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Priorities for research and development

Suppose you have control over lots of money for research and development and want to spend it in the best way possible to serve military purposes. What areas have priority? The usual practice is simply to look at current funding and to assess which areas are producing valuable results. Some unproductive areas—unproductive for military purposes, that is—can be dropped, and some new areas can be added, drawn from new funding proposals.

Prior funding patterns provide little guidance in setting priorities for science and technology for nonviolent rather than military purposes since there has been almost no funding for nonviolent struggle, much less for relevant science and technology. There has been a little funding for social analyses of the feasibility of social defence, but that's about all.

Another possibility is to examine the use of science and technology in actual nonviolent struggles, and then to assess whether there are technological improvements that would aid the struggle. This might involve looking at the use of radio in Czechoslovakia in 1968 or the role of agriculture and food delivery systems in Palestine during the intifada. This approach is valuable in gaining a feeling for particular research projects, but it does not provide an overview of the areas of science and technology most likely to be useful for nonviolent struggle.

Research proposals

The next possibility is to look at proposals for research. To get an overview, it is useful to look at the Dutch book *Research on Civilian-Based Defence*, which describes in detail 24 areas for major research projects into social defence.¹ Here is a sketch of these projects.

- An inventory of organisations and social structures, such as government bureaucracies, corporations and pressure groups, examining how an aggressor might seek to control them and how they might be strengthened to resist takeover.
- An examination of centralised versus decentralised coordination of social defence, surveying studies of resistance to the Nazis during World War II, guerrilla warfare, military strategy and other areas.
- Collection of information about technologies of repression and what can be done to oppose them. (This is discussed in chapter 8.)
- An examination of the influence of the new information technologies on the capacity for both repression and social defence. (This is a central theme in chapter 5.)
- An investigation of databases and personal files, how they might be misused and protected, and the social effects of measures for dealing with them. (This topic is dealt with briefly in chapter 5.)
- An assessment of the value of instructions for workers in government bureaucracies on resisting occupation by an aggressor.
- An inventory of key people and positions in government bureaucracies in relation to social defence.
- A study of the reception to the idea of social defence, surveying social defence advocates, media, government bureaucracies, etc.
- A study of factors promoting psychological health, focussing on child rearing and the school system, and their relevance to willingness to resist injustice.
- A listing and examination of basic assumptions and unsolved questions in writings about social defence.
- A survey of theories and ideas of writers on nonviolent resistance and their relevance to action.
- An analysis of Dutch nonviolent struggle during the 1920s and 1930s and Dutch resistance to the Nazis.
- An assessment of Alex Schmid's ten conditions needed for the success of social defence.
- An examination of the process of conversion from military defence to social defence, called "transarmament." (An aspect of this is discussed in chapter 10.)
- An assessment of the value to social defence of Lazare Carnot's method of studying new fields "by stating problems as double negating sentences to come to new knowledge."

- An examination of the idea of the centre of gravity in a defence system, looking at both theory and case studies.
- An inventory of means of confrontation, their relationships, their connection to the centre of gravity, and their relevance to strategic goals.
- A study of different social defence security systems and how building each one up might affect social conditions after a war.
- An examination of Jürgen Habermas's distinction between strategic action and communicative action and the relevance of this distinction to social defence.
- An inventory of goals and weapons of opponents of social defence, and an assessment of likely conflicts.
- An examination of occupations by military forces since World War II and implications for social defence.
- A study of the political effects of introducing social defence, including effects on diplomacy, the economic system and political structures.
- An analysis of spying ("intelligence services"), how it might operate against a social defence system and how it might be resisted.
- An examination of what and how information might need to be collected as part of a social defence system; in other words, an examination of social defence intelligence services.

Most of these research projects would require years of investigation. Their scope is not revealed by these brief descriptions. This list hints at the vast amount of research that could be carried out into social defence. Indeed, given that the military spends billions of dollars each year on research, it can be anticipated that a full-scale social defence system might spawn a similar mass of research. Therefore, the 24 projects listed here from de Valk's book would only be the barest beginning of a full-scale social defence research effort.

Most of the 24 projects are social rather than technological: they deal largely with history, psychology, politics, ideology, strategy and policy. Only three—the third, fourth and fifth as listed—provide any focus on technology. This gives an indication of the relative neglect of the technological dimension in the nonviolence field. Indeed, searching through writings on nonviolence, there is remarkably little attention to technology, so it is worth mentioning those few writers who deal with it.

The earliest and most important was novelist and essayist Aldous Huxley, whose ideas are described in the prologue. Then there is leading peace researcher Johan Galtung, who has made specific suggestions for specific technological developments that would aid a social defence system, especially in his 1968 paper “On the strategy of nonmilitary defense: some proposals and problems.” He suggests, for example, that research could be done into how to design a country’s physical equipment so that it can be sabotaged appropriately. Since Galtung’s ideas are so insightful, it is worth quoting his entire account on this point.

The task would not be to blow up a factory completely, *but to remove that minimum part which would cause maximum uselessness.* Which part this is and how much will have to be removed would be a subject of meticulous calculation, where the availability of substitutes, or substitute uses of the remaining parts of the factory, would play a great role. Such calculations are well within the reach of modern, computerized societies. Thus, in an airplane it would probably not lead to the removal of the propeller (since the engine could then be used for other purposes), but of some small, highly specialized part of the engine, and so on. In the tertiary sectors of society, it would generally be easier since these sectors (except transport and communication) are mainly concerned with symbolic activity, so that the removal or destruction of files, codes, manuals of procedure, membership files, population data, means of financial transactions, etc., should cause a high degree of uselessness. Transport and communication are also relatively easily reduced in efficiency. But in the primary sector it would generally be less easy, since the facilities here are more like territory. However, pits can be undermined and fields can be rendered useless by chemical means—and better technology could make both strategies time dependent, so that even though the destruction would be irreversible for the time being, it would still only be temporary. It might be argued that all the enemy then would have to do, would be to sit down and wait for usefulness to recur—but the counter-strategy against that again would be to calculate the timing of destruction as well as recovery, or to have options for repeated destruction.²

Richard Wendell Fogg raised a few relevant points, for example noting the importance of broadcasting to the population of an aggressor’s country.³ Eminent nonviolence scholar Gene Sharp devoted a page to general comments about the need to question

standard assumptions about large technological scale and centralised control over energy, food, production and transport; he suggested that attention should be paid to technology with the aim of diffusing social power.⁴ Aside from these authors, though, little had previously been done before my own work. The contrast with the enormous military research and development programmes is striking.

There are two obvious groups who might have been expected to undertake studies of science and technology for nonviolent struggle. The first is activists and scholars in the field of nonviolent action. As far as activists go, there have been untold millions of people who have participated in nonviolent action, ranging from workers engaging in strikes to participants in mass rallies, but only some of these have seen their action as part of a strategic method for social change. The number of reflective activists and researchers who have striven to improve the capacity for nonviolent action is much smaller, but is still quite considerable. Why haven't they examined technology systematically?

One important reason is that the most important factors in making nonviolent action successful are psychological, social, organisational and strategic. Technology seldom is a crucial factor. In warfare, by contrast, technological factors are much more obvious and important. It makes sense to tackle the most important factors first, and so supporters of nonviolence have concentrated on non-technical dimensions of action. But this can't be the entire explanation, since technical factors sometimes are vital, as in the case of communication technology in quite a number of struggles.

Another factor may be that most peace researchers (like most other researchers) are cut off from grassroots movements and more oriented to standard belief systems. For career and status reasons, as well as funding, they are more likely to direct attention to military technology than to nonviolent action, reconciliation and building peaceful societies, with technological facets of such topics being very low in priority.⁵

Another reason is that few of those who have pushed forward the frontiers of nonviolent action have been scientists or engineers. Peace research is seen primarily as part of the social sciences, and most writers on social defence have been trained as social scientists. It is relevant that Galtung, who has dealt with technical dimensions, was originally a mathematician.

Yet another possible reason stems from the contrasting agendas of the two main approaches to nonviolent action, the principled and the pragmatic approaches. Many of those who believe in nonviolence as a matter of principle, irrespective of its immediate effectiveness, also adopt a critical analysis of modern technology and industry. Gandhi argued for technologies that allowed for local control, for village industries rather than mass production. This Gandhian approach contains a strong critique of technology but, because it is primarily a rejection of sophisticated technologies, doesn't encourage thinking about selecting, adapting and developing technologies that might support nonviolent struggle more effectively.

The pragmatic approach to nonviolence is based on the view that nonviolent action is more effective than the use of violence. The approach is, in many cases, joined with an acceptance—for the time being at least—of many features of current society: industrialism, the system of states, capitalism, etc. In other words, nonviolent action as a pragmatic method is commonly used as a method of reform within the present system, with no plan for long-term transformation of social structures except the military. As part of this, technology is not questioned in any fundamental fashion, and hence its capacity for supporting nonviolent action is not examined.

In this picture, the transformation of technology to serve nonviolent action falls between the agenda of principled nonviolence, which rejects much of modern technology, and the agenda of pragmatic nonviolence, which accepts most nonmilitary modern technology. Undoubtedly, this picture is much too simple. There are, after all, many activists and scholars who support principled nonviolence without rejecting modern technology and who support pragmatic nonviolence as part of a programme for fundamental change in social structures. But perhaps there is an element of truth here that, along with other factors, has contributed to the neglect of technology for nonviolent struggle.

Another way into this field is to begin as a scientist or engineer and to become involved with nonviolence. For decades, many scientists and engineers have been involved in peace movements, but this has led to little engagement with the nonviolence movement.

Just as importantly, few scientists have linked their concerns about war and peace with a critique of science itself. Critics of science have

exposed the use of science for profit and social control.⁶ There are several reasons why they have given so little attention to nonviolence.

The first reason is that nonviolence has a very low scholarly profile. As an intellectual tool, a critic of science might use political economy, Marxism, feminism or even postmodernism, but would be unlikely to be even aware of nonviolence theory. Few of the critics of science have been involved in campaigns where ideas and writings about nonviolence are raised.

Another reason is that most critics of science study what exists and don't spend much time envisioning alternatives. Exposé of the corporate abuse of science abound, but there are few investigations of what science would be like under cooperative economic structures.

Finally, much of the critique of science has been undertaken from socialist perspectives, which are primarily built on a critique of capitalism. Socialists seek the end of capitalism through the capture of state power, whether in a revolution or through electoral politics. In either case, there is no rejection of the use of violence. Armed struggle—especially in Third World countries—is usually supported or reluctantly accepted as a necessity.

These are some of the reasons why there has been so little investigation of nonviolence by scientists, engineers or critics of science. The reasons presented here for the neglect of science and technology for nonviolent struggle are somewhat speculative. All that is certain is that the topic has been neglected.⁷

Key factors approach

So far I have presented several ways for setting priorities for science and technology for nonviolent struggle:

- look at previous funding priorities (not useful, since there has been almost no prior funding);
- look at actual uses of science and technology in nonviolent struggles (useful, but providing little guidance for priorities);
- look at research proposals (useful, but limited in scope).

Another way to proceed is to draw up a list of areas important for engaging in struggle and then determine which scientific fields have the greatest potential of contributing in those areas. Let me first consider military struggle, for which the most obvious area is weapons. Many branches of the physical sciences and engineering

are vital for this, from nuclear physics and chemistry to molecular biology.

But there are other, less obvious, areas where improved knowledge may be helpful. One important area is recruitment and retention of skilled personnel. For this, psychological and sociological studies might prove useful. Other areas important for military strength are arms manufacture, transportation, logistics, training, leadership and communication. By going through all key areas, assessing needs and then assessing which (if any) fields of science and technology might prove useful, a set of priorities can be set up for funding research and development.

Of course, there are other considerations that affect military funding for science and technology. These include financial constraints, availability of skilled and willing scientists and technologists, political support or opposition, possible civilian spinoffs and arms control treaties, among others. But the general approach, namely of listing key areas and seeing which technical fields are most useful to them, still has merit.

This approach can now be applied to social defence. The first thing to do is to list key areas important to a social defence system. This is not so easy! There is no generally accepted list, and certainly no list designed for this purpose. So, on the basis of my knowledge of social defence and in consultation with Mary Cawte, who had just read through many of the writings on social defence, I wrote down a number of areas. I then sent the list to a few social defence experts, who suggested additions.⁸ On the next page is the list that resulted from this process.

It is impossible to give weights to these factors in terms of their importance, since there is no theoretical framework available for this purpose. Nevertheless, a general ranking is possible by looking at studies of nonviolent struggles. Undoubtedly the greatest attention is given to psychological and organisational factors, as suggested by the 24 Dutch social defence research proposals.

The priority given to psychological and organisational factors also can be illustrated by examining the views of writers on social defence who have examined the centre of gravity, a key concept proposed by the classic military strategist Carl von Clausewitz.⁹

Key factors in a social defence system

Active factors

Psychological and organisational factors

- morale, unity, will
- knowledge, education, understanding, analysis, strategy, tactics, evaluation
- coordination, decision-making, organisation, leadership

Physical infrastructure

- communication
- survival: food, water, clothing, shelter, energy, transportation, health
- industry, production, economics

Other factors

- skills
- self-reliance
- allies
- constructive programme (building a nonviolent society)

Reactive factors (including direct disarmament¹⁰)

- anti-nuclear weapons (countering the threat and effects of nuclear weapons)
 - anti-biological weapons
 - anti-chemical weapons
 - anti-conventional weapons.
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Anders Boserup and Andrew Mack, in their pioneering book *War Without Weapons*, apply Clausewitzian strategic theory to social defence. The centre of gravity is the opponent's central source of strength, which should be the main target for destruction. The centre of gravity of the defence is determined by the mode of defence, which is the basis for Clausewitz's idea of the superiority of the defence over the offence. Boserup and Mack conclude that for a social defence system, the centre of gravity is the unity of the resistance: "It is against this point that the whole thrust of the attack must be directed and to its preservation that all efforts of the defence must tend."¹¹ If the defence is able to absorb the attack, then its next

task is to mount a counterattack against the centre of gravity of the opponent. Boserup and Mack say that in the case of military attack against a social defence system, the centre of gravity of the offence depends on the mode of attack and that, generally speaking, it will be those things that allow the offence (for example, repression of the nonviolent defenders) to continue.

Other social defence theorists have built on Boserup and Mack's analysis but differed about the precise nature of the centre of gravity. Gene Keyes, who studied the Danish resistance to the Nazis, concludes that the centre of gravity for a social defence system is the morale of the resistance.¹² Robert Burrowes, in a far-reaching Gandhian approach to social defence strategy, argues that the strategic aim of the defence is to "consolidate the power and will of the defending population to resist the aggression" and the strategic aim of the counteroffensive is to "*alter* the will of the opponent elite to conduct the aggression, and to *undermine* their power to do so."¹³ In Burrowes' model, the centre of gravity is the sum total of social resources that support the strategy; more specifically, it is the power of a party to a conflict to conduct the struggle and its will to do so. Both Keyes and Burrowes say that the centre of gravity for the offence is the same as for the defence, namely morale for Keyes and power/will for Burrowes.

Although Boserup and Mack, Keyes and Burrowes differ concerning the location of the centre of gravity of a social defence system, they agree that it lies primarily in the social and psychological facets of the resistance, namely either unity, morale or will. It certainly is not technology (weapons). However, technology can be used to bolster unity, morale and will.

As for factors classified as physical infrastructure in the list of key factors in a social defence system, communication technology is probably the most important because of its close link to psychological and organisational factors. Only seldom is survival of the population threatened in a nonviolent resistance,¹⁴ and industry only occasionally plays an important role. The capacity to understand, resist, and dismantle weapons of the aggressor is a topic seldom discussed in the nonviolence literature.

This list of key factors provides a preliminary way to assess the importance of scientific fields to nonviolent struggle. For example, consider biology: it can offer some help in the task of survival, for

example via understanding of ecology, such as knowledge of species not requiring pesticides or fertilisers (which might be unavailable in event of a blockade) or fruit-bearing species. Biologists could also provide some insight into the capability of biological weapons and how to counter them.

Proceeding in this fashion for all the key factors leads to the following list.

Relevance of science and engineering to key elements in a social defence system

- *biology*: survival; anti-biological weapons
 - *chemistry*: anti-chemical weapons
 - *earth sciences*: survival
 - *medicine*: survival
 - *agricultural science*: survival
 - *physics/mathematics*: communication
 - *computing/electrical engineering*: communication
 - *engineering*: survival; industry, etc.; communication; anti-conventional weapons
 - *psychology*: morale, etc.
 - *languages*: communication
 - *economics*: industry, etc.
 - *sociology, politics, philosophy, history, education*: knowledge, etc.; coordination, etc.
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Although this list is not definitive, it gives a good indication of the relevance of various fields to nonviolent struggle. It is apparent that a number of fields of science and engineering can contribute to survival (earth sciences, medicine, agricultural science, most branches of engineering) and a number of them can contribute to communication (computer science, electrical engineering, mathematics). But aside from a few other areas (chemistry can contribute to anti-chemical warfare; engineering has a crucial role in designing industry for a social defence system), the bulk of science and engineering has little to offer to nonviolent struggle.

This conclusion needs an immediate qualification. Aside from contributions to survival and communication, the bulk of *present-day* science and engineering seems to offer little to nonviolent struggle. It is quite possible that these fields could be more relevant if they were

redirected—for example through a change in funding patterns—from military to nonviolent goals. In terms of present systems of knowledge, skills and hardware, the social sciences have a much more important role to play in supporting social defence than do the natural sciences and engineering.

In summary, a comparison of research priorities for military and nonviolent ends shows some dramatic differences at a number of levels. Research into improving nonviolent struggle would lead to a much greater emphasis on social science than does military-related research. Within individual disciplines, a priority on nonviolent struggle would mean greater attention to particular fields, such as telecommunications. Finally, within particular fields, such as telecommunications, a nonviolence-oriented research agenda would lead to emphasis on different puzzles.

Implications

A science and technology policy based on promoting social defence would be dramatically different from one based on promoting military strength. The following changes would be among the most significant.

(1) There would be much greater emphasis given to social sciences compared to natural sciences and engineering. The implication is that the present situation in which natural science and engineering receive the bulk of research monies is, to some degree, a product of military priorities operating in the past century, and that quite a different balance between the 'soft' and 'hard' sciences might eventuate if social defence received the same investments and priority now given to the military.

Complaints by scholars in the humanities and social sciences that they are shortchanged in the struggle for research money typically make appeals to intellectual worthiness or the importance of culture. The analysis here provides quite a different argument: that social science—or, more precisely, particular branches of social science—are central to the development of the capacity of a society to defend itself using nonviolent methods. (It should be noted that present-day social science has been shaped by military priorities and that a social science shaped by social defence priorities might look quite different.)

(2) The effort given to different research fields would be shifted considerably. For example, particle physics would be a much lower priority whereas telecommunications and social psychology would be much higher priorities.

(3) Different particular projects in any field would be emphasised. Examples will be given in the following chapters.

(4) Research would be responsive to and involve the participation of a wide range of community interests, unlike the present situation where military interests predominate. This point will be discussed further in chapter 9.

Notes

1. Giliam de Valk in cooperation with Johan Niezing, *Research on Civilian-Based Defence* (Amsterdam: SISWO, 1993). The background to this book is described in chapter 10.

2. Johan Galtung, "On the strategy of nonmilitary defense: some proposals and problems," in Johan Galtung, *Peace, War and Defense. Essays in Peace Research, Volume Two* (Copenhagen: Christian Ejlers, 1976), pp. 378-426, 466-472, quote at pp. 390-391.

3. R. W. Fogg, "A technical equivalent of war," in H. Chestnut (ed.), *Contributions of Technology to International Conflict Resolution* (Oxford: Pergamon Press, 1986), pp. 113-120.

4. Gene Sharp, *Social Power and Political Freedom* (Boston: Porter Sargent, 1980), pp. 403-404.

5. I thank Ellen Elster for this point. See Berenice Carroll, "Peace research: the cult of power," *Journal of Conflict Resolution*, Vol. 16, No. 4, December 1972, pp. 585-616.

6. See for example Hilary and Steven Rose (eds.), *The Political Economy of Science: Ideology of/in the Natural Sciences* (London: Macmillan, 1976) and *The Radicalisation of Science: Ideology of/in the Natural Sciences* (London: Macmillan, 1976); and the journals (all now defunct) *Science for the People*, *Science for People* and *Radical Science Journal*. Unfortunately, the critique of engineering does not boast an extensive literature.

7. The reasons are harder to pin down, because there are few definite actions or motivations to investigate, as in all cases where the issue is lack of interest and lack of investigation. I think that the reasons mentioned above are plausible, and have some basis in the writings and activities of activists and scholars (though I haven't gone into this sort of detail). By searching for explanations for neglect, it may be possible to find ways to stimulate greater interest in the topic.

8. I thank Robert Burrowes in particular for useful comments.

9. Carl von Clausewitz, *Vom Kriege [On War]* (Berlin: Ferdinand Dümmler, 1832). The following paragraphs on the centre of gravity are taken from Brian Martin, "Social defence strategy: the role of technology," *Journal of Peace Research*, Vol. 36, No. 5, 1999, pp. 535-552.

10. Direct disarmament is the disabling and dismantling of weapons by people without the permission of governments and commanders.

11. Anders Boserup and Andrew Mack, *War Without Weapons: Non-violence in National Defence* (London: Frances Pinter, 1974), pp. 148-182, quote at p. 163.

12. Gene Keyes, "Strategic non-violent defense: the construct of an option," *Journal of Strategic Studies*, Vol. 4, 1981, pp. 125-151, at p. 133.

13 Robert J. Burrowes, *The Strategy of Nonviolent Defense: A Gandhian Approach* (Albany, NY: State University of New York Press, 1996), p. 209.

14 One case is the Palestinian intifada, though the resistance is better described as unarmed than nonviolent.