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THE POST-MODERN CRITIQUE OF SCIENCE

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1. INTRODUCTION AND BACKGROUND

Perhaps the most fundamental tenet of the enlightenment was the belief that there is an external world whose reality is independent of us, and that we humans could gain knowledge of it. We could express this as the separate ontological and epistemological claims:

(1) An external world exists and is independent of all observers.
(2) Our cognitive capacities equip us to gain knowledge and understanding of this external world.

For the scientific enterprise these claims are bedrock principles. Together they enable the scientist to make claims about the world in the belief that they can properly be judged true or false, and that the standard of truth/falsity is an absolute standard - correspondence to that external reality.

Some *postmodernists* question this assumption by proposing that the only knowledge we can have has to be set against a standard of truth that is relative and not absolute[1]. For the postmodernist (1) may be true or it may not be true, but it should not concern us. If (2) is true at all then the knowledge involved is socially constructed and socially relative. It may be affected by our cognitive capacities, but not by the world itself, being far more affected by our cultural background and social practises:

'Reality is the consequence rather than the cause [of] social construction of facts.' [2]

Scientists were content that social science should examine the sociology of science, in the sense of establishing how in practice the scientific enterprise functions, and Kuhn's *Structure of Scientific Revolutions* can be seen as a major step in this. Within this discipline it was possible to suggest, for example, that the reason Newton's laws emerged when they did was related to social forces. This work could be referred to as the *weak programme* of *social constructivism*. However, in the 1970s a new movement in sociology emerged - the *Strong Programme* [3]. This went far beyond the modest proposals of he weak programme in suggesting that the very form of Newton's laws were also determined by social forces. The content of scientific theories is not determined solely by an objective external world, but by the cultural background of the scientists that produced them.

This of course represents a direct challenge to central enlightenment values, hence the very name *Postmodernist*. Not surprisingly, although initially slow to respond, scientists eventually reacted to this in a hostile way.

In this essay I shall argue that the Postmodern critique is too extreme and that much of it is based upon an extremely poor understanding of what science actually is. However, I also argue that 'science' is somewhat responsible for the emergence of the distrust and suspicion that have fuelled this critique, and I suggest some of the mistakes that science has made.

2. THE POSTMODERN CHALLENGE

The *Postmodern* critique of science comes in several different forms. There is the feminist attack, alleging that science is, through and through, male gender dominated. There is the post-colonial

view that science is just an expression of Western colonialism, tending to marginalise the equally valid alternative 'sciences' of colonised countries. There are many more. Postmodernism is a cultural movement rather than one specific idea.

However, central to all forms of postmodernism is a deep assumption of anti-realism and cognitive relativism, as typified by Bloor's Strong Programme holding that knowledge itself is socially constructed. According to Bloor, knowledge is not true belief about an objective reality, that belief being held with adequate justification, but is, rather, a product of a particular social group's way of being. Let us try and unpack this, and, in the process, we shall see the incoherence that is at the heart of this kind of cognitive relativism.

Modern science maintains

(3) The world is about 5000 million years old.

Creationists believe

(4) The world is just 5000 years old.

The social constructivist maintains that (3) and (4) are equally valid considered as knowledge. Science is but one way of knowing the world and others are equally valid. What are we to make of this claim? It can be taken in one of three different ways.

(a) As a claim about truth
(b) As a claim about justification
(c) As a claim about pragmatic usefulness.

Let's take a look at each of these possibilities.

2.1 As a claim about truth

Taken as a claim about truth (3) and (4) seem to contradict each other. The world cannot both be 5000 years old and 5000 million years old. Both (3) and (4) imply the denial of each other. But how can a claim and its denial both be true? The postmodernist response to this is to say that both claims can be true if truth is taken relative to different perspectives. From the perspective of modern science it is true that the world began 5000 million years ago, while from the creationist perspective it is true that the world began 5000 years ago. But this sounds very much like a redefinition of truth to be simply what some group believes. It is enough for a social group to share a belief, for that belief to be, by definition, true. This approaches unintelligibility: How does one decide between conflicting beliefs? Surely it is precisely by finding out what is *true*. Incoherence looms: if a claim and its denial can both be true then the postmodernist will have to concede that there is nothing irrational about denying postmodernism and confirming its opposite, realism, and an absolute standard of truth. But this is precisely what postmodernism wants to reject. If postmodernism makes the assertion that truth is relative it is immediately open to anyone to simply say 'OK, I deny postmodernism, so within my social group postmodernism is false'. So the question of whether or not the postmodern view is true is open to neither rational debate nor empirical discovery, but can be decided only by means of rhetoric - rhetoric from both camps aimed at winning over more support on the presumed basis that the larger the social group that support a view the more 'true' it becomes.

2.2 As a claim about justification

In this case the postmodernist position is that (3) and (4) have equal justification. Now whether or not these two claims are equally justified from the standpoint of modern science is an empirical matter, and seems to be denied - it is precisely the point that modern science claims greater justification for its account of the world's age. Similarly, whether or not these two claims are equally justified from the standpoint of 'creationist science' is also an empirical matter, and we can assume that creationism claims greater justification for its account. So this cannot be what the postmodernist has in mind. What he must suggest is that both accounts are equally justified given their different rules of what counts as justification and that there is no objective matter of fact as to how to choose between these two different systems of justification. Now the rules of evidence have been made relative to different social perspectives.

But this again collapses into incoherence: The postmodernist needs justification to say that his view is correct, but his rules of justification are not obviously superior to those of the realist follower of enlightenment principles. The postmodernist needs some means of establishing that his rules of justification are necessarily superior, but how can he do this if all is relative? Once again we seem on the path toward rhetoric replacing rational debate.

2.3 As a claim about pragmatic usefulness

It might be said that claiming equal validity for (3) and (4) amounts to the claim that (3) and (4) are equally useful beliefs in terms of the purposes they fulfil within their respective cultures. This is a pragmatist account of truth. Modern science aims to give an account of reality that is pragmatically useful within modern science, hence true within modern science. And within modern science (3) is more useful than (4) so (3) is true. However, the creationist deals with religious truth and myth. For the creationist (4) is pragmatically useful in terms of its emotional and symbolic significance. In terms of the needs of the creationist culture (4) is far more useful than (3) so (4) is true and (3) is false.

But this construal of what the postmodernist means leads nowhere for it casts (4) as fairy tale to be set against the reality of (3). Even if it is granted that (4) is of great pragmatic use to the creationist, this casts no doubts at all on the truth of (3) as an account of reality. If the creationist wants to maintain that the world is just 5000 years old, but adds that this is just a useful myth that helps gets more converts, then what is all the fuss about anyway?

2.4 Summary

Cognitive relativism just does not work because it is self-refuting. The view that knowledge and truth are socially constructed is self-refuting and runs up against the obvious question of whether this view itself is socially constructed. If it is then presumably those of a different social background are perfectly free to reject it. The attempt of postmodernism to oppose (1) and (2) - the pillars of enlightenment philosophy - fails.

However, it is not just that cognitive relativism is self-refuting, that would amount to being merely harmlessly misguided. But it is dangerously misguided in that it has as a consequence the replacement of rational debate and empirical enquiry with rhetorical persuasion.

3. BIG SCIENCE AND PURE SCIENCE

3.1 The Sokal affair

In 1996 an academic physicist called Alan Sokal submitted an article entitled 'Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity' to the Social Studies journal *Social Text* [4]. His article was a deliberate spoof and gave the appearance that he was as

critical of modern science as the postmodernists. It was published, whereupon Sokal revealed that it was a hoax, thus exposing the editorial policy of the journal as way below normally accepted academic standards. Sokal's article was written in the style of some of the postmodern extremists, such as Latour, Lacan, Kristeva, Deleuze, in that it used mathematical and scientific terms in a manner that implied connections between them and political/social ideas. Typing 'Science Wars' into Google reveals hundreds of web pages on the topic, the best being Sokal's own: http://www.physics.nyu.edu/faculty/sokal/#papers.

Undoubtedly Sokal's article successfully revealed much of postmodern academe to be riddled with postured erudition and irrationality bordering upon charlatanry. However, whilst witnessing the embarrassment of French intellectuals may gratify and amuse Anglo Saxons, this should not distract us from realising that the postmodern critique does raise valid concerns. Sokal has rightly exposed some rampant excesses but this does not enable us to ignore the whole postmodern critique.

3.2 The emergence of Big Science

It is important not to confuse the postmodern critique with the more general sociological critique that has been in the background since the middle of the twentieth century, and has increased in more recent years. It seems legitimate to examine the effects of social, economic, and political pressures upon scientific progress. Science operates within society and the choice of which scientific questions to examine is at least as much a social question as a scientific one. In the reverse direction, scientific progress has enormous social and political consequences. Since Hitler's scientists developed V-rockets, and America's Manhattan project produced the atomic bomb, science certainly cannot claim to pursue knowledge only for its own sake. On the contrary, science is clearly seen to be up to its neck in politics and the economic forces of global capital. In these terms the deepening impression of science as a means of coercion, whether environmental or military, leaves it open to attack from precisely those forces of discontent that also congregate beneath the postmodernist banner - feminism, post-colonialism, environmentalism, etc.

'Science' today is, in reality, two different things. On the one hand there is still pure scientific research, as carried on largely within academic institutions[5]. Then again, there is Big Science - The Manhattan project, the USA/USSR space race, the Genome project, GM foods research. These are massive prestige projects with heavy financial commitment. In many respects these latter are better seen as engineering, technology, or applied science. Moreover, the 'prestige' involved is not scientific prestige but national, and the financial investment is made with the expectation of a return; not a scientific return but profit and or increased military strength. We should not be surprised to find that the ways of Big Science are somewhat different from those of Pure Science[6].

3.3 The critique of science is really a critique of society

The problem is that the public (and by this I mean all those outside of the scientific culture) see the term 'science' as referring to Big Science, not Pure Science. They see Big Science as responsible for nuclear reactor accidents, ozone layer depletion, dried up river beds, and all the other ills of late twentieth century life. In many respects they are right, but it is not the Pure Science aspect of these enterprises that has caused the problem. The Pure Science part of Big Science is as accurate and correct as it has always been. The ills of Big Science arise from its political and economic aspects.

Crick and Watson discovered the helical structure of DNA. This was Pure Science. Considered simply as a discovery about the nature of reality, it can be judged in terms of its success or failure. It can be regarded as a theory that can be subjected to standard scientific methodology, whether

this is seen as falsification or the foundation of a new research paradigm. However, all science takes place within a social context and the social context of the late twentieth century sees free market capital dominant. So of course that free market capital, seeing the opportunities for profit, funds Big Science in the form of the Genome project, and GM foods research, and all the many other forms of genetic research that would have been impossible without Crick and Watson's Pure Science discovery. In reality, the critique of Big Science is not a critique of science per se, but of the political and economic system within which we live.

3.4 Can Pure Science be value free?

The criticism of Big Science is clearly justified, for Big Science is as much politics and business as it is science. But does any blame attach to Pure Science, or is it beyond such criticism? The central question here is whether or not it is legitimate to think of Pure Science as a value free activity. We may perhaps view the development of GM foods from the discovery of DNA as *bad*, and the discovery of genetically based cancer cures as *good*. In this way we would be seeing Big Science as very much associated with values and this is surely correct since we have argued that Big Science is deeply political and social.

But Pure Science can remain protected from such considerations only if it maintains itself to be value free. On this view, the search for the structure of DNA was not, of itself, of any moral significance. It seems doubtful that such a claim can be maintained in the modern world. It may be that Aristotle could reasonably claim that his scientific researches and proposals were entirely free of any considerations of value[7]. This may even be claimed of the works of Tycho Brahe or Gregor Mendel. But if we examine the development of science in the three centuries between Newton/Boyle and Crick/Watson we see it increasingly driven by economic and social factors, and increasingly absorbed into the fabric of society. This is obviously true of Big Science but is also more subtly true of Pure Science due to the way this has become funded. It thus becomes increasingly difficult to see any scientific work as value free. Given the overall state of the world at the present time, scientists must surely revise their tendency to see all Pure Science as value free.

I believe that this general sociological critique of science is valid and is the motivation for most of the so-called postmodernist critique. The fact that this latter critique is framed in terms of anti-realism, relativism, and the crazy excesses exposed by Sokal makes it all too easy to dismiss.

To those of us who still consider ourselves to be children of the enlightenment and the Age of Reason, the relativism of the postmodern critique can easily seem preposterous and worthy of dismissal along with witchcraft and astrology. My aim here has been to suggest that, even if this is so, some of the postmodern complaints against science remain valid even if postmodernism itself is rejected.

4. CONCLUSION

Postmodernism seems in danger of shooting itself in the foot on two counts: First, by descending to levels of criticism that do not withstand scholarly examination, and which expose their writers to have a level of scientific understanding that makes their vaunted erudition appear as charlatanry. Secondly, by basing so much of its critique around self-refuting ideas of cognitive relativism. What is sauce for the goose is sauce for the gander - the investigation of scientific laboratory practices carried out by Latour and Woolgar can be equally carried out on postmodernists by scientists. According to postmodernism's own rules, the results would be equally valid.

It just is not acceptable to say that science is just one more form of knowing, along with religion, art, culture, etc. The fact is that scientific knowledge is uniquely anchored to the world of nature by virtue of its being anchored to empirical observation and this gives it a unique epistemic authority.

However, I believe that postmodernism's critique of science grows out of a more general sociological disquiet. In the early twentieth century science may have been typified by the picture of Einstein as a kind but eccentric professor, relentlessly pursuing the pure intellectual truth. Science no longer has such an image, nor any longer deserves such an image. It has become too involved with profit, military developments, politics. If postmodernism exposes any inadequacy in modern science it is that it is no longer seen as representing the enlightenment quest for pure knowledge for its own sake, but the more grubby aims of commercial and environmental control.

NOTES

1. This is a quote from the *Routledge Encyclopaedia of Philosophy*: '... postmodernity involves the recognition that, to a large extent, one's relative systems construct the world. In short, that the world is not One; that words like 'truth', 'nature', 'reality' and even 'human' are weasel words because they imply, falsely, that an autonomous world of meaning and values exists, and that it transcends all finite and mutually exclusive human systems and somehow guarantees them. Postmodernism denies absolute status to any truth or nature or reality. The question always remains - what truth, which nature, whose reality?' (section on Postmodernism by E.D. Ermarth)
2. This quotation is from Latour & Woolgar (1979, p237) and is referred to in Sokal (1998)
3. The Strong Programme is described in Bloor, 1976
4. Sokal, 1996.
5. Though the increasing trend toward industrial sponsorship of university science undermines this.
6. A more thorough discussion of the Big Science/Pure Science distinction can be found in Fuller, 2000.
7. Though it seems extremely unlikely that he, or any other Greek, would have wished to make such a claim since his concept of value would perhaps have been rather different to ours.

BIBLIOGRAPHY

Bloor, D. *Knowledge and Social Imagery* ,University of Chicago Press, 1976

Barnes, B. & Bloor, D. & Henry, J. *Scientific Knowledge: a Sociological Analysis*, Athlone, 1996.

Fuller, S. *Thomas Kuhn: A Philosophical History for our Times*, Chicago University Press, 2000.

Kukla, A. *Social Constructivism and the Philosophy of Science*, Routledge, 2000.

Latour, B. & Woolgar, S. *Laboratory Life the Social Construction of Scientific Facts*, Sage, 1979.

Miller, D. 'Sokal & Bricmont: Back to the Frying Pan' at www.warwick.ac.uk philosophy/miller/sokal.html

Sokal, A. 'Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity' in *Social Text*, 46-47, pp. 217-252. The full text can also be viewed on the web at http://www.physics.nyu.edu/faculty/sokal/transgress_v2/transgress v2_singlefile.html

Sokal, A. & Bricmont, J. *Intellectual Impostures*, Profile Books, 1998.