Science for nonviolent struggle

Application to the Australian Research Council for support in 1992

Chief investigator: Brian Martin

15. Summary of project

Organised nonviolent struggle, as an alternative to military methods, can be greatly aided by appropriate scientific research and technological development. The project involves surveying research and development relevant to a number of areas — such as industry, food production and communications — to determine what has been done and what might be done to support nonviolent struggle. The findings will be used to determine whether science and technology used for the purposes of war and repression can be converted to serve the purposes of nonviolent struggle.

Aims and significance

The aim of this project is to determine what scientific findings and technological products are useful for the purposes of nonviolent struggle. Simultaneously, an assessment will be made of the degree to which science and technology which have been shaped by military priorities can be used to support nonviolent struggle. This in turn will allow the development of a framework for science policy for nonviolent struggle.

The project has a two-fold significance, theoretical and practical.

Theoretical significance There is a long tradition of investigations into social influences on the development of science. The normal approach is to examine closely the social history of particular scientific theories and technological artefacts to determine the degree to which they have been influenced or 'shaped' by economics, class structure, ideologies, etc.[1] The limitation of this approach is that there is seldom any assessment of the sort of science and technology that might otherwise have been developed.

This project approaches this issue by looking at the usefulness of science and technology, which have been shaped by military imperatives, for an alternative purpose, namely nonviolent struggle. This approach is ambitious theoretically, since most analysts have simply examined science and technology within existing social structures, and have not postulated a radically different goal as the basis for examining social influences.

Practical significance As described below, there is a small but thriving field of study in nonviolent resistance to aggression. However, very little has been done in this field to study the relevance of science and technology for nonviolent resistance. The project will be a pioneering effort within the tradition of research into nonviolent action. Its results will undoubtedly attract great interest around the world among those involved in studying and using nonviolent methods as well as among sympathetic scientists and engineers and their educators.

Background

Because the topic of this project will be unfamiliar to many, it is appropriate to provide a lengthier than usual description of the context of the research.

It is often noted that between one quarter and one half of scientists and engineers worldwide are engaged in military-related research and development. Critics argue that

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[1]. Barry Barnes, *Scientific Knowledge and Sociological Theory* (London: Routledge and Kegan Paul, 1974); Donald MacKenzie and Judy Wajcman (eds), *The Social Shaping of Technology* (Milton Keynes: Open University Press, 1985); Michael Mulkay, *Science and the Sociology of Knowledge* (London: Allen and Unwin, 1979);

these scientists should be working instead on nonmilitary projects in food production, health, transportation, education and a host of other topics. Yet it is uncommon for scientists who oppose military research to be able, through their scientific investigations, to promote some alternative means for promoting security.

One of the reasons why it is difficult to replace 'science for war' with 'science for peace' is that most strategies for peace rely on strictly diplomatic or political measures which pay no special concern to science. There is, though, one alternative to war that has a significant potential role for natural scientists as researchers: social defence[2]. This can be defined as nonviolent community resistance to aggression as an alternative to military defence. Social defence is also known as nonviolent defence, civilian defence and civilian-based defence.

There are numerous methods for nonviolent struggle, including petitions, marches, rallies, strikes, boycotts, sit-ins and alternative institutions[3]. These methods can be used to directly oppose a military invasion or coup, by directly hindering the aggressor. But perhaps more important is the role of nonviolent action in undermining support for the aggressor, whether that support is in the country under threat, in the home country of the aggressor, or among the troops themselves.

To obtain some feeling for what a nonviolent resistance would be like, it is useful to turn to historical examples. In 1923, French and Belgian troops occupied the Ruhr. Military resistance was out of the question; the German government called for nonviolent resistance. Support from the German people was widespread, and the occupiers were faced by noncooperation from coal miners, civil servants, shopkeepers and many others. In spite of brutal repression, this resistance was maintained until called off by the German government, whose economy was in collapse. Public opinion in France and Belgium was outraged by the atrocities carried out by their troops. The occupiers withdrew in 1925[4].

In August 1968, Soviet and other eastern bloc troops carried out a massive invasion of Czechoslovakia, hoping to quickly set up a puppet government and smash 'socialism with a human face'. There was no resistance from the Czechoslovak military, nor from Western countries. However, there was an amazingly effective spontaneous nonviolent resistance, from the political leadership down. People talked to the invading soldiers (who had been told they were there to stop a capitalist takeover) and undermined their loyalty so quickly that many had to be rotated out of the country in a matter of days. The radio network continued to broadcast messages of resistance, and jamming equipment being brought in by rail never reached its destination due to calculated action by rail workers. It took fully eight months before a puppet government could be installed[5].

Nonviolent resistance can also be a potent tool against military coups, a problem for which the military is obviously the cause rather than the solution. In 1961, there was a coup in Algeria led by generals who were opposed to moves by de Gaulle to grant independence from France. Noncooperation by members of the armed forces in Algeria was crucial in thwarting the coup. About half the bomber force left the country as pilots simply flew out and didn't return. Some soldiers noncooperated by just staying in their barracks. Others reported for duty but caused inefficiency by failing to pass on communications, losing files and so forth. The coup collapsed after four days without a shot having been fired against it[6].

These historical examples, a sample of many available, cannot prove the effectiveness of social defence. They are, though, indications of possible methods of struggle using nonviolent action. Most importantly, in each of these cases the resistance was

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[2]. Boserup, A. & Mack, A. *War Without Weapons: Non-violence in National Defence* (Frances Pinter, London, 1974); Geeraerts, G. (ed.), *Possibilities of Civilian Defence in Western Europe* (Swets and Zeitlinger, Amsterdam, 1977); Keyes, G., 'Strategic non-violent defense: the construct of an option', *Journal of Strategic Studies*, vol 4, pp. 125-151 (1981); King-Hall, S. *Defence in the Nuclear Age* (Victor Gollancz, London, 1958); Niezing, J. *Sociale Verdediging als Logisch Alternatief* (Van Gorcum, Assen, Netherlands, 1987); Sharp, G. *Making Europe Unconquerable: The Potential of Civilian-based Deterrence and Defense* (Ballinger, Cambridge, Mass., 1985); Sharp, G., *Civilian-Based Defense: A Post-Military Weapons System* (Princeton: Princeton University Press, 1990).

[3]. Sharp, G. *The Politics of Nonviolent Action* (Porter Sargent, Boston, 1973).

[4]. Sternstein, W. in *The Strategy of Civilian Defence: Non-violent Resistance to Aggresssion* (ed. Roberts, A.) 106-135 (Faber and Faber, London, 1967).

[5]. Windsor, P. & Roberts, A. *Czechoslovakia 1968: Reform, Repression and Resistance* (Chatto & Windus, London, 1969).

[6]. Roberts, A., 'Civil resistance to military coups', *Journal of Peace Research*, vol. 12, pp. 19-36 (1975).

spontaneous: there was no advance planning for nonviolent struggle. To judge social defence by spontaneous use of nonviolent action would be like judging military defence by uses of violence in which there was no military production, no military training and no advance planning.

It is at this point that research and development for nonviolent resistance become important. In any systematically planned programme of social defence, science and technology have an important role to play[7]. It is useful to consider a number of different areas[8].

Industry Often one of the main aims of an aggressor is to take control of industry. Therefore it is important for workers to be able to shut down production. But what if the aggressors torture the workers or their families to force them to keep production going? One solution is to design manufacturing systems to include vital components which, if destroyed, cannot easily be replaced. Spares could be kept in a safe place, such as another country. Torture would not help to replace the components, and would become pointless.

In some industries, a better strategy might be to decentralise production so that it would be difficult for an aggressor to 'take control' easily. It might be desirable for small-scale operations to be easily disabled but also to be easily reenabled.

On the other hand, in some cases the aggressor may wish to destroy industrial facilities in order to subjugate the population. In such cases, it would be important to develop systems that are resistant to sabotage by outsiders. Another possibility is the building of an alternative industrial capacity which could be put into operation if the aggressor captured the existing one.

There are a host of industrial design problems requiring research and development. It should be clear that these problems cannot be addressed as isolated technical puzzles. The meshing of technical and social domains is crucial, and close consultation would need to be made with workers and others.

Food, energy, shelter, transport Against a ruthless aggressor, pure and simple survival becomes important. Basic services need to be maintained. Although few aggressors have tried to starve a population into submission, it is important to be prepared.

Large-scale monocultures are vulnerable to disruption. A more resilient food system would include many local gardens and food-bearing trees. Relevant research here includes seed varieties robust to lack of fertilisers and pesticides, nutritious diets from wild natives, and methods for long-term storage of food.

Centralised energy supplies, such as power plants, are highly vulnerable. Small-scale renewable energy systems are much more resilient. As well as continuation of current studies of such systems, there needs to be investigation of systems that could be maintained in the face of hostile action. Easily repairable systems would be highly desirable. Similar considerations apply to shelter and transport.

Health The organisation of health care services and community facilities could have profound implications for a community subject to aggression. The capacity of the community and its health care system to adapt to destruction and to maintain appropriate and accessible health care is crucial in times of stress.

Social defence is based on nonviolent action by the defenders, but there may still be violence by the aggressors. In such a situation, it becomes important for there to be medicines and medical techniques that can be easily administered by non-specialists. There need to be strategies to maintain health in the face of occupation, food shortages, curfews, harassment and other contingencies. As well as physical health, psychological well-being is crucial. Increasing psychological morbidity takes a heavy toll in a society.

It is useful to be able to show any deterioration in both physical and psychological health of the population due to actions by the aggressor. This includes the determination of whether torture has been used. Authoritatively demonstrating the violence of the aggressor to a wide audience is an enormously powerful tool for nonviolent resistance.

Communications One of the first things commonly done in a coup d'etat is to occupy radio and television stations. Communications are crucial to legitimacy in modern society. If social defence is to work, it must both have effective communications systems of its own and be able to disrupt the communications of the aggressor. The radio played a vital part in the resistance in Czechoslovakia in 1968.

In general, person-to-person network communications systems such as telephones, short-wave radio and computer networks are more resilient and useful to a resistance than are one-to-many communications systems such as television. It is crucial to maintain communications with people in other countries. In the cases of the Indonesian invasion of East Timor in 1975, the military coup in Poland in 1981, and the Beijing massacre in 1989, attempts were made to cut off communications with the 'outside world'. Knowledge of what is 'really going on' is usually extremely damaging to the aggressor. Genocides are usually carried out in secrecy[9].

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[7]. Galtung, J. *Peace, War and Defense: Essays in Peace Research, Volume Two* (Christian Ejlers, Copenhagen, 1976), 378-426 is one of the few authors to discuss this issue.

[8]. The following material is adapted from an article submitted for publication by the Chief Investigator.

[9]. Kuper, L. *Genocide* (Penguin, Harmondsworth, 1981).

There are a host of important areas in computers and communications worthy of development for social defence: nonjammable broadcasting systems; cheap and easy-to-use short-wave radio; miniature video recorders; encrypted or hidden communications via computers, telephone and radio; ways of destroying or hiding computer information. Some relevant systems already exist but are not widely available or known.

A well prepared system of social defence would be a powerful deterrent to aggression. It would be difficult to subjugate a society which had a decentralised industrial system that could be easily disabled by the workers, which was self-reliant in food, energy and transport, and which had a dense and effective communications system. Add to this regular training — including simulations — in nonviolent action, systematic learning of foreign languages, and cultivation of support among sympathetic groups in a variety of countries, and the society would be difficult indeed to conquer.

None of this will be possible unless people believe the society is worth defending. Military defence can be used to defend a dictatorship, but social defence will only work if the people are committed to it.

As a comprehensive package in Western strategical packaging, social defence dates from the 1950s. Since then, it has been developed by peace researchers and been widely debated in peace movements, especially in Europe. The German Green Party has adopted social defence as part of its policy. A number of governments — including those of Sweden, Finland, Yugoslavia, Switzerland, France and Austria — have either incorporated a component of social defence into their general or total defence system or seriously considered the possibility. Research on social defence and nonviolent action has been funded by a number of governments, such as the Netherlands, and universities, such as Harvard University's Center for International Affairs with its Program on Nonviolent Sanctions in Conflict and Defense. In Australia, however, funding has been minimal so far.

Overall, compared to funding for military-related research, there has been little money for science and technology for nonviolent struggle. By assessing the prospects for using science and technology to support nonviolent resistance, this project aims to explore how this situation might be changed.

Personal background

This proposal brings together two strands of my research that have occupied much of my attention for many years: the social shaping of science, and social defence. I have a long experience in examining social influences on science,[10] including considerable attention to science, technology and warfare.[11] This is aided by the insights gained from over a decade of postdoctoral research experience as a research scientist and authorship of 35 scientific papers in several fields (stratospheric modelling, numerical methods, astrophysics, wind power and electricity grids) in addition to my research in the social sciences. This background in examining social influences on science and technology motivates the theoretical aim of assessing the usefulness of science and technology, shaped by military influences, for nonviolent struggle.

I have been involved in the study of nonviolent alternatives to military defence for over ten years and have written extensively on this topic.[12] I have played a key role in

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[10]. Brian Martin, 'The selective usefulness of game theory', *Social Studies of Science*, vol. 8, 1978, pp. 85-110; Brian Martin, *The Bias of Science* (Canberra: Society for Social Responsibility in Science, 1979); Jill Bowling and Brian Martin, 'Science: a masculine disorder?', *Science and Public Policy*, vol. 12, December 1985, pp. 308-316; and others.

[11]. Brian Martin, 'Science and war', in Arthur Birch (ed.), *Science Research in Australia* (Canberra: Australian National University, 1983), pp. 101-108; Brian Martin, 'Computing and war', *Peace and Change*, vol. 14, April 1989, pp. 203-222.

[12]. Brian Martin, 'Mobilizing against nuclear war', *Social Alternatives*, vol 1, nos 6-7, June 1980, pp. 6-11; Brian Martin, 'Grassroots action for peace', *Social Alternatives*, vol 3, no 1, October 1982, pp. 77-82 (translated into Swedish and Japanese); Brian Martin, *Uprooting War* (London: Freedom Press, 1984); Brian Martin, 'Lessons in nonviolence from the Fiji coups', *Gandhi Marg*, vol 10, no 6, September 1988,

several group projects which involved interviewing people (such as public servants, tradespeople and computer programmers) about what can be done to oppose an invasion or military coup.[13] This sort of investigation into the practicalities of nonviolent defence is highly regarded overseas — the report *Capital Defence* has been translated into Italian and Dutch — where the usual approach is advocacy at the level of ideas. My background, involving both extensive interviewing and theoretical analyses in relation to nonviolent defence, gives me uniquely relevant knowledge and skills for carrying out the proposed project. This background also provides the motivation for studying means for nonviolent struggle.

Research Plan

In outline, the research will be carried out in the following stages.

1. Examination of the requirements for nonviolent struggle and appropriate science and technology to aid it, based on literature searches and interviews (15 months).

2. Parallel examination of science and technology for military struggle and repression, using secondary literature (3 months).

3. Assessment of the relevance of military-related science and technology to nonviolent struggle, and vice versa (6 months).

4. Formulation of principles for a science policy for nonviolent struggle (6 months).

5. Writing up findings (6 months).

The first two stages will provide the basic data for the project. The third stage uses this data to explore the theoretical issues about the social shaping of science and technology. The final two stages are concerned with organising the results into relevant and communicable form.

1. *Examination of the requirements for nonviolent struggle and appropriate science and technology to aid it.* This stage will begin with a careful reading of the relevant literature on nonviolent struggle, with a dual purpose. First, note will be made of any explicit suggestions or indications for useful science and technology. Second, the major areas of struggle will be classified into diverse categories such as communications, food, morale and allies. This will be a lengthy task because there is no unified theoretical perspective on the elements of nonviolent struggle. This survey of literature will take about six months (with a careful reading of about 25 key books and 150 articles). Most of this literature search, reading and classification will be done by the research associate under guidance.

The suggestions for useful science and technology will be allocated to the areas of struggle. Then, to develop further ideas for science and technology useful for nonviolent struggle, a series of brainstorming sessions will be held with small groups of sympathetic people. Additional ideas will be added to the suggestions obtained from the literature.

Next, a series of interviews will be held with scientists and technologists in a range of fields to assess the proposals for useful science and technology. Basically, the interviewees will be asked, concerning each idea, whether it is (a) already possible and/or available, (b) feasible in the near term with suitable research, development or investment, or (c) impossible or feasible only in the long term. No special sample is required for this interview process, except that enough views are sought to ensure that idiosyncratic opinions are put in context. People to be interviewed will be sought through personal contacts and through organisations such as Scientists Against Nuclear Arms. It is

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pp. 326-339; Brian Martin, 'Revolutionary social defence', *Bulletin of Peace Proposals*, 1991, in press; and others.

13. Jacki Quilty et al., *Capital Defence: Social Defence for Canberra* (Canberra: Canberra Peacemakers, 1986); Alison Rawling et al., 'The Australian Post Office and social defence', *Nonviolence Today*, no 14, April-May 1990, pp. 6-8. A project on telecommunications is in progress.

anticipated that there will be about 60 interviews. Most will take place in Wollongong and Sydney, with a couple of trips to Canberra to interview specialists in CSIRO. The Chief Investigator and the research associate will carry out some interviews together and some individually. The interviews and compilation of results will take the remaining time from the 15 months devoted to the first stage of the project.

2. *Parallel examination of science and technology for military struggle and repression.* This stage is much simpler because there is already a considerable secondary literature on the uses of science and technology for the military[14] and for repression.[15] The aim here is to produce a classification of military and repressive uses of science and technology parallel to that used in stage 1 for nonviolent struggle. Standard surveys of the literature will be used. This stage is listed to require three months; in practice it will be carried out over the first 18 months in parallel with stage 1.

3. *Assessment of the relevance of military-related science and technology to nonviolent struggle, and vice versa.* This test of the theory of the impact of the social shaping of science and technology will proceed as follows.

First, two contrasting areas from the areas important for nonviolent struggle, such as communications and morale, will be chosen. The uses of science and technology for these areas will be examined to see to what degree they are useful for military struggle and repression.

Second, two contrasting areas will be chosen from the areas important for military and repressive purposes. They could be the same two areas. The uses of science and technology for these areas will be examined to see to what degree they are useful for nonviolent struggle.

If the applications of science and technology are equally useable for military and nonviolent purposes, then the science and technology could be said to be neutral with respect to these purposes. On the other hand, if the applications for military purposes are irrelevant for nonviolent purposes, or vice versa, then the science and technology could be said to be totally shaped for the purposes for which it is used. In practice, the outcome is likely to be somewhere between these two extremes, and the test of theory will provide an indication of the *degree* to which social shaping of science and technology leads to a product that cannot be used for other purposes (this degree can be called selective useability). The selective useability of different fields, such as nuclear physics and radio, will be examined.

This test will rely heavily on the information gathered in stages 1 and 2. It is anticipated that some follow-up interviews and further investigation of the literature will be required to elucidate points that arise in this test of theory. Since each area chosen (such as communications) will include a range of uses of science and technology, the assessment will take considerable time, hence the six months allotted.

4. *Formulation of principles for a science policy for nonviolent struggle.* The information from stages 1-3 provides the basis for specifying what areas of research and development deserve priority in order to improve the capacity for nonviolent struggle. This will provide guidance for developing a science policy appropriate for a society moving from violent to nonviolent methods.

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[14]. For example, Robin Clarke, *The Science of War and Peace* (London: Cape, 1971); Peter Watson, *War on the Mind: the Military Uses and Abuses of Psychology* (Harmondsworth: Penguin, 1980).

[15]. Key authors include Michael Klare, George Lopez, Michael Stohl, Miles Wolpin and Steve Wright. See for example Marjo Hoefnagels (ed.), *Repression and Repressive Violence* (Amsterdam: Swets & Zeitlinger, 1977); Steve Wright, *New Police Technologies and Sub-state Conflict Control* (PhD thesis, University of Lancaster, 1987). PIOOM — Dutch acronym for an interdisciplinary research programme on the causes of violations of human rights — provides much valuable material for this purpose. See Alex P. Schmid, *Research on Gross Human Rights Violations: A Programme* (Leiden: Center for the Study of Social Conflicts, University of Leiden, 1989).

This stage will involve a survey of current science policy, especially in relation to military R&D, in order to provide rough figures for skilled labour, capital investments and annual funding in different areas of science and technology. Then, using the results of the first three stages, a number of models for conversion to R&D for nonviolent struggle will be proposed. For example, if, according to stage 3, some areas of R&D can be readily switched to serve nonviolent struggle, then there are no economic implications of a switch (only an issue of social priorities for R&D). On the other hand, some areas important to nonviolent struggle may require reskilling and new investments. In order to develop models, other science policy researchers will be consulted, and the literature on peace conversion drawn upon.[16]

5. *Writing up of findings.* One major outcome will be a book reporting the policy-relevant findings, especially the details of science and technology relevant to nonviolent struggle and science policy for nonviolent struggle. The findings will also be published in a range of journals (peace research, social studies of science, science policy, science).

Justification of budget

The main item in the budget is the salary for a research associate for three years. This level of appointment is necessary to obtain a person able to understand the basic science and technology in a wide range of areas and as well the theoretical issues involved in both the social shaping of science and technology and the principles of nonviolent action. Within the basic structure of the project, the research associate will be expected, with guidance and assistance from the chief investigator, to survey technical journals, arrange interviews with scientists and participate in interviews, take interview notes and classify the results according to the theoretical framework utilised. Given the scope and originality of the project, an appointment at the research assistant level is not appropriate.

The nominated research associate, Miriam Solomon, is admirably suited for this research project. She has long experience with nonviolent action generally and social defence in particular. Her degrees in physiology provide more than adequate scientific background. (Advanced scientific training is not required, since the project requires coverage of a wide range of scientific disciplines rather than specialised knowledge.) She has extensive experience in interviewing, has had much contact with scientists and engineers (for example through the organisation Scientists Against Nuclear Arms), and founded a peace group incorporating a range of professional organisations.

Ms Solomon's recent research on the social shaping of health policy and health research is an ideal background for dealing with the social shaping of science and technology. I have read her thesis on "Public participation in mental health policy formation"; it clearly demonstrates high level competence in critical thinking and writing. Given that she has demonstrated skills and experience relevant to all facets of the project, Ms Solomon will be an ideal appointment.

The need for three years' salary is based on the timetable, which essentially specifies 18 months for looking at science and technology for nonviolent and military struggle, 6 months for testing the effect of the social shaping of science and technology, 6 months for developing the implications for science policy and 6 months for writing up. Since no work has been done in this area, this is a minimum requirement for satisfactory completion of the project.

The remainder of the budget is for computer searches, postage, photocopying and local travel to carry out interviews.

Comments on assessors

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[16]. See for example Melman, S. *The Demilitarized Society: Disarmament and Conversion* (Harvest House, Montreal, 1988). This literature does not, however, discuss science and technology for nonviolent struggle.

There are relatively few scholars who work both on nonviolent action and the social shaping of science. The two nominated assessors are superbly qualified. Prof. Dr. Johan Niezing has an eminent record in peace research, is the author of a major book on social defence, and chaired a group advising the Netherlands government on research into social defence.[17] Prof. Glenn Paige has vast experience in peace research and is a convenor of the Nonviolence Study Group of the International Peace Research Association. They are highly appropriate assessors because of their long experience in formulating and assessing projects on nonviolence and social defence, and because they have no collaborative or special personal relationship with the Chief Investigator.

Other prominent figures include Professor Gene Sharp, Program on Nonviolent Sanctions in Conflict and Defense, Center for International Affairs, Harvard University, the world's greatest authority on nonviolent action, and Michael Randle, School of Peace Studies, University of Bradford, coordinator of the Social Defence Project in Britain.

Within Australia, two top scholars well qualified to comment on the proposal are Andrew Mack, Head, Peace Research Centre, Australian National University, co-author of one of the leading books on social defence, and Ralph Summy, Government, University of Queensland, author, editor and leading authority on nonviolent action.

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[17]. Advisory Group on Research into Non-violent Conflict Resolution, *Research into Non-Violent Conflict Resolution and Social Defence: A Detailed Research Programme* (Amsterdam: Netherlands Universities' Joint Social Research Centre, 1986).

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* Brian Martin, *Scientific Knowledge in Controversy: The Social Dynamics of the Fluoridation Debate* (Albany: State University of New York Press, 1991, in press).

* Brian Martin. Revolutionary social defence. *Bulletin of Peace Proposals*, 1991, in press.