

Tales from the Berkeley Woods: Feyerabend on science in a free society

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ABSTRACT

Paul Feyerabend has, over recent years, strutted the stage of philosophy of science as the enfant terrible of epistemology. In a quarter century of publication and teaching, his principal concern has been with the problem of empiricism in philosophy of science. My aim in this paper is to show that the glitter that is 'Feyerabendiana' conceals the dross that is Feyerabend. I propose to tackle the phenomenon of Feyerabend by focusing on his recent book *Science in a Free Society*. Principally, my comments shall be directed at his social, political and educational ideas.

Paul Feyerabend - Viennese born quantum physicist and commentator on matters scientific; one-time child astronomer and teenage university lecturer; ex-German army lieutenant and current Samurai movie buff; an almost student of Wittgenstein's, an actual student of Popper's; fan of Mill and foe of Marx - has been professor of philosophy at Berkeley since 1958. Nowadays he is anxious to describe himself as an 'epistemological anarchist' or 'Dadaist'. As a self-styled radical iconoclast and staunch opponent of scientific chauvinism, Feyerabend has, over recent years, strutted the stage of philosophy of science as the enfant terrible of epistemology. In a quarter century of publication and teaching, his principal concern has been with the problem of empiricism in philosophy of science. If it were not for the flamboyance and notoriety attaching to *Against Method* (1975) and *Science in a Free Society* (1978), Feyerabend's reputation would rest on the far more soberly written, if equally trenchant, critiques of empiricism published throughout the 1960's.¹ As it stands, however, these later works have tended to eclipse and overshadow their origins in his earlier writing. Indeed his position has remained continuous within empiricism. Effectively there has been no Damascus road for Paul of Berkeley. My aim in this paper is to show that the glitter that is 'Feyerabendiana' conceals the dross that is Feyerabend.

Many problems confront evaluators and interpreters of Feyerabend. They must possess not only the imaginative agility of a chess player, but the hide of a pachyderm as well. Moreover they must be able to detect and distinguish Feyerabend's direct and indirect modes of undermining rational argument, and uncomplainingly accept contradictions, confusions, and inconsistencies. On the last point P.K. Machamer had the temerity to contrast positions developed earlier by Feyerabend with those contained in *Against Method*. In reply Feyerabend says:

Machamer often raises the ghosts of papers I wrote centuries ago (subjective time!) to combat something I wrote more recently. In this he is no doubt influenced by philosophers who, having made some tiny discovery, come back to it again and again for want of anything new to say and who turn this failing - lack of ideas - into a supreme virtue, viz: consistency. When writing a paper I

have usually forgotten what I wrote before, and application of earlier arguments is done at the applier's own risk.²

Clearly life with Dada wasn't meant to be easy. Nor should we overlook the point that he does not follow his own advice even here. For *Against Method* is replete with references, passages, even whole chapters culled from earlier works, and incommensurability itself, which first appeared in 1962, is far from "forgotten".

I propose to tackle the phenomenon of Feyerabend by focusing on his recent book *Science in a Free Society*. This, essentially, is a continuation and development of the argument begun in *Against Method*. Principally, my comments shall be directed at his social, political and educational ideas. This means the paper will not go into great detail about Feyerabend's encounters with three former opponents - Galileo, Popper and Lakatos. He claims to have fallen in love with the first, knocked out the second, "a mere propagandist", and to the third, who unfortunately died before a rematch with *Against Method* could be arranged,³ offered a posthumous apology.

Feyerabend often claims that Hans Richter's *Dada: Art and Anti-Art* (1965) is "an excellent textbook for a Dadaist science". Seen against this advice the epistemological anarchist not only has no programme, but is against all programmes though on occasions such a person will vociferously defend the status quo, or its opponents. Feyerabend continues,

To be a true Dadaist, one must also be an anti-dadaist. His aims remain stable, or change as a result of argument, or of boredom, or of a conversion experience, or because he wants to impress some people, and so on ... He may appeal to reason or to emotion. He may decide to proceed violently, or in a peaceful manner. His favourite pastime is to confuse rationalists by inventing compelling reasons for unreasonable doctrines. There is no view however 'absurd' or 'immoral', he refuses to consider or to act upon, and no method he regards as indispensable. The only thing he opposes positively and absolutely are universal standards, universal laws, universal ideas such as 'Truth', 'Justice', 'Honesty', 'Reason' and the behaviour they engender, though he does not deny that it is often good policy to act as if such laws (such standards, such ideas) existed and as if he believed in them ... Behind all this outrage lies his conviction that man will cease to be a slave and gain dignity that is more than an exercise in cautious conformism, only when he becomes capable of stepping outside the most fundamental convictions, including those convictions which allegedly make him human.⁴

This is quite an apologia for male opportunism and disingenuousness.

Further insights into both Dada as an artistic phenomenon and Feyerabend as an epistemologist can be gleaned if we examine aspects of Richter's account that Feyerabend overlooks. The poet Hugo Ball is credited with founding Dada in the Cabaret Voltaire in May 1916. To this establishment, the site of many a Dada "happening", came a wide variety of artists, writers and bohemians. Dada, Richter writes, was not an artistic (epistemological) movement, it was a storm that broke over the world of art (epistemology). A new ethic took sometimes a positive, sometimes a negative form, often appearing as art and then as the negation of art, at times deeply moral and at other times totally amoral. With a commendably piquant sense of irony Richter adds, "it is understandable that art historians ... have been unable to cope with the complexities and contradictions of Dada" The confusions have centred on exactly what Dada meant. We have seen what it means to Feyerabend. The central experience of Dada is summed up by Richter as the desire for freedom which entailed an excessive distaste and contempt for the public. "The freedom not to care a damn about anything ... brought us close to the source of all art, the voice within ourselves".⁵ There is one principal conclusion which may be drawn from this brief discussion of Dadaism in relation to Feyerabend. To the extent that Dada resonates his anti-rationalist epistemology, it can also be seen to echo reactionary individualism, incoherent interiority, absolutism, elitism and authoritarian disdain - all of which are features of Feyerabend's social and political stance. His passionate affair with freedom reveals much love but little understanding.

Science in a Free Society has the merit of sweeping away at least some of the confusion surrounding the central tenets of *Against Method*. It allows for a more perspicacious understanding of Feyerabend's work. Those who were attracted to his "marxism", or to the epistemology of "anything goes", would be well advised to look much more closely into the matter. Underneath the radical tone of his epistemology and social philosophy, Feyerabend is decidedly conservative. In particular his position is neither "against method" as such, nor does it entail an end of methodology thesis. Rather, his purpose was, and remains, the more common-place one of demonstrating the limits of all methodologies. Feyerabend's current stance is not far removed from his earlier advocacy of methodological pluralism, proliferation of theories, and tolerance in matters epistemological. It is the glittering package in which these quite familiar liberal nostrums are contained that catches the eye and causes all the controversy. I would like to concentrate on his account of reason and practice in relation to the principle "anything goes".

Central to Feyerabend's concern has been the divorce between theories of scientific activity and the actual practices of science. Attempts by philosophers of science to account for the growth of knowledge have been seriously flawed by what he sees as the limits of rationality and the desire to make "Great Science conform to Great Standards". Indeed Feyerabend has a derisively scornful attitude towards the efforts of philosophers of science, apart from himself of course. Bastard subjects such as the philosophy of science, which have not a single discovery to their credit, profit from the boom of the sciences and should be allowed to die a natural death.⁶

If others have misconstrued the relation between reason and practice, then how does Feyerabend see it? Broadly speaking he offers an idealistic version and a naturalist version (both of which run into difficulties) and settles for "naive anarchism" as his preferred account. In the idealistic version reason guides practice, and the authority of reason is independent of the authority of practices and traditions and it shapes the practices in accordance with its demands. The problem here, of course, is that acting rationally often conflicts with the world as it is, does not give the expected results, and so the canons of reason have continually to be reformulated. Alternatively, the naturalist version argues that reason receives both its content and authority from practice. Naturalism describes the way practice works and formulates its underlying principles. But if practices deteriorate then basing standards on such practices may perpetuate their shortcomings. From this Feyerabend suggests that reason and practice are not two different kinds of entities but "parts of a single dialectical process". He develops a synthesis of idealism and naturalism which he terms "naive anarchism". This position recognises the limitations of all rules and standards, and claims:

- a) that both absolute rules and context dependent rules have their limits, and infers
- b) that all rules and standards are worthless and should be given up.

Feyerabend goes on to say, "I agree with (a) but I do not agree with (b). I argue that all rules have their limits, and that there is no comprehensive "rationality". I do not argue that we should proceed without rules and standards". The contextual account of reason and practice which he seeks is not to replace absolute rules, rather it is to supplement them. Naive anarchism retains from naturalism the idea that research can change reason, and from idealism it retains the idea that reason can change research. "Combining the two elements", Feyerabend says, "we arrive at the idea of a guide who is part of the activity guided and is changed by it".

Now it is important to realize the unfrightening and non-startling nature of Feyerabend's naive anarchism. Not only are absolute rules implicitly granted a place, provided their limits are recognised, but clearly a naive anarchist methodology is simply additional to such rules. So what Feyerabend is against is not so much "methodology" per se but dogmatic non-limit-recognising methodology. What he is for is more flexible, imaginative and responsive procedures for science than those enshrined in principles of consistency, content increase, observational adequacy, and falsifiability. From this perspective a lot less is being said, and claimed, by Feyerabend than first appearances might suggest. Moreover, to the extent that epistemological fallibilism is part of the

Popperian *weltanschauung*, then Feyerabend's radical scepticism clearly belongs to the same family, despite his attempts to deny it.⁷

What, then, of the much vaunted principle "anything goes"? Leaving aside, for the moment, the amorality of his liberalism, Feyerabend's methodological suggestions and stratagems - ad hoc hypotheses; plurality of theories; counterinduction; backward movements; skipping over difficulties; forging connections with influential ideologies; and the use of political force to revive "scientifically untenable" theories - are all designed to give substance to naive anarchism. In effect they are antidotes and cures for what Feyerabend considers to be the "rationalist" sickness of science. In a reply to Joske Agassi on this point he writes:

I do not say that epistemology should become anarchic, or that philosophy of science should become anarchic. I say that both disciplines should receive anarchism as a medicine. Epistemology is sick, it must be cured, and the medicine is anarchy.⁸

Now, "Dr. Feyerabend" continues, "medicine is not something one takes all the time. One takes it for a certain period of time, and then one stops". And when the patient has been medicated and healed, "then we may return to a more enlightened and more liberal form of rationality".⁹ So those who say "anything goes" as a full-blown assault against method were seriously, if understandably, mistaken. The limited intent of Feyerabend's epistemology is transparent. Quite correctly he states that "anything goes" does not express any convictions of his. Indeed Feyerabend is far more concerned to liberalize reason through brief, unconsummated, flirtations with anarchism. What then is left of "anything goes"? Simply this:

if you cannot live without principles that hold independently of situation, shape of world, exigencies of research, temperamental peculiarities, then I can give you such a principle. It will be empty, useless, and pretty ridiculous - but it will be a 'principle'. It will be the 'principle' 'anything goes'.¹⁰

Of course this is a principle no one would want, not even Feyerabend

In general terms, the social and political ideas propounded by Feyerabend can be said to clearly signal the exit of Dada and the entry of Mill. Not that the greater ease with which we can detect the origins of his social philosophy make it either any more palatable, or in any fundamental way different from the theoretical individualism which underpins his naive anarchism. Quite a substantial part of Feyerabend's writing is devoted to the social consequences of rationalism. "For me", he writes, "democracy, the right of people to arrange their lives as they see fit comes first, 'rationality', 'truth' and all those other inventions of our intellectuals come second. This, incidentally, is the main reason why I prefer Mill to Popper".¹¹ If Feyerabend is simply a medicinal anarchist for epistemology, then his politics epitomises the dissolution of vacuous liberalism into impotence and confusion.

The locus of his social philosophy is, in familiar liberal fashion, the individual. Feyerabend writes, "it seems to me that the happiness and the full development of an individual human being is now as ever the highest possible value". And again, "I am convinced that mankind and even science will profit from everyone doing his own thing".¹² While these statements might create the impression of radical libertarianism, such an impression would be quite misleading. Far from being a super-revolutionary in politics or methodology, Feyerabend is at pains to separate anarchism, as not the most attractive political philosophy, from the pills to be swallowed by epistemology. "While the political or religious anarchist wants to remove a certain form of life p the epistemological anarchist may want to defend it, for he has no everlasting loyalty to, and no everlasting aversion against, any institution or ideology".¹³ Yet the attempted separation fails because both his epistemology and his politics emanate from the same source: the theoretical and practical primacy of the individual. As a consequence his ethical-political argument is inextricably linked to his discourse against method.

For an advanced radical sceptic Feyerabend is curiously uncritical of John Stuart Mill whose *On Liberty* is described as "magnificent", "truly humanitarian", "immortal", and containing arguments it

is not possible to improve upon.¹⁴ The possibilities Feyerabend finds in Mill are truly astonishing: “it provides room for any human desire and any human vice”. There are, he continues, no general principles apart from the principles of minimal interference with the lives of individuals, or groups of individuals who have decided to pursue a common aim. There is no attempt to make the sanctity of human life binding for all. From this he goes on to assert,

whoever wants to lead a dangerous life, whoever wants to taste human blood, will be permitted to do so within the domain of his own subsociety. But he will not be permitted to implicate others who are not willing to go his way.¹⁵

For Feyerabend “a world in which a louse can live happily is a better world, a more instructive world, a more mature world than a world in which a louse must be wiped out”. Behind the seeming anarchism of these statements lies Feyerabend - Mill’s conviction that conditional liberty is possible and desirable. Moreover “not all actions are permitted, and a strong police force prevents the various subsocieties from interfering with each other. But as regards the nature of these societies, “anything goes”, especially in the field of education”.¹⁶ It would be interesting to hear more on the role of the police in Feyerabend’s “free society” but, in typical fashion, the authoritarianism lurking behind his romantic libertarianism remains undetected. Instead he optimistically and idealistically asserts that “every man (sic) now has a chance to combine his own self-liberation with objective social change and, thereby, with the liberation of others”.¹⁷

How is this to be achieved? Is there anywhere, where it is being achieved? Feyerabend’s answer to the first question is the creation of a free society where all traditions are given equal rights, equal access to education and other positions of power. This is possible because traditions are neither good nor bad, they simply are; and they only assume desirable or undesirable qualities when compared with other traditions. A free society will emerge only where a spirit of collaboration prevails and people solve problems within a protective structure that functions like an iron railing. Such a society will be relativistic, not in the sense that any distribution of truth values over traditions is acceptable, but in the sense that each tradition has the right to protection. A free society will also be democratic and organized in such a way that science will be responsive to citizen initiatives and effectively separated from the state.

A democracy for Feyerabend “is an assembly of mature people”, and this maturity must be “learned by active participation in the decisions still to be made”.¹⁸ He warns us that many people, especially scientists and rationalists, have not yet reached the maturity necessary for life in such a democracy. This is because the “maturity” he is speaking about “is not an intellectual virtue, it is a sensitivity that can only be acquired by frequent contacts, with different points of view”. In other words, maturity involves pluralism, tolerance and eclecticism. It is not difficult to see how this connects with his stance epistemologically. Similarly, science in a free society must recognise that democratic judgment overrules expert opinion, that arguments from either methodology or results do not establish the supremacy of science, and that laymen can and must supervise science.¹⁹ The best possibility for achieving all of this lies, Feyerabend suggests, in the United States which “is very close to a cultural laboratory in the sense of Mill where different forms of life are developed and different modes of human existence tested”. Acknowledging that restrictions, excesses and brutalities can be found in the United States, he suggests these “occur in the brains of human beings; they are not found in the constitution”²⁰ (of human beings presumably, and not the United States).

Feyerabend’s political strategy for attaining the free society rests heavily on citizen initiatives of the Ralph Nader variety. Yet when confronting the behemoth of multi-national corporate science and technology, particularly in an epoch dominated by capabilities for mutually assured destruction, such initiatives are likely to be politically impotent. Further, his basic individualist assumptions are politically labile and are as compatible with right-wing libertarianism as with any left-wing position. Not only is any adequate understanding of the state absent in Feyerabend, but there is considerable confusion over its function in relation to science. Alongside the separation of

science from the state we also find arguments for its intervention on the side of previously discredited practices. Referring to the regeneration of traditional medicine in China post 1954, he suggests that such “proliferation must be enforced by political means”, although as in the case of the Lysenko affair this does not always work. Feyerabend has replied to this point by stating that, “intervention is compatible with separation if it tries to introduce it, or to protect it, or to restore it when it has been violated”.²¹ The confusion remains.

More importantly, the individualism basic to Feyerabend’s social and epistemological position reflects the Robinson Crusoe image of the hero-scientist or citizen (Galileo, Nader). This is an image familiar in vulgar economics, where the self-image of maximum isolation can be contrasted with the reality of maximum interrelation. Nor can we neglect the paternalism of elitism implicit in the notion of “maturity” in Feyerabend’s democratic free society. For this he quotes Mill directly: “it is perhaps hardly necessary to say that this doctrine (pluralism of ideas and institutions) is meant to apply only to human beings in the maturity of their faculties”, by which Feyerabend means “to fellow intellectuals and their pupils”.²² It is this version of Millian liberalism which makes him vulnerable to the criticism that *On Liberty* does not offer safeguards for individuality. Rather individuality is elevated by protecting these superior persons against mediocrity. Indeed it could be argued, contrary to Feyerabend, that Mill feared democracy and loved individuality, not so much because the latter would induce diversity, but because by breaking up existing rigidities individuality would make the world safe for reason.

Still, there may be one area where Mill is preferable to Feyerabend: namely the oppression of women and their struggle for liberation. Casting aside Mill’s *On the Subjection of Women* Feyerabend asserts, “most women fall over themselves to get access to male-defined positions. so that they may be able to repeat, and considering their verve, perhaps even amplify male idiocy”.²³ Opinions of this calibre perhaps provide much of the explanation for his sexist language and patronising attitude towards women in general. If feminists have little prospect of joining Feyerabend’s “free society”, then marxists have absolutely no chance. Nothing reveals the intellectual and political opportunism of Feyerabend’s discourse more clearly than his use of marxist texts. The academic milieu of philosophy of science, certainly as exemplified by Popper and Lakatos, has been marked by considerable political conservatism, So Feyerabend’s use of marxist references contains both shock value in that context, and useful ammunition against empiricist methodologies which tended to neglect the demands of social and scientific practice. His actual view of marxism is that it is a philosophy of lunatics, without meaning, without charm, without connection with reality. Perhaps for this reason Feyerabend lends his support to Ronald Reagan who swept the whole affair of the Berkeley uprisings away like a bad dream.²⁴ If marxists are beyond the pale there is just a chance that Nazis might make it. Commenting on Agassi’s fear that advocacy of anarchist moves could result in a recurrence of Auschwitz, Feyerabend says that many Nazis were puny and despicable men, who were nonetheless human and “created in the image of God and that alone requires us to treat them with greater circumspection”. Unfortunately no such generosity can be expected by Christ, Buddha, St. Augustine, Luther and Marx who, for Feyerabend, are not “leaders of mankind”, but “some of our greatest criminals”.²⁵ Here again Hill might be preferable to Feyerabend.

One of the recurring theories in both *Against Method* and *Science in a Free Society* is the utter inadequacy of education, particularly scientific education. Much of the social and ideological dominance enjoyed by scientific rationality has its origins, according to Feyerabend, in repressive and stultifying educational procedures. The thrust of his critique here is to suggest that reform is crucial if the current “murder of minds and cultures that is committed year in year out in universities and schools” is to be thwarted and overcome. Feyerabend is rightly disturbed at the intellectual pollution to be found in the illiterate empty verbiage of many self-styled educational experts. This professionalized incompetence can be found in teachers who use grades and fear of failure to drive out from pupils every ounce of imagination. “As far as I am concerned”, he writes, “the first and most pressing problem is to get education out of the hands of professional educators”.²⁶ The noblest human endowment - friendship, trust, companionship, making others happy - these, he says, are

misused and defiled by teachers who have only a fraction of the talent, inventiveness and charm of their pupils. The results of such education can be seen in universities where servile non-entities try to identify the source of their misery. What they find, he suggests, "is that lack of perspective is really responsibility of thought, that illiteracy is really professional competence, and that mental constipation is scholarship".²⁷

What, then, should be done? Feyerabend advocates a general education that will not be permeated by the demands of special professions, special standards, and special subjects. Such an education should prepare a citizen to choose between standards but not conform to the standards of one particular group. While children will be encouraged to gain proficiency in the more important subjects, this will be the proficiency applicable to a game which lacks serious commitment. What Feyerabend is seeking is the mature citizen who has not been instructed in a special ideology, but who possesses a certain mental toughness, or scepticism. An essential part of a general education, he concludes, is acquaintance with the most outstanding propagandists, so that resistance can be built up against all propaganda including argument.²⁸

Two points can be made about this critique of education. Firstly, Feyerabend's excoriation of teachers who stifle individuality, creativity and so on echoes other paeans to romanticist education. Here, as elsewhere, the descriptive account functions to arouse a certain sympathy which, however, is merely transient since the analytical rationale is shallow and the practical ramifications of his proposals remain hollow and vague. Secondly, like many other romantics, Feyerabend treats education idealistically and abstractly. Nor for him the more difficult, but more valuable, task of scrutinizing the production and reproduction of scientific knowledge and practices via education, and their role in legitimating existing power relations in advanced corporate technocracies. Moreover, there is an evident tension between the abstract homogeneity of his categories (rationalists, scientists, marxists) which often makes him sound like a classic ideologue, and the equally abstract heterogeneity of his aspirations (free society, general education, mature citizens). Nowhere is this tension resolved, and Feyerabend's social philosophy remains incoherently utopian.

In *Against Method* and *Science in a Free Society* Feyerabend has endeavoured to convince us that *apres moi le deluge*; or perhaps *extra Feyerabendam nulla salus*. Neither aspiration is capable of fulfilment. Instead we have the rather mundane argument that if the limits of all methodologies are recognized then the hubris of science would suitably diminish. Further his critical discourse against empiricist orthodoxy remains negative and dependent on its object. The theoretical and practical primacy of the individual abides as a central tenet of his epistemology and social philosophy. Under closer scrutiny his "dadaist" methodology emerges as, solely medicinal. Likewise his arguments for a free society lack coherence, clarity and practicability. More fundamentally, Feyerabend's flirtation with unreason is politically counterproductive to the ends he seeks - namely the dethronement of science. This is because he fails to recognise that the rationality he castigates (like the individualism he seeks) is a product of a particular social formation and serves the particular social and political ends of a specific class. In effect his invitation to greater romanticism carries with it the danger of hostility to rationality in general. Unable to escape from his individualist problematic Feyerabend's politics vacillate impotently between easily co-opted citizen initiatives and total separatism. Neither is likely to pose a threat to capitalist social relations and the science which serves them.

Feyerabend is fond of telling us that we should be sceptical about the fairy tales produced by scientists. This paper suggests a similar view be taken of the tales from the Berkeley woods.

References

1. See, for example: P. K. Feyerabend (1962) "Explanation, Reduction and Empiricism" in Il. Feigl and G. Maxwell (eds.) *Minnesota Studies in the Philosophy of Science* Vol. III; (1965) "Problems in Empiricism" in R. G. Colodny (ed.) *Beyond the Edge of Certainty*, New York: Prentice Hall; (1968) "How to be a Good Empiricist" in F. Nidditch (ed.) *The Philosophy of Science*, Oxford: University Press; (1969) "Problems

in Empiricism: Part II" in R.G. Colodny (ed.) *The Nature and Function of Scientific Theories*, New Jersey: Prentice-Hall; (1970) "Classical Empiricism" in R. E. Butts (ed.) *The Methodological Heritage of Newton*, Oxford: Basil Blackwell.

2. P.K. Feyerabend (1975) *Against Method*, London: New Left Books, p.114. Hereafter AM followed by page reference.
3. P.K. Feyerabend (1978) *Science in a Free Society*, London: New Left Books. p. 114. Hereafter SFS followed by page reference. See also P. K. Feyerabend, (1975) "Imre Lakatos" in *British Journal for the Philosophy of Science*, Vol, 26.
4. P. K. Feyerabend (1975) "Science: Its Myth and Role in Society" in *Inquiry* Vol. 18, No, 2, p, 178, cf. AM, pp. 189-192.
5. Il. Richter (1965) *Dada: Art and Anti Art*, New York: H. N. Abrams, pp. 9 and 50.
6. SFS, pp. 15, 122.
7. SFS, pp. 24-25, 32-33 (original emphasis), 179.
8. *Ibid.*, p.127 (original emphasis).
9. *Ibid.*
10. *Ibid.* p. 188.
11. *Ibid.*, p. 145. The other reason is that there is no Harriet Taylor in Popper's life. See AM, p.48.
12. P. K. Feyerabend, "Consolations for the Specialist" in A. Musgrave and I. Lakatos (eds.) (1970) *Criticism and the Growth of Knowledge*, Cambridge University Press, p. 210 and AM, p. 215.
13. AM, p.189.
14. AM, pp. 53, 48, and SFS, p. 86.
15. SFS, p. 132.
16. *Ibid.*, pp. 153-4.
17. *Ibid.*, p. 178.
18. *Ibid.*, pp. 27-30, 82-85, 87.
19. *Ibid.*, pp. 86-105.
20. *Ibid.*, p. 133 (original emphasis).
21. AM, pp. 50-51; SFS, p. 181.
22. SFS, p.29.
23. *Ibid.*, p. 177.
24. *Ibid.*, p. 181.
25. *Ibid.*, p. 128, 139.
26. *Ibid.*, p. 119; AM, p. 217.
27. *Ibid.*, pp. 174-175.
28. AM, pp. 218, 308.