

# Weapons Research and Development

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The best-known example of weapons research and development (WRD) is the Manhattan Project, which produced the first three nuclear weapons and the only ones to have been used in wartime (see *NUCLEAR WEAPONS*). This project made use of recent discoveries in nuclear physics, as well as other scientific theories and state-of-the-art experimental and computational techniques: nuclear weapons were, in other words, products of applied science. However, if WRD is defined as a species of applied science (Arrigo 2000: 303), then it becomes a relatively recent endeavor and much else that should really be included under the heading will be ruled out. For instance, Mikhail Kalashnikov designed the AK-47 assault rifle, at about the same time as the Manhattan Project, without consciously applying any scientific theory. The AK-47 is sturdy, well-made, reliable, and easy to operate, and is the most widely used weapon since World War II – and was surely the product of WRD. For this reason, a definition of WRD such as the following is recommended: WRD is research and development aimed at the *design* of new weapons, improvements of existing weapons, or the design and improvement of ancillary and support structures (Forge 2013: 14). The latter include weapons platforms, such as ships, and methods of command, control, and communication. Given this broad characterization, and provided that research is not itself understood too narrowly, WRD can be dated from at least the fourth century BCE, if not earlier, when there were systematic and codified attempts to make siege artillery (Rihill 2007). WRD in this general sense, as opposed to specific examples of WRD directed toward particular weapons such as weapons of mass destruction, is a neglected but important topic in applied ethics. It will be the topic addressed in what follows, with one exception to be discussed next and included here because it is currently of interest.

There are as yet, we believe, no autonomous weapons (AWs) in existence, but there have been calls, by philosophers as well as AI specialists and others, for there to be a moratorium on further research into their possibility so that there never will be. Almost all existing weapons systems have human “operators” who consciously select their targets, and do so more or less precisely and accurately; mines, booby traps, and other such remote devices are different in that their targets are selected passively, and at the moment these are the only exceptions. AWs will be, or are intended to be, intelligent systems which learn from their environment, in line with their basic programming, what to attack. One way to construct examples of AWs (thought experiments at this stage) is simply to impute to them the ability to carry out the missions of human soldiers. So, for instance, suppose the mission is to enter a village where there are thought to be insurgents, to identify and deal with any

insurgents, while leaving the noncombatants unharmed. In this case, it will be necessary for a squad of AWs carrying out the mission to be able to discriminate between insurgents and noncombatants and to deal with the latter in the appropriate manner. Just as ordinary soldiers would have some idea in advance who is an enemy and who is not – in the most obvious case, the former are those with the weapons shooting at them – and then deal with the situation in the village as they find it, so too for the AWs. What is it about AWs that makes them therefore morally unacceptable? If some particular WRD projects should be banned, then this will be because the weapons in question will have features that make them unacceptable. For instance, weapons of mass destruction do not discriminate between combatants and noncombatants and their use is disproportionate; they should therefore not be made (*see* PROPORTIONALITY [IN WAR]).

If a weapon is autonomous, then no one, no human, can be responsible for what it does, for this is part of what it means for an agent to be autonomous. But if the application of force is to be legitimate, then those who apply force – soldiers who kill other human beings, for instance – must be responsible for what they do. Provided that only non-surrendering enemy combatants are killed, then the application of force is permissible; otherwise it is not and the agents in question must be held accountable. Much of the debate about AWs has concerned the possibility and significance of “responsibility gaps” were such weapons to be let loose: if no one can be held to account when AWs are used, then this undermines the notion that the application of force can be legitimate. Among others, Sparrow (2007) has argued that there are responsibility gaps and that this feature renders the use of AWs morally unacceptable; Schulzke (2013) has maintained that there are no such gaps; and Leveringhaus (2016) has claimed that the existence of responsibility gaps is not sufficient to show that the deployment of AWs is unacceptable. When a contested and multifaceted concept like moral responsibility is applied to a new and relatively imprecise notion such as that of AWs, a rich vein is opened up for philosophers to work on. There are other ideas on the topic as well. Leveringhaus claims that a second wave of issues about AWs is beginning to emerge, following the first wave of concerns about moral responsibility (2016: 86–7). Leveringhaus’s own contribution to the second wave is the proposition that human agency is necessary if warfare is to be legitimate because, unlike AWs, human soldiers have the choice not to shoot when all their “targeting parameters” are satisfied. There will doubtless be further debate on AWs.

Returning now to the question of WRD as a whole, it is, unlike its products, for the most part not harmful in any direct sense, in that those who design weapons are not harming anyone when conducting experiments, doing calculations, and so forth. The exception here is when WRD involves experiments on human and animal subjects, as has happened in poison gas research (Schmidt 2015). At the outset, therefore, it needs to be established that there is some indirect connection with harmful acts, for there is no other *moral* issue raised by WRD, though there may be economic or social issues to do with resource allocation. Hurka has introduced the idea of intervening wrongful agency, whereby an “innocent” agent, one who is not to

be held responsible, creates the conditions for wrongdoing by another party, and it might be thought that WRD is innocent in this sense (2005: 47). But this conclusion is not correct. Weapons are unique among all the artifacts produced by humans in that they are *designed* to harm. That is to say, what weapons do *primarily* is to hurt, maim, and kill people and other living things, and destroy things of value, such as homes, crops, and even whole societies. While there are several ways in which to view an activity whose primary purpose is the provision of the means to harm, depending, for example, on how the relation between harming and wrongful agency is understood (*see* HARM PRINCIPLE; MORAL ABSOLUTES), one that sees WRD as permissible provided that there is adequate justification is an acceptable starting point for further discussion (Forge 2017: 11–14). Once this is granted, the relevant moral issues have to do with justification (*see* RESPONSIBILITY).

Those who commission WRD and acquire armaments, mostly governments, do not advertise themselves as acquiring new means to harm people and destroy value. When reasons are given, these are couched in the language of strengthening defense, or obtaining the means for defense or deterrence, or some such – the largest WRD body today is allied to the US Department of Defense and has the title Defense Advanced Research Projects Agency. And, one assumes, this will be how (some) weapons researchers will often tend to represent their actions, namely for defense or deterrence. By describing WRD programs with reference to defense, it is suggested that these are needed to *prevent* harm, to prevent others using armed force to attack or coerce and so damage a country’s “vital interests.” Governments have an obligation to protect these interests, and in this way they justify their weapons acquisition programs (Forge 2013: 230–1).

There is, of course, nothing wrong with the weapons researcher being a patriotic person, but this should not lead her to always adopt the outlook of her country uncritically, for her country may be aggressive and bent on conquest, and will use the language of defense to disguise the purposes for which the products of WRD are to be used – many examples could be given. Clearly, it is wrong to be aggressive: it is wrong to use military force to take the lives or possessions of others, to deprive them of free choices and their way of life. Weapons are thus the means both to achieve such bad ends and to prevent them. The weapons researcher should try to ensure that the products of her work are only used to prevent bad outcomes, not promote them – indeed, as a moral agent, she must do so. The preferred option here, therefore, would be to only engage in WRD that produces weapons that are “inherently defensive” in the sense that they could not support aggression, as this would allow the weapons researcher to disregard all the contingencies of the particular historical context in which she finds herself and relieve her of the obligation to look ahead and try to see how the weapons she designs will be used.

Liddell Hart was one military strategist who thought that weapons could be classified as defensive and offensive, but he changed his mind about which weapons fitted into which category – he thought the tank was an offensive weapon and then classed it as defensive (*see* Mearsheimer 1988: 113). But the confusion here is not merely about how to categorize individual weapons like tanks. Weapons are designed

to fulfill given tactical roles or missions in virtue of their technical capabilities, but these roles or missions are typically embedded in various “higher levels” of war-fighting strategy, such as operations, theater strategy, and grand strategy (Luttwak 1987: 69–71; *see* WAR). An obvious candidate for a weapon that is defensive in the tactical sense is one that is fixed around an asset and is designed to prevent that asset from being destroyed. Such a mission could, however, be part of an aggressive strategy or war: Hitler’s headquarters during World War II were always ringed by defensive weapons. The mistake is thus to think that a weapon that has, or can have, a defensive mission could not be used in a war of aggression. There is a related issue here, one that reinforces the point just made – namely, that a country that decides henceforth to only engage in WRD for defensive roles is not necessarily less likely to be the victim of aggression. One of the most critical periods of the Cold War came in 1983, during the first Reagan Administration, when the Soviets thought, not unreasonably given the rhetoric, that the US was going to set up a “Star Wars” missile defense system, a move they felt was highly aggressive. Their thinking was that this could be a prelude to a nuclear attack on the Soviet Union, with the missile defense intended to neutralize any Soviet response (*see* SELF-DEFENSE). The Soviets seriously entertained the idea of striking first before the system was in place (Fitzgerald 1987).

Another option for dealing with the vital interest of security, and therefore another option for the weapons researcher, is to build a fearsome offensive capability, to deter any aggressor – deterrence is a relationship between states that obtains within some historical context (*see* DETERRENCE). Whether this is a good idea, and how to realize it, was an enduring theme of the Cold War. It was even suggested at the time that the nuclear arms race had become a kind of substitute for war, a competition in the realm of WRD rather than on the battlefield (Huntington 1983). However, any deterrent effect of a weapon derives from its primary purpose of being the means to cause harm: a deterrent only works if the weapon in question could cause unacceptable damage. The converse does not hold – the products of the Manhattan Project were never used to deter – and that is why deterrence is a *derivative* function of a weapon (Forge 2013: 144). So if deterrence is to be used to justify participation in WRD, there must be reasons to believe that deterrence will not fail – the price of nuclear deterrence failing is too great on any calculus – and that the weapons will not be used for aggressive ends in some other context. But what assurance can there be that this is true? In the first place, the historical record shows that neither the control of nuclear weapons nor the intelligence about Soviet (US) intentions was perfect. In the second place, an assumption might be made to the effect that the homeland of the weapons researcher is a good citizen of the world, one that does not engage in aggressive acts. But it is hard to come up with a country that has sponsored WRD which satisfies this demand for any significant time period. For example, the three countries that emerged victorious after World War II – Britain, the Soviet Union, and the United States – have all been guilty of aggressive acts, in Vietnam, Afghanistan, Iraq, and Syria, to name but four instances. Moreover, the products of both the examples of wartime WRD mentioned above came to be used in ways that

could not have been anticipated by their designers. Both programs began in 1942 and were intended for the war against Nazi Germany. But the atomic bomb, originally intended as a deterrent, was used against Japanese civilians, while the assault rifle, intended as an infantryman's weapon for World War II, has come to be used by, among others, terrorists and child soldiers – Kalashnikov himself had second thoughts about the invention of his “guns” (Kalashnikov 2006).

This problem, of weapons being designed in one context to deal with certain immediate needs but coming to be used in quite different and unanticipated ways in another context, becomes more difficult to address when attention is focused on the immediate outcome of WRD as opposed to the hardware which this enables. WRD produces *knowledge* (Hacking 1986: 239), knowledge in the form of design instructions for making weapons (Forge 2017: 23–7). Designs, unlike the weapons themselves, never wear out, and there is no limit on how many weapons are made from them. Designs can be licensed, stolen, sold, uncovered by reverse engineering, copied, and even rediscovered – Heisenberg “discovered” how the atomic bomb worked after hearing that it was used against Japan and hence that it was in fact possible. Granted that weapons researchers understand that they produce designs that can project into the future, then the case can be made for holding them responsible for future unknown effects of their work – agents can be responsible for what they do not foresee if it can be shown that these things should have been foreseen (Forge 2008: Chs. 6–7). These possible unknown future effects cannot be *assumed* to be “good,” to involve the prevention of harm or in the prosecution of a just war or some such (*see* JUST CAUSE). But to justify WRD, that must be established; yet it is unclear how to do it.

WRD is, to repeat, a relatively new area for moral philosophers. The aim here has been to introduce the topic and show what the important issues are, as well as to outline the main positions, such as they are. The outstanding issue remains whether it is possible to justify episodes of WRD with reference to the historical context in which the work is done, for it is clear that the technical capabilities of the weapons themselves, and the roles and missions for which they are intended, will not suffice.

**See also:** DETERRENCE; HARM PRINCIPLE; JUST CAUSE; MORAL ABSOLUTES; NUCLEAR WEAPONS; PROPORTIONALITY (IN WAR); RESPONSIBILITY; SELF-DEFENSE; WAR

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