

Science and technology for nonviolent struggle

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Brian Martin

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 assess its relevance to nonviolent struggle. The findings will be used to determine how science and technology used for the purposes of war and repression can be converted most effectively 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 most 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 and technology. 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 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. As a result of the current decline in the global arms race, there is increased interest in alternative directions for both national security and for military science and technology. The results of this project will provide practical guidance for a reorientation of science and technology for defence.

Background²

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

¹ Barry Barnes, *Scientific Knowledge and Sociological Theory* (London: Routledge and Kegan Paul, 1974); Donald MacKenzie, *Inventing Accuracy: An Historical Sociology of Nuclear Missile Guidance* (Cambridge, MA: MIT Press, 1990); 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).

² The core ideas of this application, especially the following section, have been published as Brian Martin, ‘Science for nonviolent struggle’, *Science and Public Policy*, vol 19, no 1 (February 1992).

role for natural scientists as researchers: social defence.³ This can be defined as nonviolent community resistance to aggression as an alternative to military defence.

There are numerous methods for nonviolent struggle, including petitions, marches, rallies, strikes, boycotts, sit-ins and alternative institutions.⁴ 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 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

Other relevant examples include the German resistance to the occupation of the Ruhr in 1923,⁶ the collapse of the 1961 coup in Algeria⁷ and the defeat of the 1991 Soviet coup.

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 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 in this context 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.⁸ It is useful to consider some examples.

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.

³. Anders Boserup & Andrew Mack, *War Without Weapons: Non-violence in National Defence* (Frances Pinter, London, 1974); Gustaaf Geeraerts (ed.), *Possibilities of Civilian Defence in Western Europe* (Swets and Zeitlinger, Amsterdam, 1977); Gene Keyes, 'Strategic non-violent defense: the construct of an option', *Journal of Strategic Studies*, vol 4, pp. 125-151 (1981); Stephen King-Hall, *Defence in the Nuclear Age* (Victor Gollancz, London, 1958); Johan Niezing, *Sociale Verdediging als Logisch Alternatief* (Van Gorcum, Assen, Netherlands, 1987); Gene Sharp, *Making Europe Unconquerable: The Potential of Civilian-based Deterrence and Defense* (Ballinger, Cambridge, Mass., 1985); Gene Sharp, *Civilian-Based Defense: A Post-Military Weapons System* (Princeton: Princeton University Press, 1990).

⁴. Gene Sharp, *The Politics of Nonviolent Action* (Porter Sargent, Boston, 1973).

⁵. Philip Windsor & Adam Roberts, *Czechoslovakia 1968: Reform, Repression and Resistance* (Chatto & Windus, London, 1969).

⁶. Wolfgang Sternstein, in *The Strategy of Civilian Defence: Non-violent Resistance to Aggression* (ed. Adam Roberts) 106-135 (Faber and Faber, London, 1967).

⁷. Adam Roberts, 'Civil resistance to military coups', *Journal of Peace Research*, vol. 12, pp. 19-36 (1975).

⁸. Johan Galtung, *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.

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.

Communications One of the first things commonly done in a coup d'état 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.

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

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.

Science and technology are also crucially important in such areas as food, energy, shelter, transport and health.

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 sponsored studies on social defence and nonviolent action, as have some universities, such as Harvard University's Center for International Affairs with its Program on Nonviolent Sanctions in Conflict and Defense.

But there has been hardly any money to study 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 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

⁹ Leo Kuper, *Genocide* (Penguin, Harmondsworth, 1981).

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; Brian Martin, 'Mathematics and social interests', *Search*, vol 19, no 4, July-August 1988, pp. 209-214; 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.

several fields (stratospheric modelling, numerical methods, astrophysics, wind power and electricity grids) in addition to my research in the social sciences.

I have extensive experience in interviewing in a range of areas, including technical specialists at BHP (in collaboration with Colin Kearton) and fluoridation partisans. This, plus my long experience in working in science departments and collaborating with a considerable number of scientists, provides an ideal background for dealing with scientists and engineers and with technical information as required by the project.

I have been involved in the study of nonviolent alternatives to military defence since the late 1970s and have written extensively on this topic.¹² I have been a leader in 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 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.

My 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. My background in social defence provides the motivation for studying means for nonviolent struggle.

My research has been translated and published in six foreign languages, and my work on social defence in particular is widely recognised internationally. Currently I am working on a book bringing together and extending my perspectives on social defence; it should be completed by mid 1992.

Many activist groups overseas await with eagerness news of the latest initiatives on social defence in Wollongong. This project will place Australian research in social defence into world prominence in several fields, including peace research, the social analysis of science and technology, and science and technology policy.

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, interviews, and queries via computer (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 and technology 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. Computer searches and traditional methods will be used to identify books, journal articles, newspaper stories and other documents. This stage has 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

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 (also published in Swedish and Japanese); Brian Martin, *Uprooting War* (London: Freedom Press, 1984) (also published in Italian); Brian Martin, 'Lessons in nonviolence from the Fiji coups', *Gandhi Marg*, vol 10, no 6, September 1988, pp. 326-339; Brian Martin, 'Revolutionary social defence', *Bulletin of Peace Proposals*, vol 22, no 1, 1991, pp. 97-105; and others.

¹³ Jacki Quilty et al., *Capital Defence: Social Defence for Canberra* (Canberra: Canberra Peacemakers, 1986) (also published in Italian and Dutch); 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.

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, 150 journal articles and 1000 newspaper and other reports). Most of this literature search, reading and classification will be done by the research assistant 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 and suggestions sought through computer conferences. Additional ideas will be added to the ideas obtained from the literature.

Next, a series of interviews will be held with specialist 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. People to be interviewed will be sought through personal contacts and through organisations such as Scientists Against Nuclear Arms. Social scientists and nonviolent activists also will be interviewed concerning the social feasibility of technical proposals. It is 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 assistant will carry out some interviews together and some individually.

Supplementing the face-to-face interviews, a set of key queries will be formulated and responses sought through the post, computer conferences and e-mail with selected experts outside Australia. (The orientation of the project is transnational rather than strictly Australian.) The interviews, computer-network queries 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 military¹⁴ 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.

Comparing these two results 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, queries 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

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).

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 and technology 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 and technology policy appropriate for a society moving from violent to nonviolent methods.

This stage will involve a survey of current science and technology 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 and technology 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 and technology policy for nonviolent struggle. The findings will also be published in a range of journals (peace research, social studies of science, science policy, science).

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.

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Core of the project

Brian Martin. Science for nonviolent struggle. *Science and Public Policy*, vol 19, no 1 (February 1992).

Relevant to the project

(a) nonviolent struggle

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