirituality, only that it is not something they are equipped to talk about. According to Wittgenstein's 'Lecture on Ethics' (1929) it is not something which language is equipped to deal with at all. And yet,
both are still expressing a form of value when they relate what they regard as true, since to say something is true is surely to grant it a measure of importance; it is to erect a stable point on which other assumptions and values can be based. So science, as has been mentioned, has very clearly defined values, such as speed and longevity, but neither of these contributes much by way of meaning. As Ricard says, what is the sense of a longer life lived in an old age home remote from love and care? What are you going to do that is so meaningful in the place you arrived at earlier than you would have? Mahatma Ghandi said 'the quality of life is not increased by speeding it up'. The same point is made by Andy Capp in a cartoon in which his wife comments how much she would like him to buy her a new kettle because 'it'll save so much time', to which he replies 'And what are you going to do with the time you save?'

Sokal writes:

> It is perfectly legitimate to turn to intuition or literature in order to obtain some kind of nonscientific understanding of those aspects of human experience that cannot, at least at present, be tackled more rigorously. (188)

Veiled within this statement is the assumption (or even worse -- the hope) that all human experience may one day be rigorously presented by science. This is the sort of notion made absurd by Alfred Jarry in his posthumous *Exploits and Opinions of Dr. Faustroll, Pataphysician* (1965), in which pataphysics, 'the science of the particular' (21), is employed in rigorously describing Faustroll as being '...a man of medium height, or, to be absolutely accurate, of \(8 \times 10^{10} + 10^4 + 4 \times 10^9 + 5 \times 10^6\) atomic diameters' (7). In hyper specificity, all possible human application is lost.

*I have searched in vain for an authoritative source for this quotation, however it would remain a valid remark even if it did not originate with Gandhi.*
This idea is also echoed by Brennan:

... as science has discovered more and more fundamental physical principles, they seem to have less and less to do with us...physicists can explain almost anything in the objective world, yet we understand our own lives less and less. (1997: 244)

Similarly, Searle says:

We have a certain commonsense picture of ourselves as human beings which is very hard to square with our overall “scientific” conception of the world.
(in The Architecture of Babel, Broderick, 1994:19)

This is a truly radical statement in the light of Sokal's mission to further the cause of 'common sense'. And yet, it does ring true -- we still say the sun rises and sets, more than four hundred years after we should know better. I am sure that practising scientists themselves are more concerned about practicalities such as where they will eat and sleep and who they will make love to, than whether a neutrino has mass or not. Curiously enough (or perhaps unsurprisingly), scientists do not seem to live by the pure materialism of their creed. Wilbur points out that the great theorists of modern physics (relativity and quantum physics)- Einstein, Schroedinger, Heisenberg, Bohr, Eddington, Pauli, de Broglie, Jeans and Planck...all were non-materialists sympathetic to a spiritual view of the world...
(in On Purpose, Charles Birch, 1991:152)

Certainly anti-scientific feelings come about when humanists find themselves threatened by what they perceive as a heartless science, yet there are at least as many scientists who are spiritualists as those who are out-and-out atheists like Dawkins. In a recent article in the Mail and Guardian (Barrell, Transcendental Meditations, Dec 23, 1999:55), George Ellis, who is described as 'one of South Africa's leading mathematicians and an internationally prominent cosmologist',
states in an interview:

There's an area into which science simply cannot go. Ethics and aesthetics are beyond science. Not just now, but forever... My own view... is that there is an underlying reality which we can call "transcendence". Various intuitions of it are available to us. Morality, beauty, love - which are all beyond the competence of physics to deal with.

In this dissertation I have suggested that perhaps the mistake which Sokal set out to rectify came about because philosophers and cultural theorists abandoned the fields of enquiry which their disciplines are competent to deal with -- questions involving aesthetics, ethics, and metaphysics -- and instead attempted to make their work appear scientific. Perhaps the humanities' attempts at appearing scientific have failed precisely because the nature of their investigations is entirely different. Perhaps Sokal is right in saying that the humanities should not try to emulate science. Perhaps one requires a more responsible administration of the two, as suggested by Mortimer J. Adler:

The power that science gives us over our environment, health and lives can, as we all know, be either misused and misdirected, or used with good purpose and results. Without the prescriptive knowledge given us by ethical and political philosophy, we have no guidance in the use of that power, directing it to the ends of a good life and a good society. (1993: 71)

Finally, I would like to make quite clear that I myself am no Luddite. Although science has contributed an enormous amount to the destruction of the planet and our species, and though I feel it is important to make plain that its goals are not ever self-evidently beneficial, I must still concede that many effects of scientific enquiry, such as mechanical and electrical technologies, form such a natural part of my everyday life that it would be hard to imagine living without them. I do, however, feel that there is a great difference between using science and believing in science as a superior truth, an ultimate truth, or, worse still, as the only truth.
8. After-word: The Emperor's Old Clothes

Although he discredits the truth of stories, Sokal uses a story to illustrate the terms of his truth. This is namely the Hans Christian Anderson tale of 'The Emperor's New Clothes', a story picked up by many of the commentators on the affair on the Internet, who have used it mostly to deride the silly theorists who have now supposedly been forced down to earth with a bump. The story, being a children's fairy-tale, is assumed to be so straight-forward and obvious an analogy that it requires no explanation, and yet, who exactly are the various players in the tale -- the King, the Tailors, the people, the boy? To my knowledge, only John Krige (1998) has picked up that Sokal identifies himself with the innocent, naive boy who explodes the illusion that the king is not wearing anything at all, but unless the other players are identified, and their role in the narrative made clear, possible meanings of the metaphor remain vague.

The King might represent reality, or truth. The tailors could be the Postmodern theorists who have dressed up and represented the truth in a false way. The people remain, well, the people. The role of the king, and the assumption that truth is simply waiting authoritatively in his castle and waiting to come out and meet 'the people', is a sticky point, but let us consider the crucial role of clothing. In everyday life, clothes quite clearly present an illusion. A lady dressed in a red dress does not, for instance, possess a red body, even though she has every appearance of being red. By means of clothing we are protected and transformed from naked, shivering, rather similar creatures to a vast array of identities divided into social, sexual, economic, national and historical categories, or roles. If we possess any measure of common sense, then we know for a fact that everybody is really and truly naked, that almost everybody possesses genitals and everybody performs bodily functions. And yet, we are most likely to ignore this fact and relate to people in terms of what they are wearing. We thus willingly suspend belief and
enter into a contractual arrangement whereby clothing constitutes a norm, and nakedness an aberration -- quite clearly a case of wholesale consensual deception. (Curiously enough, one may be considered to display a quality such as 'authenticity' by dressing in an individual way, not dressing like the crowd, and yet to appear in public simply as we are, without trappings, is designated as mad.)

If clothing, the fashionable cover-up, the symbolic display of super-ego veiling the truth about our sexuality and bodily functions, if this is considered as a false representation of reality, then it is the tailors who are the real truth-tellers in the tale, for it is they who reveal for all to see what has hitherto been unconsciously concealed, namely that without his pomp and splendour -- the king is as butt-naked as his people. By analogy then, it appears that Sokal would prefer to have his sense of authority veiled, his codes mystified, his assumptions sustained. He would rather the Postmodernists do not tamper with the fabric of illusion created by representations formed by language. He would rather they make for his king a splendid robe of gold and green, that he may stand by as the child on the roadside and marvel at the majesty which is man.
9. Select Bibliography


