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Ethics and Military Research

On the Moral Responsibility of Scientists

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This paper discusses the personal moral responsibility of scientists contributing to military research. A number of arguments defending the view that scientists do not carry any responsibility (or only a marginal responsibility) for the way in which their work is used are evaluated. It is argued that none of the arguments are convincing. Furthermore, some of the difficulties related to ascribing moral responsibility to scientists are considered.

In the time shortly after the end of the Second World War an interesting correspondence took place between Albert Einstein and the American Quaker A. J. Muste. The background for this correspondence was a public appeal in which Einstein's *Emergency Committee of Atomic Scientists* urged the public for donations to support scientists in their attempts to develop controls limiting the development and use of nuclear weapons. The point made by Muste in his letters was not that the content of the appeal was wrong, rather it was that if the appeal were to be taken seriously, then what Einstein and other scientists should do would be to renounce any involvement in constructing such weapons in the first place. He concluded by asking: "As for the masses, how can they be expected to believe that atomic weapons are as worthless and horrible as the scientists say they are, when the scientists continue to make the things [...]" and, furthermore, he declared that this "cannot make sense to ordinary human beings".[1]

The history of science reveals several examples of scientists who have followed Muste's prescriptions by renouncing involvement in military research. To take two examples within mathematics from very different epochs: Around 1600 the British mathematician John Napier – the founder of the theory of logarithms – experimented with a new form of artillery design. According to reports of witnesses, his invention cleared a very large area, destroying "all living creatures exceeding a foot in height". Napier was forced to take great pains to conceal the work-

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[1] Muste, A. J., *Letter to A. Einstein* dated September 15, 1947. Located at: Records of the fellowship of reconciliation, Swarthmore College Peace Collection, Swarthmore, PA. My attention was directed to this correspondence by Chalk, R., Drawing the line: an examination of conscientious objection in science, in: Mircham, C. and Siekevitz, P. (eds.): *Ethical Issues Associated with Scientific and Technological Research for the Military, Annals of the New York Academy of Science*, vol. 577, New York 1989. I here quote from and draw on Chalk, p. 61.

ings of his invention and, in the latter part of his life, spoke specifically against the construction of new weapons.[2] Another more recent example is that of the mathematician Norbert Wiener – the founder of the field of cybernetics research – who had been working on guided missiles during the Second World War but, in the aftermath of the Hiroshima bombing publicly announced his decision not to "publish any future work [...] which may do damage in the hands of irresponsible militarists".[3] Though there are thus notable examples of scientists who have acted and made decisions which accord well with Muste's recommendations, it seems to be a fact that most scientists who are offered an opportunity to engage in – or who have in their careers carried out – military research do not take such radical stands. Many scientists are probably less concerned with moral implications than with the scientific attractions of their work or, as J. Robert Oppenheimer once put it, the scientific "sweetness" of the problems.

What I shall be concerned with here, however, is not the question of what motivates scientists in their work nor the question of how scientists throughout history have perceived their role in relation to military inventions and development but, rather, the ethical question which constituted the core of the Einstein-Muste correspondence – namely, whether scientists can be held to be acting rightly or wrongly in carrying out military research or, as it is often put, whether scientists in this respect have a moral responsibility. Should we, for instance, regard it as ethically illegitimate when scientists contribute to the construction of weapon systems or to the development of other sorts of military technology? Due to the comprehensive attention which over the last decades has been directed to this sort of question, and owing to the limited length of this article, several aspects of the question will have to be left untouched. What I shall do is to consider, in the following five sections, a number of arguments which have been presented in the debate; all arguments are to the effect that scientists either do not have a moral responsibility or that if they do bear such a responsibility this is only to a very marginal extent. I shall suggest that neither of these arguments are convincing. In the final section, I shall briefly argue that – in so far as scientists do have a moral responsibility – the relation between such a responsibility and the justification of warfare is pretty complex, which means that it is a very difficult task to make evaluations of responsibility for the individual scientist.

1 The Nature-of-scientific-inquiry Argument

The first argument I shall consider basically holds that the idea of the moral responsibility of scientists rests on misrepresentation of the nature of scientific work. The argument has been presented most forcefully by Robert Hoffman who

[2] See Chalk, R., Drawing the line: an examination of consientious objection in science, op. cit. note 1, p. 65.

[3] Quoted from Chalk, R., Drawing the line: an examination of conscientious objection, op. cit. note 1, p. 69. Original in Wiener, N., A scientist rebels, *Atlantic Monthly* **179** (1946), p. 46.

contends that the claim that the freedom of scientists to pursue the truth should be withheld only if the scientist rightly recognizes his moral responsibility, and the claim that the scientist may sometimes have a positive duty to limit his research, are both mistaken. These views are simply based upon a "defective theory" of scientific inquiry. According to Hoffman, inquiry, rightly conceived, is an "activity that seeks to eliminate an undesirable characteristic of a situation", namely, "its doubtfulness or indeterminateness". Thus, the starting point of inquiry is the "recognition of the indeterminateness of a certain situation with respect to a specific issue". Now, on the ground of this somewhat meagre characteristic of scientific inquiry, he goes on to claim that we can "see how odd it is to hold a scientist responsible for the specific truth he finds". Hoffman's point is that to hold a scientist responsible for what he discovers is "tantamount to demanding that he rightly foresee the outcome of his inquiry before initiating it". But if that were possible, that is, if he could foresee the specific truth it would yield, "there would be no need for inquiry".[4] In short, since the essential nature of inquiry is that one cannot foresee what one will discover, the scientist cannot properly be held responsible for the results that follow from his research.

Hoffman's argument can be perceived as related to the traditional "moral luck argument" which has received wide attention in the modern discussion of ethical theory. According to this argument, it is absurd to hold someone morally responsible for consequences which follow from acts as a result of mere good or bad luck. However, in my view it is hard to find any interpretation of Hoffman's argument which does not leave it highly implausible. The first thing worth noticing is that, even if the sketched description of what characterizes scientific inquiry is correct, it does not follow that the scientist is exempted from responsibility in all parts of his work. Carrying out an inquiry is only one part of the scientific work; another is the communication of the results of an inquiry. Thus, even if it is correct, an inquiry is a process in which the scientist discovers something which at the beginning was unforeseeable, then there is no reason why he should not be held responsible for communicating the results when doing so can be expected to have terrible consequences. As mentioned, abstaining from publishing certain results was exactly the device adopted by Wiener. To this Hoffman might, of course, respond that all he is concerned with is the discussion of responsibility in relation to scientific inquiry. However, even if this is so, there is a second point which makes it reasonable to regard the argument as defective, namely, that it rests on a misrepresentation of the nature of scientific research. Admittedly, there exists scientific research which is *pure* or *fundamental* in the sense that it, from the outset, is not clear what the precise purpose of the inquiry consists in. Moreover, it is obviously also correct that scientific inquiries now and then produce results which were totally unexpected, that is, which almost pop up as luck would have it. However, most scientific research does not fit this description. On the contrary, typical research is better described as "mission-oriented", in the sense that the

[4] All quotations are from Hoffman, R., Scientific research and moral rectitude, *Philosophy* **50**

scientist seeks to solve pretty well-defined problems.[5] When Harvard Professor Louis Fieser during the Second World War was presented with the task of developing a means for burning out Japanese from bunkers, it did not make much sense to hold that he, at the beginning of his research, had no idea what he was looking for. Even though it is trivially true that Fieser did not from the start know the precise outcome that would follow from his inquiry – which in this case turned out to be napalm – he certainly had an idea of what would constitute a satisfactory solution to the problem. The same is the case, to a larger or minor extent, with much other research. That is not to say that it may be clear how the results of the research will in the end be used by those who make that kind of decision – but I shall return to this question below. What is important is that scientists may have qualified expectations with regard to what may follow from their work if it turns out successfully. But, in that case, the nature of scientific inquiry does not itself rule out the idea of ascribing a moral responsibility to the scientist. If such a responsibility does not exist it must be due to some other reason.

2 The Morality-is-handled-by-the-state Argument

Another argument which has now and then been presented in the discussion of the moral responsibility of scientists seeks to reject such a responsibility on the ground of an appeal to the contention that questions of right and wrong do not lie in the hands of individual scientists. For instance, some of the atomic scientists who responded to Muste's appeal not to take part in the construction of weapons did so by objecting that it is simply not the responsibility of scientists to judge whether research projects should be initiated or continued. Hans Bethe held that a "strike" by the scientists "would only antagonize the public of the United States who would rightly accuse us of trying to dictate the policies of the country".[6] And Willie Higinbotham even more emphatically proclaimed that "We believe in government by the people [...] if scientists were to walk out on all military projects they would be taking the law into their own hands just as surely as the Ku Klux Klan".[7]

Put in a more general form, the argument which can be reconstructed on the ground of these quotations may go the following way: As long as a scientific research project does not in any way violate the law and is perhaps in one way or the other endorsed by the government of the society, the individual scientist should not concern himself with the ethical aspects of the research and cannot either be held responsible in the sense that he, for instance, may be regarded as having acted

[5] See also the criticism of Hoffman's view in Belsey, A., The moral responsibility of the scientist, *Philosophy* **53** (1978).

[6] Bethe, H., *Letter to A. J. Muste* dated December 16, 1946, location see op.cit, note 1. I here quote from Clark, R., Drawing the line: an examination of conscientious objection in science, op.cit. note 1, p. 62.

[7]

wrongly by carrying out his work. Morality, so to speak, is handled by the state and by the state only. Hence, as long as these conditions are satisfied it cannot be wrong for a scientist to take part in military research. In fact, it might perhaps even be held to be wrong not to take part in such projects. Now, is this argument convincing?

In order to answer this question, clarification is required. It is simply not obvious what the precise content of the argument amounts to. At least two overall interpretations can be distinguished, each of which seems to call for further elaboration in order to be conclusive. The first interpretation would be to hold that the claim that "the state handles morality" means that whatever the government judges right or wrong simply *is* right or wrong. What makes a certain policy right is that it is sanctioned by the state. The second interpretation might be that the claim means that governmental decisions and regulations function as some sort of filtering system in the sense that if some kind of project is wrong, and thus should not be undertaken, it would be filtered out by the government in the first place. Thus, on this view it is not the governmental decisions themselves which make a certain policy or project right or wrong – they are, so to speak, not right- and wrong-producing – but the government sees to it that only what is morally right makes it through the filter.

Now, it should be noticed that if the intention of the morality-is-handled-by-the-state argument is to show that the scientists do not carry any moral responsibility, that is, that they should be regarded as *amoral* in their professional roles, then the argument is flawed. On neither interpretation does it follow that scientists do not have a moral responsibility. No matter whether governmental decisions produce right and wrong decisions or merely filter out the right from the wrong, there would still seem to remain a moral responsibility for the scientist, namely, to act in accordance with what is right and wrong, that is, to follow the policies which are endorsed by the government. In that sense, the scientist is not left genuinely amoral in his work. However, it might still be held that the sort of cases which have typically led to discussions of the responsibility of scientists such as, for instance, scientists' contributions to state-mandated development of mass-destruction weapon systems, would be ruled out by the argument. There would be no room for conflict between what is morally right and what is endorsed by the state. Be that as it may, however, there are still reasons to doubt the argument in either interpretation.

The question which the first interpretation naturally gives rise to is: why should we accept the position in the first place? That is, why should we accept that some policy is morally right just because it is endorsed by the state? Probably the most appealing answer would go along the lines of Higinbotham's quoted subscription to "government by the people"; that is, to hold that if a policy is endorsed by society through a representative government, then it is right precisely because it reflects the voice of the people. However, even though we in a democratic society would apparently in many situations regard such a view as reasonable, it is nevertheless a position which is morally highly controversial and which would thus need further support to be convincing. Firstly, it is not hard to construct (or find) examples of decisions which are made by representative governments but which might still

in fact determined relative to what a certain decision-maker decides, why shou the decision-maker then be a representative government and not another partic lar group of people or perhaps certain individuals? This is a question that needs be answered in order to bring support to the view. And notice that the view cann be supported by the sort of moral arguments by which the legitimacy of democrat decisions are often sustained. If something is right if and only if it is endorsc by a representative government, then the claim that this position is morally rig becomes circular.[8] Finally, the claim that what is right is what is endorsed by a re| resentative government seems dubious if the notion of endorsement is not qualifie The obvious question is whether governmentally endorsed projects are right eve if they are endorsed on the ground of factually mistaken assumptions. Suppo: that a government endorses a certain project on the ground of the assumption th the project will not have any environmentally damaging consequences, but that scientist knows that this assumption is not correct. In that case, it is certainly dubious position to hold that what the government decided is right. However, su| pose that the conception of endorsement is qualified by holding that what is rig| is what is endorsed by a government if it is not endorsed on the ground of fal: assumptions. In that case there might be cases where certain projects are endorsc by the government but where a scientist would be right in not acting in accordanc with the endorsement. And there might be cases in which a scientist could right be morally accused for having participated in a military research project, eve when the project was actually endorsed by the government. Thus, there would n be much left of the initial idea that morality is only a governmental affair.

Let us then turn to the second interpretation of the argument. Is it more re: sonable to hold that a representative government sees to it that only what is rig| passes through the filter of decisions? As in the case of the first interpretatio: neither does this version of the argument justify the conclusion that the scientist amoral in his professional role. It seems that there would still be something rig| which the scientists ought to act in accordance with, namely, the decisions mac by the government (and *vice versa* with regard to policies which are governmer tally rejected). Be that as it may, there is an obvious problem that confronts th position, namely, that it rests on an assumption which is highly dubious. In ord to reach the conclusion that there cannot be situations in which a scientist ac wrongly by following governmental decisions or rightly by acting against suc decisions, it will have to be presupposed that the government always correct manages to distinguish right from wrong. However, it is certainly hard to see ho such an assumption of infallibility can be supported. On the contrary, it is reasor able to assume that even the most well-functioning governments may sometim fail in their decisions with regard to what should and what should not be don Which means that there may still be something to be said by others, such as scier tists engaged in military research.

Thus in sum, the idea that "the state handles morality", understood in the sens that once a certain scientific project is endorsed by the government there woul

be no moral questions left on the shoulders of scientists, is not plausible. Neither the interpretation that governmental decisions create right and wrong, nor the – in one way – more modest interpretation that the government filters out right from wrong, succeeded in bringing support to the picture of a scientist who is basically amoral in his professional life. And both interpretations on closer scrutiny turn out to be highly dubious. However, perhaps the important thing is not whether military research is governmentally endorsed in the first place but rather how a government or whoever is politically responsible decides to apply the outcome of the scientific work. This is the point of the argument to which we shall now turn.

3 The Scientists-do-not-decide-on-application Argument

The argument which, I believe, most naturally comes to mind in the discussion of the moral responsibility of scientists who perform military research is that the ascription of responsibility to scientists is misplaced because it rests on a conflation of research and application. The argument has been presented forcefully by Hoffman who, as an example, considers a virus inquiry which leads to the discovery of chemical compounds that are toxic to humans. Now, as Hoffman puts it, one of the "logical implications of the statement that a certain chemical compound is toxic to human beings is the statement that *if* the compound were to be used effectively in warfare, it would harm people". However, as he emphasizes, this statement is hypothetical, that is, it does not enjoin anyone to use the chemical compound in waging warfare. The decision to wage chemical warfare is simply not an implication of the scientific inquiry nor the truths it discovers. It is, Hoffman contends, therefore "senseless to ascribe responsibility to him [the scientist] for the use of his discovery. Responsibility for that use is rightly ascribed to whoever formulates the policy and whoever makes the decisions".[9] If the result of military research is wrongly applied it is the government or another possible decision-maker who should be held responsible. One should not shoot at the scientists.

Put in a more general form, the argument is based on the premise that the people who make fatal decisions or acts are those who should be held responsible: they are the ones who may be deciding or acting rightly or wrongly. Responsibility should be ascribed to the latest mind which enters a stream of events. The problem with this view simply is that, even though there are situations in which it seems reasonable, there are certainly also cases in which it seems highly problematic. To illustrate this we can use an example made up by Immanuel Kant in a short famous essay titled "On the Supposed Right to Lie from Altruistic Motives".[10]

[9] Hoffman, R., Scientific research and moral rectitude, op.cit. note 4, p. 476.

[10] Kant's "On the supposed right to lie from altruistic motives" can be found in *Critique of Prac*

Kant imagines a person who is fleeing from a murderer and who tells you wh he is going to hide. When the murderer comes along and asks where the flee person went you have pretty good reasons to believe that, if you tell the truth, t person will be found and killed by the murderer. What should you do – tell truth or lie? The reason that Kant's essay is famous is not that it constitutes place where he provides the most elaborate insights of his moral philosophy rather that it clearly illustrates what most people regard as an implausible rig ism of his position: according to Kant it would be wrong to lie even if this w the only way to save a person's life. However, if one agrees that Kant's answer morally unacceptable, that is, that you may act wrongly by telling the truth, th one cannot at the same time maintain the view that it is only the last person a serious of events to whom responsibility may be ascribed. Put in another w Hoffman is wrong when he holds that one should only be held responsible for wh follows logically from descriptions of one's acts. If one has good reasons to beli that something fatal will follow if one acts in a certain way and that this could prevented if one does not do so, then this provides a sufficient base for the ascri tion of responsibility to the moral agent. If this view is applied to the discussion military research it implies that, if a scientist has reasonable grounds for regardi it as likely that the results of his research will be used, by the government (or wh ever makes the relevant decisions), in a way that will adversely affect mankin then he may be acting wrongly in carrying out the research or by communicati the results. Thus, the scientists-do-not-decide-on-application argument cann I believe, stand closer scrutiny. If the argument at first sight seems convincin this may be because one imagines situations in which one has no idea how t outcomes of one's research will be used by others. In such a case, it may strike as much more reasonable to exempt the researcher from any moral responsibilit However, just as this lack of insight into future consequences did not exist in t murderer example, neither is there general reason to believe that it correctly repr sents what is at stake in military research. That more may be said on the possibili of making such estimations on the application of the results of scientific researc is an issue I shall return to below. However, enough has been said to reject t argument that has been considered in this section.

4 The Replaceability Argument

An answer which is frequently met in contexts in which someone is blamed f having acted in a way which had undesirable consequences, is that the act d not really make any difference because the consequences would have occurre anyway, namely, as a result of someone else's act. More plainly put, the argume says that "If I did not do it, someone else would" therefore "I did not really d anything wrong". It might be suggested that this well-known argument can b transferred directly to our discussion of the moral responsibility of scientists. If particular scientist had not taken part in a military research project someone el

The argument clearly has some appeal. We are often inclined to believe that the rightness or wrongness of an act should be evaluated on the ground of the consequences of the act. For instance, in many cases we find it reasonable to hold that an act was wrong because it led to a result which was worse than what would have been the case had the act not been performed. Therefore, if one can show that a scientist's work did not really make any difference because his work would have been carried out no matter whether or not he did it, there would no longer be a ground for regarding carrying out his work as wrong. Nevertheless, there are good reasons to be sceptical with regard to this argument.

It is obvious that in order to be sound it must be presupposed that the empirical premise of the argument is correct. That is, that the scientist actually would have been fully replaceable had he not undertaken his research. The premise would be wrong if other scientists, for personal or moral reasons, would not have taken on the work, or if other scientists did not possess the sufficient skills to do the work. However, even if we assume – which is probably often the case – that the replaceability premise is correct, there is another more basic reason to reject the argument. It is simply not plausible to hold that the possibility of replacement exempts one from moral responsibility. As Douglas P. Lackey has pointed out there are probably only a few people who would be willing to accept this significance of replaceability if the focus were to be on right or praiseworthy actions. As he puts it "I would be surprised to find a scientist working on a project who would accept the argument that he does not deserve to be paid for his work because, if he had not done it, someone else would have stepped in and done the same work".[11] Be that as it may, I believe that the implausibility of the alleged moral significance of replaceability can be demonstrated straightforwardly by a simple example which is far from the work of scientists.

Suppose that Smith and Jones both intend to kill an innocent person before them, and that Smith knows that if he does not kill the person Jones certainly will. Now, will it be wrong if Smith kills the innocent person? The answer must certainly be in the affirmative. However, if Smith does not kill the person it will not make any difference: the person will be killed by Jones. Thus, it seems that there might be cases in which an individual act may be judged wrong even though it did not make any difference in the final result.[12] To object that one can never be absolutely certain that a particular result would have been produced anyway – that Smith could never be certain that Jones would have done the killing – and that this makes an important moral difference, is not a way out of the problem if one wishes to maintain that scientists do not carry a moral responsibility: neither in their case would there be certainty with regard to replaceability. Thus, I believe that the replaceability argument should not be accepted.

[11] Lackey, D. P., Military funds, moral demands: personal responsibility of the individual scientist, in Mitcham, C. and Siekevitz, P. (eds.), op.cit. note 1, p. 128.

5 The Share-of-the-total Argument

The earlier discussion of Kant's murder example showed that it is not plausible to maintain that one is exempted from responsibility merely because another person's decisions are also involved in the production of a bad result. However, it might be held that the example may bring support to another argument which does not seek to establish that scientists do not have any moral responsibility but rather that even if they do bear a responsibility it is only a very marginal one: a responsibility that may almost be ignored.

The argument is pretty simple. On the one hand, it does not seem reasonable to hold that one does not bear any moral responsibility if one told the murderer where the fleeing person was hiding and this, as expected, led to the death of the person. On the other hand, it seems counter-intuitive to hold that one bears the total responsibility for the death of this person: after all, what one did was only to tell the truth to someone who then carried out the murder. The fatal result would not have occurred had the murderer not acted as he did. Thus, the truth-telling person bears some but not the full responsibility for what happened. Put in more general terms, the view is that in situations in which many people contribute to a certain outcome, each contributor is only responsible for a small share of this outcome. Now, if this apparently appealing view is correct it has obvious implications for the discussion of scientific responsibility. Suppose that the work which a scientist has done is in the end applied in a weapon system and that this system is used in a way that has fatal consequences. Obviously the fatal result is then not only a consequence of the scientist's decision to carry out his research. Several other people's decisions and acts have been involved in the production of the fatal outcome, for instance, other scientists, engineers, politicians, military personnel, and many others. There is usually a very long distance from the scientist's writing desk to the final consequences of the application of his work. Therefore, if what might be called the "share-of-the-total view" is correct, that is, if each contributor to a project does not bear responsibility except for a small share of the final outcome, it would seem that the individual scientist only makes a morally almost negligible contribution to the bad result.

Sometimes it might, of course, be the case that the distance between the result of the scientific research and the consequences of the application is not so long. Moreover, there might also be cases in which the fatal consequences are of such a high magnitude that even a small share of the total responsibility would amount to something which was far from negligible. However, even if we leave these possibilities aside there is a more general reason to reject the argument, namely, that the share-of-the-total view on closer inspection turns out to not be morally acceptable. In cases where the persons who are involved in a certain project each makes a contribution which is necessary for the production of the final outcome, it simply does not seem morally plausible to maintain that each person bears responsibility only for a share of this outcome. This can be illustrated relatively easily by adopting an

example presented by the Oxford philosopher Derek Parfit.[13] Suppose that, due to an accident, the lives of a hundred people are in danger. These people can be saved if I and three other people join in a rescue mission. If any of us fails to join, all of the 100 people will die. However, if I fail to join, I could save, single-handedly, 50 people. What should I do?

If one adopts the share-of-the-total view then, by joining the rescue mission with the three others, I would be responsible for saving 25 lives. Compared with the 50 lives I would save by acting single-handedly, this view therefore implies that I ought to operate on my own. I should not join the rescue mission. But this clearly is an unacceptable conclusion. It is indisputably better if 100 lives are saved than if 50 lives are.[14] However, in order to reach this conclusion, that is, in order to make my participating in the rescue mission the rational answer, we will have to give up the share-of-the-total view in favour of a view which ascribes full responsibility – that is, responsibility for the whole outcome – to each person whose work is a necessary condition for the success of a project.[15] Admittedly, the claim that we should be held responsible for having benefited (or harmed) someone in the sense this principle suggests, does not correspond fully with our ordinary idea of when we benefit (or harm) someone. We are often inclined to believe that we have benefited (or harmed) someone only when the act we perform is the chief or immediate cause of the benefit (or harm). However, as the example indicated, we may benefit (or harm) someone even when an act is a more remote part of the cause that led to the benefit (or harm). The share-of-the-total view simply constitutes what Parfit rightly refers to as a "mistake in moral mathematics".

This leaves us with a pretty simple conclusion. If the work of a scientist who contributes to military research is a necessary condition for the final application of, say, a certain weapon system or some other piece of military technology, then the fact that the scientist is far distant from the application of the weapon system, in the sense that many others' work and decisions are also necessary for the application, does not reduce the responsibility of the scientist. The scientist may – along with many others, such as politicians and military decision-makers – be held totally responsible for a bad result.

6 Concluding Remarks

In the previous sections, I have evaluated a number of arguments to the effect that scientists cannot rightly be said to bear a moral responsibility in their pro-

[13] Ibid. p. 67-70. The argument is also discussed by Lackey, D. C., Military funds, moral demands: personal responsibility of the individual scientist, op. cit. note 10, p. 129.

[14] It is, in the example, assumed that the other three persons would not be able to save any lives if they were acting single-handedly.

[15] Strictly speaking, the view that full responsibility should be ascribed to all who contribute with something that is necessary for the production of a certain outcome, does not follow

fessional life as military researchers. According to the first argument, the idea ascribing moral responsibility to scientists was based on a lack of understandi of the nature of scientific research. The open-endedness of the scientific inqui it was held, makes it absurd to ascribe moral responsibility for the results. As w argued, however, this argument basically ignored the mission-orientedness of mc military research. The second argument sought to establish the lack of respon bility on the ground of the view that morality is an issue for the state, not for t individual scientist. As was made clear, the argument did not succeed in showi that scientists are exempted from any responsibility and neither of the consi ered interpretations of the view on closer examination turned out as plausib According to the third argument, the amoral nature of the scientist's work was simple implication of the fact that it is not scientists who decide whether or ho the results of their work should be applied. Responsibility should be ascribed politicians and other decision-makers, not to scientists. However, as the examp of the murderer and the fleeing person demonstrated, it is on closer scrutiny n reasonable to hold that only the final agent or decision-makers in a series of even leading to a bad result should be held responsible. The fourth argument suggest that due to the fact that a scientist may have been replaced by another if he h not carried out his research, the ascription of responsibility was misplaced. As response, I argued that replaceability, even if it is correct, does not exempt o from responsibility. Finally, it was argued that the argument, that a scientist is on one part in a series of agents whose work and decisions may lead to a bad or goo outcome, does not imply that responsibility is correspondingly reduced. Anyo who makes necessary contributions to a project should be ascribed responsibili for the total result of the project. In sum, neither of the arguments I have examin has succeeding in showing that scientists are exempted from responsibility in th work as military researchers.

To me it seems much more plausible to maintain the opposite view, namely, th military researchers may be held to bear a responsibility. Though I shall not he engage in a closer discussion of the precise foundation of such a responsibility wish to make one further comment on the matter. Acting in accordance with moral responsibility may be a very complicated matter. To take a few exampl The term military research – which is often used somewhat loosely – covers enormous range of activities. For some of these activities it is a fact that both mi tary and civilian applications are apparent. It is a well-known fact that not or nuclear power, but also drugs, pesticides, aircraft, radar, processed food, satellit computers, transistors, lasers and many other technologies have been develop for military purposes but have also had obvious civilian applications. There is reason why a possible civilian spin-off should not be counted in when the scient is considering the pros and cons for engaging in a research project. But this clea complicates the ethical evaluation.

Furthermore, when considering whether it would be right or wrong to take p in a certain military research project it is often assumed that the answer to t question depends on whether a war or some other kind of military operation, which the result of the research is applied, would be morally justified. Roug

to carry out the military research, or perhaps it would even be right to do so and, oppositely, if the military operation is morally unjustified it would be wrong to undertake the military research. For instance, pacifists – like Muste – who believe that all sorts of warfare is unjustified usually hold that military research is wrong. And advocates of the just-war tradition also often seem to defend this sort of relation between whether wars are just or unjust and whether military research is right or wrong. However, this relation is clearly much too simplistic. Even if a military operation is just, a certain military technology may lead to an increase in the number of victims and, oppositely, if a military operation is not justified the application of a certain technology may nevertheless decrease the number of victims. In fact, if there is something to the old saying *si vis pacem para bellum*,[16] then even a pacifist may regard military research as right. Thus, there is no simple relation between the legitimacy of war and the rightness or wrongness of military research. This clearly underlines the complexity of an ethical assessment of this sort of research.

The reason for mentioning these examples is, on the one hand, to underline that it may in practice be very difficult for the individual scientist to assess whether it would be right or wrong to engage in miliary research. But also, on the other, to emphasize that this complexity of bearing and carrying out responsibility should not be conflated with the view that scientists do not have any responsibility. The former view makes it vital to engage in and seek to sort out the practical complications – the latter view makes this work irrelevant.

IV
Enlightenment Perspectives