

# THE GOAL OF SELF-MANAGED SCIENCE

**Implications for action**

**Brian Martin**

By self-managed science I mean science done by a large fraction of the populace, in a way democratically and equitably decided upon by all the populace.

What does the goal of self-managed science imply for action today? Can radical scientists promote self-managed science directly through actions in the scientific community? How should radical scientists, with their specialised expertise, link their efforts with groups in other sectors of employment? Is self-managed science an immediate goal, or will science be one of the last features of society to be democratised? The path between present society and science and anything approaching the ideal of self-management is long and difficult theoretically, not to mention in practice. In the following I will present some of my own ideas on this. They are not meant to suggest a fixed line or strategy, but to provide an alternative perspective, a complementary viewpoint, to some previous *RSJ* articles (especially Bob Young's; see Bibliography).

I will not be especially concerned here to describe or justify self-managed science as a goal. This is done to some extent in my book *The Bias of Science*. In any case the implications for action coming out of the goal of self-managed science reflect back on the validity of the goal itself.

## **Relevant Personal Background**

A person's ideas are likely to reflect personal experiences, and even more likely to reflect an unconscious justification of one's past and present actions and lifestyle. Therefore we have every right to be sceptical of

conventional justifications of science and society **written** by those who have a heavy stake (material and/or psychological) in society and in their ideas about it. But by the same token, those of us critical of current arrangements should go to extra trouble to spell out our own life situation, so that others can avoid being misled by inadequately justified generalisations. This is the reason why I include here a fairly lengthy description of the Australian context and my own personal experiences.

I have been doing scientific research (mainly in theoretical physics and applied maths) since beginning a Ph.D. in 1971. I have known perhaps 200 or so scientists, mostly university-based (although naturally only a small fraction of these have I known quite well). Virtually none have developed a critical consciousness of the political role of their own research (or even of research in general). However, quite a number of these scientists have progressive political views, and a few are engaged in radical activities such as in education. Essentially, there is no radical scientists' movement in Australia. David Biggins has analysed the development of the 'social responsibility in science' movements in the UK, US and Australia, and noted that only in Australia has there been no evolution to a more radical position. Mike Hales has asked why this is so. The best I can do is offer a few suggestions about possible influences.

In Australia about 20% of 'gross expenditure on R&D' is classified under 'advancement of knowledge', compared with about 10% under 'defence' (with the remainder going to 'economic development', 60%, and 'community welfare', 10%) (Project Score report 1976-77). Only a negligible amount of the defence R&D takes place outside defence organisations. So at least compared with the US, Australia has a weak and isolated indigenous military-industrial complex, which may help reduce awareness of the way science is conditioned to serve particular political and economic interests. Geographical dispersal may play some role. Often the formation of an organisation depends initially on a few vital individuals. It may be noted also that Australia has had a contact for *Science for the People* for quite a number of years, whereas there was in recent years prior to 1979 no contact in Texas, which has nearly the same population as Australia. Perhaps the question should be why some centres *have* developed strong organisations. Also playing a role may be general parochialism and anti-intellectualism in Australia (not that different from Texas!). This in addition to Australia's role in the world economy and in scientific research leads to some degree of brain drain, including loss of radical scientists to more sympathetic environments.

Although I have not been involved with an active radical scientists' group, for some years I have been associated with the environmental movement. Many in this movement in Australia are very progressive politically. In particular, in Friends of the Earth there is strong support

(probably a majority of the most active members) for self-management, nonviolent action and organising from the grass-roots to change structures in society.

It is also difficult to explain why the environmental movement in Australia has been so politicised. Perhaps contributing to this has been the presence of socially conscious parts of the union movement (most visible in the Green Bans) and the Australian Labor Party. In any case, much of what might be called the 'activist nonbureaucratic left' is concentrated in the environmental and feminist movements.

In summary, in comparison with the situation in Britain as I understand it, the scientists in Australia are less politicised (in their workplace) and the environmentalists much more politicised.

I have been urged by Mike Hales to describe my own history of accommodation/alienation in the scientific establishment. I offer it here without any pretence of providing deep insights.

When I came to Australia from the US in 1969, my ideas about both society and science were due more to absorption from outside influences than to careful thinking. During the years spent on my Ph.D. at Sydney University, I read a lot about politics and the critique of society, such as the works of Marcuse. (In developing my ideas, I think it was a great help to be away from prior friends and relatives: the stake of my self-image in maintaining previously expressed beliefs was greatly reduced.) It was only as my political ideas developed that I gradually began to apply them to my own situation. Also, reading Kuhn and Ravetz and watching myself do research (and learning to do research) was very revealing. In 1973 I started trying out innovative teaching methods in science using the approach of Herman T. Epstein, and this led to an awareness that professionalism in science is subject to the same sort of critique as Illich has applied to education and medicine. As a result of my research involving mathematical modelling of dispersion of exhaust from SSTs, I started on my writing about science which led, after a long period of development, to *The Bias of Science*.

In 1976 I came to Canberra with a job at the Australian National University. Several friends in Sydney had suggested people in Canberra to look up, and as a result I made quick contact with both the Society for Social Responsibility in Science and Friends of the Earth. I felt much more at home with the latter group both in terms of politics and of orientation towards grass-roots organising. (If there had been a radical science group in Canberra I almost certainly would have become active in it.) It is mainly since being actively involved in the environmental movement that I have started to obtain some grasp of practical politics.

Although I am still doing research, I don't *feel* like a real researcher, since my spare time involvement in the environmental movement looms more vital. The relation of the Australian situation and my personal situation to the comments that follow should be directly obvious. Once again I wish to emphasise that my comments are mainly to help provide a more balanced perspective.

### **Self-managed Science: First or Last?**

My feeling is that academic-style science is likely to be one of the *last* places to change in any transition to self-management in society. There are several reasons for this. First, academic science is not fundamental to the production process except perhaps in the long term. Changes in the social relations of scientific research will not greatly upset the rest of the economic and political system, and hence are more likely to reflect than influence the predominant structures in society. Second, scientific workers are relatively well off materially and in terms of job satisfaction, are intensely specialised by discipline and research topic, and are fragmented between competing universities, government organisations and corporations. The organisation of scientific workers is likely to be much more difficult than organisation of many other groups in the community and in the workplace. Third, the methods of scientific practice and the tools for understanding that constitute scientific knowledge are basically a *reflection* of prevailing social, political, and economic structures in society. The relation of these methods and tools to the direct circumstances of most people in their day-to-day lives is indirect if not irrelevant. With these methods and tools, scientists are in a poor position to transform their own enterprise using a vision of a different sort of society.

The account by *Science for the People* tells how in China scientific research was the last bastion of hierarchical organisation during the Cultural Revolution (this refers to hierarchy at the community and work level, and not of course at the level of state policy).

It may be that scientists are like some other professional groups – middle managers in business, doctors, school teachers: an unlikely place for the creation of a movement for fundamental institutional change. Of course important movements can arise amongst such groups, but the real challenge to the status quo may come from those who advocate alternative institutional arrangements – as in the case of education, medicine or community planning.

The very idea of self-managed science suggests that this eventuality will

not be brought about solely by scientists, but will require a movement from the people. How difficult will it be for highly socialised scientists to perceive the basic needs and demands that must form the basis for a struggle for self-managed science?

This suggests to me that it may be more valuable for many scientists to become involved in 'outside' struggles – education, health, workers' control, environment, community participation – than to try to radicalise scientists *per se*. In entering these other struggles, scientists of course should not forget about science and its role in society. In fighting for self-management in these 'outside' areas, the object should be to bring in an appreciation of the limitations of current science and ideally to build the foundations of self-managed science *outside* the present scientific establishment. For example, in as much as the movement for free schools can form the basis for a transitional demand, scientists can help by trying to develop and introduce alternative ways of learning science that impart technical competence along with a practical awareness of the political role of science in society: a scientific education that is selectively useful for challenging business as usual. In workers' struggles, the understanding and self-managed control of technology could form the basis for scientists' involvement bringing in the idea of self-managed science.

Another reason for getting involved in struggles outside the scientific community is that it is easier (in my opinion) for activists to be radicalised than for 'radicals' to be radicalised. In my experience there are quite a number of intellectuals, especially in the university, whose political ideas are very advanced but who do little to promote them (except perhaps by publishing academic articles). It is often very difficult to get such individuals involved in day-to-day struggles. On the other hand there are numerous people who are active in various movements (such as environmentalists or feminists) who can easily become radicalised, either through the political awareness that comes from the struggle (and its disillusionments) or through awareness of the political nature of apparently 'neutral' changes in society.

Perhaps the most valuable thing that can be done while remaining within the scientific community is to help others (both students and researchers) escape from an outmoded institution. At least such is the conclusion of John Holt as regards the actions of radical teachers. But even with such a pessimistic conclusion, there is quite a lot that can be done.

### **Possible Actions for Radical Scientists**

I describe here some possible worthwhile activities for radical scientists still doing science, activities which have some connection with the goal of

self-managed science. On request I have included some personal and local illustrations of the basic points.

*(a) Communicating radical views on science*

Most scientists communicate about research principally through direct contact, specialist seminars and technical papers. Attempting to incorporate radical views in technical papers seems hardly worth the effort, because of editorial restrictions and the very limited reading audience of most scientific papers (estimated at 1 to 5 people). Specialist seminars offer only a bit more of an opportunity. In my opinion these are among the least effective channels for promoting serious thinking about the role of science in society. Direct contact with colleagues offers the chance to fully discuss issues, suggest reading (such as *RSJ!*) and invite support, for example when collecting signatures for a petition. However, there is a certain limit to the effectiveness of such efforts. In my experience there are many scientists who would not be brought to question fundamental beliefs about science or society in years of discussion. This is because the life situation of the scientist, including economic vested interests in a scientific career and a psychological commitment to a certain way of understanding the world and also sustaining self-esteem, is the most fundamental factor in forming attitudes. In any case, if the goal is to move towards self-managed science, then a wider public as an audience is just as important as are other specialist scientists.

There are many opportunities to demystify science when writing to a wider audience. My friend Mark Diesendorf, in an article on low level ionising radiation in the relatively generalist scientific journal *Search*, incorporated a section on ways in which some scientific authorities have tried to minimise the hazards of this radiation, for example by averaging doses over populations. It is surprising how seldom this sort of scientific mystification is exposed. In a later article Mark argued that the public cannot trust scientific experts to 'sound the alarms' about public dangers arising in their specialities, for example documenting conflicts of interest in the roles of Australian advocates of nuclear power and nuclear bombs. As well as presenting the material at a symposium and having it appear in a book, Mark was able to get a version published in the *Canberra Times*. Canberra has a population of about 200,000, the *Times* a readership of perhaps 100,000, so maybe 5,000 to 10,000 people read Mark's article. This impact compares favourably with the effect of incorporating a few radical comments in a specialist scientific paper!

Another fruitful approach is to collaborate with non-scientists on topics of widespread community concern (environment, war, racism), and feed in a radical perspective on science. For example, Friends of the Earth in Canberra has produced a number of leaflets on aspects of the nuclear

power debate. In most cases there has been valuable interaction between scientists and non-scientists. First there is the question of what information to include: how much about the nuclear fuel cycle is worth including? Then there is the question of expressing the information so that it is accurate and yet generally understandable: how is the half-life of plutonium explained? These leaflets are distributed at street stalls, rallies and speaking engagements such as at schools, and therefore provide a great opportunity for influencing activists and thoughtful citizens.

A similar situation applies to speaking. Any scientist who can give a seminar should be able to prepare a talk presenting a radical alternative on science or on the role of science in some social issue. Depending on the topic, there should be plenty of opportunities at schools, churches, unions or Rotary Clubs. One great advantage of doing some speaking is that one quickly finds out what people are really concerned about and really want to know about. There are lots of school science classes which would welcome the presentation of a radical view on science, yet how often is this done?

It is important to diversify and spread skills such as speaking and writing to as many people as possible. In Friends of the Earth's speaking programme this is achieved by an apprentice system. At all suitable speaking engagements both an 'apprentice speaker' and a more well-informed and experienced person go along; the latter acts as a backup and joins in as little as necessary. This helps to reduce dependence on 'resident experts'.

Because I've done no science lecturing for quite a few years, I don't have as much experience in trying to communicate a radical view on science in this area. There is obviously a great potential for introducing radical views on science into lectures, lecture notes and eventually texts. But the traditional teacher-student relationship is probably a difficult one within which to move towards self-managed science, at least as long as students are in need of credentials and teachers are obliged to give assessments.

(b) *Writing exposés of scientific practice, science policy, scientists' behaviour and so forth*

Too often disillusioned scientists totally depart from the scientific scene, without enabling others to benefit from the understanding that led to this disillusionment. If every disenchanted scientist wrote about the reasons for disenchantment, the impact would be impressive. Too often people feel restrained by loyalties in which they no longer believe.

James Watson's *The Double Helix*, which presented the competitive and somewhat ruthless side of research to a general audience, created a

disproportionate impact only because previously the public had been fed a sterilised image of scientific practice. This should indicate the potential of even relatively apolitical telling-it-like-it-is accounts of science. (See also Erwin Chargaff's *Heracleitean Fire*.) And of course there are many aspects of science, ranging from the thwarting of careers to economic influences on 'pure' research, which are much more revealing than Watson's surface account. Some of these aspects are getting attention through controversies such as the SST and pesticides, as told by Boffey or Primack and von Hippel for example. However, these accounts are not by the scientists themselves. One of the great advantages of an exposé of science by a scientist is that it cannot as easily be dismissed as uninformed.

In my own case, I wrote a critique for the Centre for Resource and Environmental Studies (CRES) where I worked for a year. There was no formal reply from leaders of CRES to any of my statements or arguments, apparently part of a policy designed to dampen debate rather than meet criticism head on. However, I understand that my article has had considerable circulation in environmental studies programmes and government departments. Two other Australian articles of this general type are Peter Springell's account of his running battle with CSIRO leaders over the doing of and publishing of environmental research and Clyde Manwell's account of bias in grant giving. Such efforts I feel help in a small way to increase awareness about the political nature of scientific institutions.

*(c) Working on socially relevant topics*

In self-managed science, scientific studies and problems would grow out of the need and interests of the populace, rather than being shaped directly or indirectly by the demands of government and industry as at present. *China: Science Walks on Two Legs* by Science for the People is the best account of how this might occur in practice.

A small beginning for anyone with the necessary research freedom is working on socially relevant topics, ranging from wind power calculations to studies of the vitamin content of foods produced under factory farming conditions.

Of course the evaluation of what is socially relevant depends a great deal on who is doing the evaluating — a great many scientists like to think their research is socially relevant. What a scientist could do is consult with radical activists in deciding upon and planning research projects and in communicating the results. (Such consultation would be embarrassing to many scientists, since most research is useless to activists.) In Australia it appears that out of all the environmental research groups in universities, not a single one is committed to helping strengthen or even analyse the arguments of environmentalists. This is not to mention the even greater



step of consulting powerless outsiders about what research is worth doing.

*(d) Democratising the workplace*

In self-managed science, the social relations of the 'scientific community' (which would embrace nearly all the populace) would be non-hierarchical. Decisions about research would not rest with particular persons on the basis of any formal rank – though those in a research collective no doubt would trust the judgement of some persons over that of others.

There are a few things one can do to move in this direction. Anyone who has formal power over others, for example over a secretary, can attempt to despecialise roles and involve all in decision-making. An important step in this is spreading the hack work around, and doing one's own share. Actually, this is about the most subversive thing one can do in terms of attacking hierarchies, and it is likely to be resisted by those below as well as those above. It is probably not good to force others to despecialise, but one can at least apply it to one's own work.

In my own research I do my own typing and programming (although I have not noticed any effect this example has had on others). There are obvious limits to such individual approaches such as lack of access to typesetting facilities. Bureaucratic constraints are likely to hinder efforts to broaden the base for decision-making about the doing of research, as in the case of trying to hire a cleaner partly on the basis of research interests or getting research staff to do cleaning. But for those in a position of sufficient strength and security I see no reason not to try.

*(e) Involving the community in scientific work*

In self-managed science, scientific work would be deprofessionalised and despecialised to a considerable extent. For example, the long term of course work presently required before beginning research would be eliminated almost entirely. A large fraction of the populace would participate in scientific research and in decision-making about research either part-time, or perhaps full-time for part of a life-time. However, this would not be due to any compulsion, but would be a natural feature of living in a self-managed society. Two possible steps in this direction are apprentice researchers and community research groups.

During one summer I invited two students, one having just finished high school and the other one year of university, to work with me on research projects. Such apprentice research has several values. Firstly, it demonstrates that doing scientific research does not necessarily require lots of training and background knowledge. This point has been shown dramatically by Gary L. Huber's programme for training high school

students in medical research in a matter of months. Secondly, apprentice researchers need not be tied to academic requirements or conventional research projects, but can (hopefully) try to tackle fundamental problems of social significance.

Taking on apprentice researchers is perhaps only a second choice to working with a community research group. The best example of this I have come across is that described by Jun Ui. In Japan a number of citizen research groups, helped by professional scientists, have made investigations into environmental problems. The research done by these groups has been different from conventional scientific research in a number of ways: it is interdisciplinary and problem-oriented rather than being specialist trivia; it does not rely on highly specialised or expensive equipment or techniques; and it has been more successful than teams of professional government or university scientists in actually obtaining socially useful knowledge, such as the cause of Minamata disease. In many ways Ui's account is more useful to Western activists than is Science for the People's account of science in China because it describes practical strategies rather than an ideal end state.

*(f) Developing alternative theories*

Actually, I am quite sceptical of the prospects for creating from within scientific institutions a counter-hegemonic worldview which prefigures the social relations of a socialist society. First, ideas tend to be more a reflection than a cause of social change, and it is difficult indeed to avoid reproducing the ideas of the current culture. Second, ideas are selectively developed and promoted in the intellectual marketplace, and radical ones are not likely to get the sympathetic attention and commitment necessary to give them any significant impact. As it is, simple non-threatening ideas (for example, limits to growth) get great attention whereas long established but subversive ideas (such as self-management in the workplace as an aid for 'efficiency') are distorted or ignored. This does not mean it's not worth trying to develop alternative theories; but it certainly may be more fruitful developing them out of actual struggles than while sitting at one's research desk.

Mike Hales noted to me that 'the sphere of thought may be one of the few where there is much real leeway, to begin with, in a struggle; so ideas – and thus intellectuals' role in class struggle – shouldn't be underplayed'. I agree in principle, but perhaps an example will help to explain my pessimism. In my analysis of game theory, I found that this mathematical framework and its associated concepts selectively lends itself to perspectives and applications which leave unquestioned the assumptions underlying existing structures in society. In making this analysis I thought considerably about the possibility of a mathematical alternative to game theory. One limitation might be one's mathematical ability – the primary

originator of game theory, John von Neumann, is considered one of the greatest mathematicians of the twentieth century. More fundamentally, a true alternative to game theory might for example incorporate as its central features collective and cooperative decision-making, with a mechanism for considering possibilities which transcend the existing categories (such as altered principles for community planning instead of choosing between freeway A and freeway B). But such an alternative might not be mathematical at all, and indeed it is difficult to imagine a mathematical theory of social interaction which does not in some way reify the social actors. Ideally, I think an alternative theory should be something that serves as a useful tool in the hands of proponents of self-management, practically or ideologically or both. But I would be more hopeful in searching for such alternatives if a few prototypes were available.

What a scientist can do in terms of these and other actions depends largely on where one is in the scientific hierarchy when one decides to do them — when one becomes radicalised (or more precisely, where one can get to given one's current momentum of orthodox accomplishments). Once one grasps a truly radical perspective on science, it is unlikely that one will keep rising in the normal manner (though there are exceptions). This is partly due to the inevitable opposition that will greet any unacceptable ideas and actions. More importantly, grasping the political dimensions of scientific research, especially of one's own research, severely undermines the necessary commitment to do that research with high motivation. (However, I think radical scientists sometimes take this to extremes. Radical workers don't give up their jobs just because they realise their labour is supporting General Motors.) Climbing the career ladder as a strategy for changing science is not likely to be successful — especially when the goal is a self-managed science in which career ladders won't exist.

I have suggested that dropping out immediately after disillusionment does not realise the full potential of one's experiences. On the other hand, staying in science is dangerous in that one may begin to justify a role because it services one's personal interests. Ideally, one would like to maintain a permanent dissonance between what one does, what one plans to be doing given the opportunity, and what one would like to be doing (in a self-managed society).

### **Avoid Reproducing the Academic Approach**

There are some things that academic scientists turned radicals need especially to avoid reproducing in their new role. These (and no doubt others more fundamental) are part of the hidden curriculum of scientific

socialisation, and tend to remain even after one has exposed the political content of scientific research and entered practical struggles.

(1) *Publishing*. Scientists are socialised to see publication as an expression of achievement in research, and it is all too possible that publication of radical ideas may take its place. If one is hooked on publishing (or reading, studying, talking, or organising), the least one can do is try to involve as many people as possible in the skills and activities of the process.

(2) *Academic language*. It is both difficult and important to communicate in a style that is neither esoteric nor condescending. I noted earlier the valuable interaction between scientists and non-scientists in developing leaflets for Friends of the Earth. One of the continual contentious issues in this work has been different people's feelings about the appropriate style for such leaflets. Some feel that arguments should be pitched at a very simple level, with simple words, short text and lots of graphics. Others think our reading audience is more sophisticated and would appreciate plenty of information. But all feel that most academic writing is far too filled with unnecessary complexities and jargon.

An important feature of this debate over appropriate writing styles and vocabulary is that there is very little useful information on the issue and hence each person seems to argue only from a limited base of personal experience and intuition. What are the most appropriate media, styles and approaches for communicating ideas about self-management and incentives for struggle? What sorts of communication and interaction really affect people and make them think and act on their own? The obvious avenue for studying such questions is as part of an activist campaign.

(3) *Originality*. Most academics are hesitant to say something if it is not at least partly original. Yet on most issues the greatest need is not for new ideas but for communication and organisation. In any case, most of the valuable ideas in a mass campaign will result from group contributions. There is no reason not to receive credit for work done, but also no reason to not do and say what has been said and done many times before.

(4) *Documentation*. Academics are trained to document their work extensively. In actual campaigns this is useful to some small extent, but should not pose as a substitute for plainly stating one's values (after all, we know that particular 'facts' are used because of the values which they embody). The danger of overdocumentation is mainly that too much time may be spent reading and chasing up references that only provide further backing for what one is saying, and do not encourage others to read and think and act for themselves.

In the nuclear power debate there are quite a number of sympathetic academics, often with highly relevant knowledge. Yet many of these academics will decline even to write a letter to the editor without

extensive study and checking of references. I am not advocating laxness about accuracy, but awareness of the considerable differences between scientific research and public campaigns.

(5) *Academic arguments.* In the nuclear power debate, I have been impressed by the considerable number of arguments brought forward, especially by academics, which bear little relation to the political, economic and social issues underlying the debate and the struggle. (For example, 'there is/is not commercial reprocessing of uranium oxide fuel in the world today'.) It is tempting but distracting to get caught up with such arguments and ignore the issues and arguments that concern the populace at large. (For example, 'nuclear power does/does not increase unemployment'.) In the intellectual marketplace proponents of self-management are outnumbered, but their impact can be disproportionate if they address the issues that count.

(6) *Being an expert.* Scientists working with non-specialist groups may be cast or cast themselves into the role of detached experts. There are two complementary approaches to overcome this. One is to encourage others to become knowledgeable, and explicitly to develop confidence in their own abilities as through the apprentice speaking programme. The other is to enter fully into the activities of the group, including the doing of routine tasks. This greatly helps to dampen delusions of the importance of expertise.

Finally, I offer a plea for serious, systematic, self-reflective study integrated with practical experience in one particular area: the success or lack of success of different methods for achieving self-management. Such a study can be historical, institutional, psychological, economic, political, and even ethical (though perhaps not physical, chemical, or biological!). Is nonviolence a necessity? What is the role of reforms and reform movements? How important is egalitarianism in radical movements? There is no great danger that knowledge along these lines will be coopted or used against the movement, for the knowledge will be selectively useful for those struggling for a self-managed society.

**Note:** Mark Diesendorf, Mike Hales, Les Levidow and Hugh Saddler provided useful comments in developing this article. D J Baines provided the information from Project Score.

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**"We want you to do some pure disinterested fundamental research into something immensely profitable."**

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