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Farewell to *WMD*: The Language and Science of Mass Destruction

CHRISTIAN ENEMARK

The term *weapons of mass destruction* (WMD) has been part of diplomatic, policy, and scholarly discourse for more than 60 years, and its use has increased sharply in the past decade. This article critically assesses the term and concludes that it should and can be abandoned. Nuclear, biological, and chemical weapons are commonly lumped together as WMD, but such conflation is dangerous. It is misleading from a technological viewpoint, and it renders the term vulnerable to political manipulation. There are important scientific and strategic differences between weapon types, and glossing over these confuses the tasks of accurately assessing and effectively addressing threats of mass destruction. The language of WMD obscures the paramount threat of nuclear weapons, exaggerates the destructive power of chemical weapons, and is unhelpful or counterproductive when used in the context of biological weapons. In the interests of effective policymaking and sound academic analysis, it is important to avoid generating the impression that dissimilar types of weaponry present comparable challenges. In presenting arguments on the desirability, therefore, of dispensing with the term WMD, the article begins by tracing the term's origins and evolution. The discussion then turns to the key scientific differences between nuclear, biological, and chemical weapons, before moving on to explain why these differences matter for the purposes of preventing and responding to threats. Specifically, it will be shown that in the areas of deterrence, defence, and non-proliferation, WMD-based language can mischaracterize the challenges that are uniquely associated with each weapon type. This is especially the case when analogies are drawn between nuclear and biological weapons. Such mischaracterization has the potential to generate adverse security consequences should it lead to the implementation of inadequate or misdirected countermeasures. Finally, building on the argument that WMD-based language should be abandoned, the article considers the feasibility of abandonment, given that the term 'weapons of mass destruction' is widely used in policy circles and appears in the text of some international arms control treaties.

Origins and Evolution

The language of mass destruction in official discourse can be traced back at least as far as a November 1945 communiqué from a meeting between US President Harry Truman, British Prime Minister Clement Attlee, and Canadian Prime Minister Mackenzie King. The three leaders favoured 'eliminating from national armaments atomic weapons and all other major weapons adaptable to mass destruction'.[1]

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In 1948 the precise formulation 'weapons of mass destruction' was defined for the first time – by the United Nations Commission for Conventional Armaments – as: 'Atomic explosive weapons, radioactive material weapons, lethal chemical and biological weapons, and any weapons developed in the future which have characteristics comparable in destructive effect to those of the atomic bomb or other weapons mentioned above.'[2] This was done in an effort to set these weapons apart from conventional weapons and thus restrict the scope of the Commission's mandate. Thereafter, until around the time of the 1991 Gulf War, the term 'weapons of mass destruction' almost always referred only to nuclear weapons. During the 1962 Cuban missile crisis, for example, US President John F. Kennedy described missiles capable of carrying nuclear warheads as 'weapons of sudden mass destruction'.[3] In 1989, however, President George H.W. Bush appeared mainly to be contemplating chemical weapons when he referred to '[r]egimes armed with old and unappeasable animosities and modern weapons of mass destruction'.[4] Since then, the term 'weapons of mass destruction' has evolved from an obscure term of art employed by security analysts and arms control activists into a powerful and widely used political tag laden with moral condemnation. In the text of President Bill Clinton's 1998 National Security Strategy, 'WMD' appeared 31 times; and President George W. Bush's 2002 National Security Strategy used the term 24 times.[5] In December 2008 the congressionally mandated Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism issued a report concluding that 'It is more likely than not that a weapon of mass destruction will be used in a terrorist attack somewhere in the world by the end of 2013.'[6] In early 2010 the US Defense Department's Quadrennial Defense Review Report highlighted the need to 'prevent and respond to global WMD crises',[7] and its Nuclear Posture Review Report referred to WMD 10 times.[8] Readers of this journal will need little convincing that the term is well entrenched, not only in the language of defence and foreign policy officialdom but also in the analyses produced by academics and think tanks. Despite the past efforts of some writers to highlight the shortcomings of WMD-based language,[9] it is persistent and pervasive.

For the purpose of assessing the desirability of abandoning this language, it is important first to acknowledge the profound uncertainty surrounding the meaning of 'weapons of mass destruction'. In a magisterial survey of this topic published in 2006, Seth Carus identified over 40 different definitions of WMD that have emerged. Almost all of these fall into one of five definitional categories: 1. WMD as a synonym for nuclear, biological, and chemical weapons; 2. WMD as chemical, biological, radiological, and nuclear (CBRN) weapons; 3. WMD as CBRN and high-explosive (CBRNE) weapons; 4. WMD as CBRNE weapons and other means of causing massive disruption, such as cyber attacks; and 5. WMD as weapons that cause massive destruction or kill large numbers of people, which does not necessarily include or exclude CBRN weapons.[10] This article focuses on and critically assesses the first of these definitional categories, and the one which is most common when contemplating contemporary security policy – WMD as nuclear, biological, and chemical weapons. Beyond the field of arms control, it is worth noting briefly that a variety of other problems have also attracted the language of mass destruction. It

has been used rhetorically in describing, for example, climate change, HIV/AIDS, Botox, cigarettes, and even Saddam Hussein.[11] In the United States, in accordance with a very broad definition of 'Use of weapons of mass destruction' in the criminal code,[12] Timothy McVeigh was convicted of the October 1995 Oklahoma bombing, which used an ammonium nitrate truck bomb, alleged terrorist Zacarias Moussaoui was charged with conspiring to use 'airplanes … as missiles', and Richard Reid pleaded guilty to a charge of attempting to use a shoe bomb.[13] More recently, WMD-related charges have been brought with respect to the detonation of pipe bombs, the acquisition of hydrogen peroxide and nail polish remover for bomb-making purposes, an unsuccessful attempt to detonate a bomb on board a passenger airliner, and an attempted car bomb attack in New York's Times Square.[14] The desirability of retaining or abandoning WMD-based language in political rhetoric and domestic criminal law is a worthwhile question, but one for another day. For the purposes of this article, it remains to set out arguments against conflating nuclear, biological, and chemical weapons from a security-oriented, arms-control perspective.

Dismantling WMD

The linguistic device of grouping together, under one term, three weapon types that are technologically vastly different carries the risk that the uniqueness of each type will be overlooked. Each type differs greatly from the other two in terms of modes of production and deployment, predictability and lethality of effects, and effective response measures. That being so, as noted in a 2005 report by the Carnegie Endowment for International Peace, a failure to differentiate weapons' threats 'can lead to seriously flawed policy'.[15] Nevertheless, the language of WMD persists, and nuclear, biological, and chemical weapons thus all too often remain undifferentiated. The WMD label exaggerates the destructiveness of chemical weapons, misrepresents the problem of biological weapons, and diverts attention from the overriding importance of dealing with nuclear weapons. In 2009, for example, the US think tank Partnership for a Secure America released its WMD Report Card, which stated in the Introduction: 'A nuclear, chemical or biological weapon in the hands of terrorists remains the single greatest threat to our nation.'[16] Such a statement risks leaving the reader with the impression that each of these three weapon types has an equal claim to being 'the single greatest threat'. This is not the case. In contrast to nuclear weapons, the ability to cause mass destruction is a potential but unlikely property of biological weapons rather than an inherent one, and chemical weapons are so lacking in destructive power that any comparison with nuclear weapons is risible. It is important to understand why this is the case so that efforts and resources for prevention and response can be channelled appropriately.

The Obama administration's 2010 National Security Strategy included the statement: 'The gravest danger to the American people and global security continues to come from weapons of mass destruction, particularly nuclear weapons'.[17] It is puzzling that the Administration chose to use this form of words when the plain meaning of the statement is that 'the gravest danger comes from nuclear weapons'. Nuclear weapons are not just one variation on a theme of mass destruction. Rather,

they are arguably the only weapons that are truly and assuredly massively destructive. No other force generated by humankind can generate as much devastation over so wide an area in so short a time (leaving no moment for mitigation) as a nuclear explosion. Such force is characterized by a fast, brief release of nuclear radiation, a rapidly developing fireball which emits intense heat and light, and a powerful blast wave which travels out from the point of burst. The fireball rises quickly and cools, forming a spreading mushroom-shaped cloud atop a column of smoke and dust.[18] On 6 August 1945 a single American nuclear bomb dropped on the Japanese city of Hiroshima resulted in 68,000 deaths.[19] And the largest nuclear device ever tested in the atmosphere, of Soviet design and with an explosive yield equivalent to 60 million tons of TNT,[20] would surely have killed millions had it been used in anger. From a technical standpoint, it is a straightforward matter to characterize a nuclear weapon as a weapon of mass destruction, but the same cannot be said for non-nuclear weapons which also commonly attract the WMD label.

Biological weapons are pathogenic microorganisms (bacteria, viruses, fungi, *et cetera*) deliberately disseminated to cause disease and death. The common tendency to classify biological weapons simply as WMD is misleading because the extent of harm resulting from their use is highly variable. To begin with, much depends on the type and quantity of microorganism released. Anthrax, caused by *Bacillus anthracis* bacteria, would necessarily have limited reach because it is a non-contagious disease treatable with antibiotics. Plague, caused by *Yersinia pestis* bacteria, is much more easily transmitted. Smallpox, however, is contagious and cannot usually be treated after infection with *Variola major* virus, although this would be highly difficult to obtain following its eradication from nature in the late 1970s. As for delivering the chosen microorganism to human targets, difficulties undermining the utility of biological weapons include: the potential instability of agents after dissemination, or their destruction if explosive methods are used; the vulnerability of biological agents to weather conditions; the potential unpredictability of the effects of a biological attack, including the possibility that the attacker's own armed forces and/or civilian population will be affected; the required incubation period between a target's exposure to biological agents and the onset of disease symptoms; and the capacity of a target state's public health system to treat victims and, if necessary, contain contagion. No such difficulties attend the use of nuclear weapons, the immediate destructive effects of which simply cannot be mitigated by medical or other means.

The empirical record on biological weapons is fortunately sparse, and those few attacks that have reportedly occurred have typically been limited in their effects. For example, the biological attacks of 2001 in the United States using envelopes laced with anthrax bacteria resulted in just five deaths,[21] and the 1984 attack on salad bars in Oregon by Rajneesh cult members using sprinkled salmonella bacteria resulted in no deaths but 751 cases of severe diarrhoea.[22] This is not to preclude, however, the theoretical possibility that biological agents deployed differently could cause death on a very large scale. In 1970 the World Health Organization (WHO) estimated there would be 250,000 casualties, 100,000 of whom would die if left untreated, following the aircraft release of 50 kilograms of anthrax over an

urban population of five million.[23] But little empirical data exists on the public record to substantiate such an estimate and others like it. The accidental release of aerosolized anthrax from a Soviet military facility in 1979 killed around 70 people, and this event provided rare epidemiological data, but deep uncertainty remains as to the likely effects if aerosolized anthrax were released deliberately.[24] One of the world's leading scholars of biological weapons issues, Malcolm Dando, maintains that biological attacks can range from being WMD to being non-WMD in terms of scale.[25] For the reasons above, however, it is plausible that a biological attack is highly unlikely to bring consequences as dire as those of a nuclear attack. Repeated references to biological weapons as being a WMD problem focus attention on the worst-case end of the threat spectrum, yet such references are usually made without the reassurance that mass casualties are also the least likely outcome of a biological attack.

The third category of non-nuclear WMD, chemical weapons, have destructive power more readily comparable to conventional weapons. A chemical weapon is a toxic chemical compound directed against the tissue of a living target to cause injury, incapacitation or death. The critical requirements for turning a chemical agent into an effective weapon are that it be toxic enough to produce the desired level of casualties and stable enough to survive dissemination either through explosion of the delivery munition or passage through a spray device. However, even if delivered successfully, a number of atmospheric or ground conditions can influence the action of a chemical agent. These include air and ground temperature, exposure to sunlight, humidity, precipitation, wind speed and direction, soil conditions and terrain.[26] For example, high ground temperature could cause the agent to decompose, high wind velocity could cause its dilution, and heavy precipitation could wash the agent away.[27]

Towards the end of the Second World War, British officials reportedly considered attacking Tokyo with phosgene and mustard. A government-employed academic, Professor D. Brunt, investigated the advantages and disadvantages of attacking the city in the winter or the summer, and how to maximize casualties by attacking a crowded neighbourhood rather than a more open area. In advice dated 8 May 1944, he wrote: 'The winter is on the average cold, and may be so cold that the danger from mustard gas would be negligible.'[28] The hot summer would have been a better time to attack, 'provided that the attack took place during a gap in the heavy rain that typically occurred'.[29] Brunt also noted that 'In the densely built areas of Japanese-type buildings, where the streets are narrow, the flow of a gas cloud would be hindered by the narrowness of the streets.'[30]

The empirical record for chemical weapons is greater than that for biological weapons, although it still suggests strongly that the former cannot plausibly be categorized as WMD. During the First World War, only two to three per cent of those soldiers gassed on the Western Front died, whereas battle wounds caused by conventional weapons were up to 12 times more likely to result in death.[31] On average it took over a ton of gas to produce a single fatality,[32] and gas accounted for less than one per cent of battle deaths.[33] The 1988 Iraqi attack on the Kurdish town of Halabja using a combination of chemical and conventional munitions resulted in up to 5,000 deaths,[34]

and the 1995 attack on the Tokyo subway by members of the Aum Shinrikyo cult using the nerve agent sarin resulted ultimately in 13 deaths.[35] There is no empirical data on the effects of chemical weapons used in large numbers against cities, although Thomas McNaugher has suggested that the likely slow dissipation of chemical agents would cause greater damage when used against cities than when used tactically.[36] Nevertheless, compared to a nuclear blast, against which there can be no defence, a state could mitigate a chemical attack on a population centre by issuing protective gear, and the slow spread of chemicals would allow some time for evacuation.[37] According to a 1993 report by the US Office of Technology Assessment (OTA) entitled *Proliferation of Weapons of Mass Destruction: Assessing the Risks*, 'chemical weapons must be delivered in great quantities to approach the potential lethality of nuclear and biological weapons'.[38] However, the same can be said for conventional weapons. Two days of firebombing raids on Dresden in 1945 killed an estimated 25,000 German people,[39] one week of conventional bombing in July and August 1943 killed around 50,000 German citizens in Hamburg, and a single night of firebombing killed an estimated 100,000 Japanese people in Tokyo in March 1945.[40] The OTA assessment of chemical weapons thus hardly merited their inclusion in a report on weapons of mass destruction from which conventional weapons were deliberately excluded.

For the purposes of this article, the OTA report's highly influential assessment of biological weapons is of even greater concern. In a much-cited passage,[41] the report postulated a city the size of Washington DC populated by between 3,000 and 10,000 unprotected people per square kilometre. In an attack on that city using 'agents delivered by a Scud-like missile with a maximum payload of 1000 kg': 300 kg of sarin (a chemical agent) would cause 60–200 deaths; 30 kg of anthrax spores would cause 30,000–100,000 deaths; a 125-kiloton (Hiroshima-size) atomic bomb would cause 23,000–80,000 deaths; and a one-megaton hydrogen bomb would kill between 570,000 and 1.9 million people.[42] In an attack on the same city using 'highly efficient, line-source delivery' from an aircraft, the result (depending on weather conditions) would be: between 300 and 8,000 deaths using 1000 kg of sarin; and between 130,000 and three million deaths using 100 kg of anthrax spores.[43] It is noteworthy that, according to the OTA assessment, the maximum damage from line-source delivery of anthrax would exceed the maximum damage from a missile-delivered one-megaton nuclear weapon by more than 50 per cent. Thus the OTA report concluded that 'in principle, biological weapons efficiently *delivered under the right conditions* against unprotected populations would, pound for pound, exceed the killing power of nuclear weapons'.[44] It is vital to note, however, that the OTA analysis did not refer to empirical data. Instead the report stated that it was providing 'rough estimates for the effects of comparable amounts of chemical, nuclear, and biological weapons. These are based on somewhat arbitrary assumptions. . .'.[45] This is as if to say: 'These are our figures. You can believe them if you like, but we made them up'. This crucial caveat is typically not mentioned when officials and academics cite the report.

Whether as a result of the OTA report, the subsequent analyses which have cited it, or conventional wisdom more generally, the idea of massive casualties resulting from the use of non-nuclear WMD has clearly taken hold. In an infamous 1997

television interview, US Defense Secretary William Cohen held up a five-pound bag of sugar and declared that an equivalent amount of anthrax spores could kill half the population of Washington DC.[46] On the eve of the 2003 US-led invasion of Iraq, President George W. Bush stated: 'The danger is clear: Using chemical, biological, or, one day, nuclear weapons obtained with the help of Iraq, the terrorists could fulfil their stated ambitions and kill thousands or *hundreds of thousands* of innocent people in our country.'[47] And an authenticated video by alleged Al Qaeda recruiter Abdullah al-Nafisi, first aired by the Arabic news network Al Jazeera in February 2009, showed al-Nafisi telling a room full of supporters: 'Four pounds of anthrax – in a suitcase this big – carried by a fighter through tunnels from Mexico into the US are guaranteed to kill 330,000 Americans within a single hour if it is properly spread in population centers there.'[48] Technically inaccurate statements such as these, which exaggerate the threat posed by non-nuclear WMD, can adversely influence not only threat assessments but also response policies and practices. The remainder of this article addresses the latter by highlighting the pitfalls of a three-in-one (WMD) response to nuclear, biological, and chemical weapons when it comes to deterrence, defence, and non-proliferation.

Deterrence, defence, and non-proliferation

Biological and chemical weapons, as non-nuclear WMD, are sometimes referred to as 'the poor man's atomic bomb'.[49] On the contrary; they should instead be regarded by would-be users and victims alike as a poor substitute for nuclear weapons. In the case of biological weapons, some states that feel threatened by nuclear-armed adversaries might suppose that the former provide rough strategic parity because of the theoretical potential for high casualties resulting from a biological attack. Such a capability is much more affordable than a nuclear programme and, at least according to assessments like that of the OTA, biological agents properly prepared and 'delivered under the right conditions'[50] could inflict human damage to an extent comparable to a nuclear strike. Technical, meteorological and other factors described in the previous section of this article militate strongly against such an outcome. According to Susan Martin, however, even the small probability of successful retaliation using biological weapons can deter a nuclear attack. As a consequence, she has argued, the spread of this option among poorer countries could lead to a 'biological revolution', comparable to the post-Second World War nuclear revolution, which would provide even weak states with the ability to deter threats to their vital interests.[51] This is an overstatement of the utility of biological weapons as a strategic deterrent. Unless and until biological weapons have the same demonstrable and assured destructive power as nuclear weapons, it is inappropriate to regard them as having a comparable deterrent value. For the purpose of strategic calculations, the vital difference is the uncertainty that surrounds not only the effects of a biological attack but also the very existence of (illegal) biological weapons programs. The destructive power of nuclear weapons can be tested conspicuously, but a biological weapons-based deterrent which is dependent on weather conditions is neither reliable nor credible.[52]

For similar reasons, chemical weapons also lack the assured destructive power required for strategic deterrence. During the 1991 Gulf War, however, the Iraqi Government clearly saw political and military advantage in referring to its chemical weapons in WMD terms. In February 1991 Iraq's ambassador to the United Nations said that his government had 'made a commitment not to use chemical weapons unless weapons of mass destruction were used against Iraq', adding that if massive, high altitude, conventional bombing continued, these bombs could then be considered weapons of mass destruction.[53] In the same month, when Iraqi President Saddam Hussein was asked whether Iraq would use chemical weapons, he replied: 'We will use weapons that match those used against us by our enemy ... weapons that are equivalent to those used against us.'[54] Was the latter claim perhaps an attempt to deter a US nuclear attack by threatening chemical retaliation? If so, it makes sense only insofar as nuclear weapons and chemical weapons are both WMD. Yet, by routinely and erroneously referring to chemical weapons as massively destructive, the governments of nuclear-armed states (and those of allied non-nuclear states under their protection) give credence to the notion of equivalence. On this point, George Perkovich has warned: 'If people lose the distinctions among "WMD" and begin to see "WMD" itself as the brand, then the heretofore less valuable chemical and biological categories begin to earn the same fear-respect-value as previously unrivalled nuclear weapons.'[55] Likewise, Scott Sagan has exhorted analysts to 'abandon the term "weapons of mass destruction," because it exaggerates the effects of chemical weapons and may even elevate their value in the eyes of some developing world leaders'.[56] It is important to acknowledge, however, that such exaggeration comes about not just for want of analytical rigour. By sustaining the notion that all WMD are strategically equal, nuclear-armed governments put themselves in a position to argue that a chemical or biological attack warrants a nuclear response.

Arguably, states that comply with the 1968 Nuclear Non-proliferation Treaty (NPT), the 1972 Biological Weapons Convention (BWC), and the 1993 Chemical Weapons Convention (CWC) have an interest in asserting strategic equivalency as among the weapons these treaties control, notwithstanding the 'huge technical, tactical, operational, and logistical distinctions among the principal kinds of WMD'.[57] The alternative, as Malcolm Davis and Colin Gray point out, is 'to have no licensed military response to a chemical or biological weapon attack other than conventional weapons', because most states have agreed to eliminate the former from their arsenals.[58] During the 1991 Gulf War, US Secretary of State James Baker implied nuclear retaliation when he threatened to use 'all possible means' should Iraq resort to biological or chemical warfare.[59] The 2002 US National Strategy to Combat Weapons of Mass Destruction stated: 'The United States will continue to make clear that it reserves the right to respond with overwhelming force—including through resort to all of our options—to the use of WMD against the United States, our forces abroad, and friends and allies.'[60] This statement implied, again, that the United States might respond to a biological or chemical attack with a nuclear strike. In apparent imitation of this policy, but going further, the Indian Government in 2003 adopted 'a doctrine including the explicit threat of nuclear first use in response to biological-

or chemical-weapons use'.[61] Similarly, on a visit to a French nuclear submarine base in 2006, President Jacques Chirac stated that 'Leaders of any state ... using weapons of mass destruction [against France] ... would be exposing themselves to a firm and appropriate response... That response could be conventional, it could also be of another nature.'[62] Most recently, the Obama administration's Nuclear Posture Review has left open the possibility of using US nuclear weapons in response to a biological or chemical attack by a nuclear-armed state or a non-nuclear state that is not NPT-compliant.[63]

The problem with such postures is that although a nuclear capability has putative deterrence value in the face of other nuclear challenges, and perhaps conventional ones too, it probably could not credibly deter biological and chemical attacks in the same way. On the whole, deterrence is not an option because the promise of nuclear retaliation is a weak threat; in practice, targets for retaliation could prove too obscure. The assumption underlying any discussion of nuclear weapons as a deterrence tool is that there is a biological or chemical attacker whose identity and location are known and against whom threats and retaliation strikes can be directed. To avoid retaliation, it is in the interests of an attacker to conceal or obscure the origin and occurrence of the attack. Doing so would be especially easy if using biological weapons. Absent the requirement for explosive dissemination, biological attacks are by nature silent, and the first indications of an unannounced attack would not appear until days or weeks later when people started falling ill. By this time, it may be too late to track down and punish the perpetrator. Even in the case of the anthrax attacks in the United States in 2001, which were announced (by the letters contained in bacteria-contaminated envelopes), seven years passed before the US Government was in a position to identify and charge the alleged perpetrator.[64] In addition to the credibility problem of nuclear deterrence against non-nuclear WMD, there is an important ethical distinction to be drawn. A nuclear strike to punish another state's use of chemical or biological weapons may be so disproportionate a response as to be politically indefensible. Different chemical and biological agents can cause casualties to vastly differing extents. For example, if an adversary used the bacterium *Coxiella burnetii*, a non-contagious microorganism which causes the incapacitating disease Q fever, the extremely low fatality rate would take away from any justification for massively lethal (nuclear) retaliation. Likewise, some chemical agents are specifically designed to be merely incapacitating or otherwise non-lethal. A disproportionate nuclear revenge attack would become the greater of two evils. As a matter of deterrence policy, therefore, it is no simple matter to say that one WMD attack deserves another.

Just as WMD-based language potentially distorts policy on deterring attacks, the same can be said of policy on the use of force for defensive purposes. Moving beyond the challenges of deterrence to those of defence, it is worth posing the question: if nuclear weapons really can deter the use of chemical and biological weapons, why was it so urgent in 2003 for the United States and Britain (both nuclear-armed states) to forcibly disarm Iraq in a full-scale invasion described as pre-emptive self-defence? In the months leading up to the Iraq War, 'WMD' was *zeitgeist* terminology for both politicians and journalists. Gregg Easterbrook, writing in *The New*

Republic magazine in October 2002, noted that the phrase 'weapons of mass destruction' had appeared in the *New York Times* in some 250 articles over the previous month alone.[65] In 2003, 'WMD' appeared in a total of 1069 stories in that newspaper, and in 632 stories in 2004.[66] Senior US officials making the case for military intervention in Iraq repeatedly claimed that the issue at stake was that country's continued possession of banned weapons in contravention of post-Gulf War UN Security Council Resolution 687 (1991). Added to the picture was a reminder that Iraqi President Saddam Hussein had a 'willingness to use' WMD.[67] This reference to the chemical attack on Halabja 15 years previously did not, however, distinguish between the evident willingness to use chemical weapons and an unproven willingness to use nuclear weapons and/or biological weapons. In a dossier entitled 'Iraq's Weapons of Mass Destruction' published on 24 September 2002, the British government claimed that Iraq had 'military plans for the use of chemical and biological weapons' and that 'Some of these weapons are deployable within 45 minutes of an order to use them'.[68] The dossier contained no evidence that Iraq was even close to possessing one or more nuclear weapons. Yet US President George W. Bush hinted strongly at nuclear weapons when, in October 2002, he first outlined the case for the Iraq War: 'Facing clear evidence of peril, we cannot wait for the final proof – the smoking gun – that could come in the form of a mushroom cloud.'[69] Curiously, and in stark contrast to Bush's calculated ambiguity, the post-invasion search for Iraqi weapons seems to have been informed by a more fine-grained conception of the problem. In a September 2004 Central Intelligence Agency report on 'Iraq's WMD', the glossary included the following explanation: 'Chemical Weapons and Biological Weapons need to be of a certain size to count as WMD—single chemical or biological artillery rounds would not be considered to be WMD, due to the limited damage they could produce.'[70]

A 2004 report by the Carnegie Endowment for International Peace found that US officials had systematically misrepresented the threat posed by Iraq prior to March 2003 by treating nuclear, biological, and chemical weapons as a single 'WMD threat':

> The conflation of these distinct threats, very different in the danger they pose, under the rubric "weapons of mass destruction" distorted the cost-benefit analysis of the war. To the extent that the U.S. Congress and the UN Security Council debated whether the "WMD" threat required urgent removal by force, debaters did not consider where along the WMD spectrum the threat lay.[71]

Constant repetition of 'the WMD threat' lumped together the high likelihood that Iraq possessed chemical weapons, which constitute only a minor threat, with the complete lack of evidence that it possessed nuclear weapons, which would be a far greater threat.[72] Thus the Carnegie report included in its recommendations the need to 'Recognize distinctions in the degree of threat posed by the different forms of "weapons of mass destruction." Otherwise, the security risks of actions taken may outweigh the risk of the targeted threat.'[73] In other words, the response to a nuclear, biological, or chemical threat needs to be a measured and proportionate one; uniquely tailored rather than bundled into a one-size-fits-all (WMD) response.

Arguably, pre-emptive self-defence against a looming nuclear threat would be more urgent and justifiable (if it is justifiable at all) than self-defence against the far more uncertain and probably lesser threat posed by chemical and/or biological weapons. But because in policy discourse the invasion of Iraq was simply about WMD, this vital distinction was unlikely to be drawn. Arguably, had the threat been more carefully and accurately described, the invasion would have been harder to justify and thus less likely to proceed.

Beyond the issue of pre-emptive defence, it is also worth considering briefly the value of a WMD-oriented approach to first response in the event of an actual attack. Specialist units within militaries worldwide are trained and maintained for the task of countering the panoply of WMD threats, but these response teams are really only useful for detection, decontamination, and treatment of casualties after a chemical attack.[74] They might also be able to disarm an undetonated nuclear device, but the effects of a nuclear explosion cannot be mitigated in the way that the effects of a chemical attack can. In the case of biological weapons, a rapid response capability is useful only if the target state knows that an attack has just occurred. Yet the most worrisome and perhaps more likely form of biological attack would be one that was covert and which thus allowed time for a biological agent to incubate and (if contagious) spread. The October 2001 anthrax attacks in the United States were exceptional because the envelopes containing bacteria also contained letters advising the reader to take antibiotics. By contrast, when the Aum Shinrikyo cult in Japan attempted unsuccessfully to disperse anthrax during the early 1990s, the attacks remained unannounced and their occurrence did not come to light until cult members faced trial several years later. Similarly, members of the Rajneesh cult did not announce in 1984 that they had sprinkled salmonella bacteria in salad bars in the Oregon town of The Dalles. Despite extensive epidemiological investigation, the source of the subsequent outbreak of food poisoning initially went unrecognized. Not until October 1985, over a year after the outbreak, did evidence emerge (in the course of an unrelated criminal investigation) that linked the event to the cult.[75] In a biological attack scenario, the most likely first responders would be physicians, nurses, pathologists, and other health professionals, and the speed of their response would depend on how quickly they recognised that certain symptoms and illnesses were out of the ordinary. This contrasts starkly with the response requirements for nuclear and chemical threats, and so highlights the weakness of a conflated, WMD-oriented approach to defence.

Turning to the issue of non-proliferation, WMD-based language can again be seen as unhelpful or even counterproductive. As Richard Price observed in his book *The Chemical Weapons Taboo*, some states have inverted the discourse that labels chemical weapons the 'poor man's bomb':

> Building upon the discourse of "weapons of mass destruction," these states have sought to parlay the West's disdain for CW [chemical weapons] into an extension of the discriminatory international non-proliferation regime by withholding their participation in the CWC until comparable efforts are made to proscribe other weapons of mass destruction.[76]

In 2004, for example, Syrian President Bashar Assad stated that his country would agree to destroy its chemical and biological weapons capability only if Israel agreed to abandon its nuclear arsenal.[77] This amounts to the argument 'I'll give up my non-nuclear WMD if you give up your nuclear WMD'. Given the vastly inferior destructive capability of chemical weapons, nuclear-armed states would naturally see this as a poor bargain, and yet the prevailing language of mass destruction imbues the proposition with unwarranted plausibility. From a non-proliferation perspective, analogizing between nuclear weapons and chemical weapons is unhelpful because of the vast difference in each weapon type's strategic significance. In the biological realm, however, use of the term 'WMD' is possibly counterproductive in the way it encourages an ill-fitting, nuclear-oriented approach to non-proliferation.

A prominent example of this is the Proliferation Security Initiative (PSI), announced in 2003, which the US State Department has described as 'an important tool in the overall U.S. strategy to combat WMD proliferation to state and non-state actors'.[78] States participating in the PSI undertake to perform specific measures for 'the interdiction of WMD and related materials'.[79] The PSI could only assist in preventing biological weapons proliferation if technologies relevant to such weapons were controllable in ways identical or similar to the control of nuclear materials. Unfortunately, they are not. As Bob Graham and Jim Talent have warned: 'Given the vast differences in the weaponization of nuclear and biological technologies, it is important to have a biological weapons prevention strategy that does not merely involve crossing out "nuclear" and adding "bio".'[80] Whereas the nuclear model of non-proliferation is designed to limit access to nuclear materials, equipment and expertise, important differences when contemplating biological weapons include: firstly, almost all biological agents are found naturally in the environment and at countless government, academic and commercial laboratories worldwide; secondly, it is impossible to track biological materials – moving around in vast numbers of small quantities – as one would track fissile materials; and thirdly, biotechnology advancements are bringing scientists closer to being able to chemically synthesize entire microorganisms from scratch, thus obviating the need for shipments of live biological agents. In 2009, five members of the US National Science Advisory Board for Biosecurity lamented the 'nuclearization of biology', highlighting the 'dichotomy between nuclear and biological threats':

> The first involves rare materials and costly, complicated science and is practically restricted to nation-states; the second involves agents that can be inexpensively and readily obtained and science not restricted to nation-states but available to rogue individuals and organizations. These fundamental differences between biological and nuclear weapons strongly suggest that nuclear counterproliferation and prevention strategies are not applicable to biology.[81]

The most important overall difference is that the spread of biological weapons-relevant technology is overwhelmingly an intangible phenomenon driven by the knowledge and behaviour of individual biological scientists. Thus attempts to control physical quantities of biological materials are for the most part misdirected and probably futile. Moreover, such attempts might be dangerous if, as Marc Ostfield

has observed, 'The biological non-proliferation approach promotes merely an *illusion of security*—creating the false impression that such measures will meaningfully prevent or substantially reduce the risk of a bioterrorism attack.'[82] Biological weapons present a proliferation challenge so far removed from the nuclear realm as to be almost unrecognizable to traditional arms control analysts and practitioners. A nuclear-oriented non-proliferation model of monitoring and intercepting prohibited substances cannot simply be grafted onto the biological realm in the name of addressing the full range of WMD threats. The scale and nature of the problem of biological weapons is radically different from that of nuclear weapons. As such, nuclear-oriented efforts like the PSI cannot accurately be described as a meaningful response to all WMD. And it follows that, from a security perspective, it is dangerous to generate the impression that they can when, in reality, there exists a gap in non-proliferation efforts.

After 'WMD': would this term be missed?

Considering the need for sound analysis and effective policy on deterrence, defence, and non-proliferation, this article has presented arguments in favour of deconflating nuclear, biological, and chemical weapons. Nevertheless, it is important for completeness' sake to consider the possible virtue, beyond mere linguistic convenience, of conflation. One argument in favour of lumping these weapons together might be an ethical one. In traditional Just War doctrine, the principle of discrimination prohibits the deliberate targeting of non-combatants. Arguably, WMD are morally distinct from other (conventional) weapons because they are inherently, rather than potentially, indiscriminate. Referring to the mass-casualty attacks on Dresden and Tokyo during the Second World War, Tony Coady has observed that 'conventional bombing need not be as indiscriminate as this, whereas it seems inherent in the idea of a WMD that it is geared to violation of the principle of discrimination'.[83] The three-in-one category of WMD certainly matches up with the dominant international view of which weapons are morally abhorrent and therefore subject to control or prohibition under the NPT, the BWC, and the CWC. An ethicist might also pose the related question: is there a danger that, by casting doubt on the mass destruction capability of non-nuclear (chemical and biological) weapons, their use becomes more acceptable? The best answer to this question would be that the acceptability of deliberately poisoning or infecting someone is more properly grounded in concerns about the manner rather than the scale of death caused. The term 'weapons of mass *destruction*' is one which more obviously purports to distinguish this category from other weapon types on the technical basis of destructive force. Thus, abandoning the term would not in itself undermine prevailing ethical sensibilities – 'a visceral reaction out of proportion to their lethality'[84] – about the inhumanity of chemical and biological weapons. Even if weapons labelled 'WMD' are equally indiscriminate, they are not equally destructive, and this technical distinction ought to be the more important consideration for the purposes of accurate threat assessment and effective response formulation.

Assuming one can dispose of the ethical argument in favour of conflation in this way, a final question remains as to the feasibility of expunging WMD-based language. For Seth Carus, writing as the Deputy Director of the Center for the Study of Weapons of Mass Destruction at National Defense University, it is for two reasons 'probably no longer possible' to abandon the term 'WMD'. First, it is 'an inseparable component of the disarmament lexicon because it appears in several arms control treaties ... [and] has the precise meaning adopted by the negotiators of the treaties', and second, 'the term has become an integral part of American political discourse'.[85] Regarding the latter point, it can indeed be difficult to bring about changes in seemingly entrenched language, but it does not follow that it is impossible. Such changes can be and have been facilitated by shifts in policy and political sentiment among politicians and officials, and to some extent this can affect or be effected by the writings of academics and journalists. For example, following changes in government leadership, the once-ubiquitous term 'War on Terror' is being quietly abandoned in the United States, Britain and Australia.[86] In the 2010 US National Security Strategy, the phrase 'weapons of mass destruction' appears just six times and the acronym 'WMD' not at all.[87] At the level of political discourse alone, it would seem that linguistic habits are not an insurmountable problem as regards the feasibility of abandoning WMD-based language. Beyond that, however, Carus insists that the appearance of the term 'weapons of mass destruction' in arms control treaties precludes any linguistic change. At first glance, this obstacle would appear to be a formidable one, but close attention to the text of relevant international agreements reveals otherwise. In some instances the WMD-based language therein could be dispensed with because it is redundant, and in others because it is too vague.

On the issue of redundancy, some informal international arms control agreements that refer to 'weapons of mass destruction' provide a definition thereof. One example is the 1987 Missile Technology Control Regime (MTCR) Guidelines which refer to 'proliferation of weapons of mass destruction (i.e. nuclear, chemical and biological weapons)'.[88] Another is the 2003 PSI Interdiction Principles which refer to 'proliferation through: (a) efforts to develop or acquire chemical, biological, or nuclear weapons and associated delivery systems; or (b) transfers ... of WMD, their delivery systems, or related materials'.[89] At the level of formal international agreements, UN Security Council Resolution 1540 (2004) employed the words 'weapons of mass destruction' just once, in the preamble to the resolution. Thereafter, the formulation is 'nuclear, chemical and biological weapons'.[90] By taking the trouble to specify what is meant by 'weapons of mass destruction', such texts render that term redundant. As such, it would not deprive the MTCR, PSI or Resolution 1540 of meaning if the term were not used; WMD-based language could be avoided at no cost to precise meaning. Indeed, it would be both simpler and clearer to replace all references to 'weapons of mass destruction' in the aforementioned texts with the built-in defining words 'nuclear, biological, and chemical weapons'.

In other international arms control texts, however, the problem with WMD-based language is not redundancy but vagueness. For example, under Article IV of the 1967 Outer Space Treaty, states undertake not to place in orbit around the earth, install on celestial bodies, or station in outer space in any other manner

'nuclear weapons or any other kinds of weapons of mass destruction'.[91] Similarly, under Article I of the 1971 Seabed Treaty, states undertake not to implant or emplace on the seabed any 'nuclear weapons or any other types of weapons of mass destruction'.[92] But neither treaty text contains a definition of WMD. Indeed nowhere in international law does an authoritative definition of the term exist. The reason for this, according to David Fidler, is that 'states have historically used international law to address each category of weapons within the WMD rubric. International law specifically on WMD is, thus, composed of three different sets of rules for each WMD technology'.[93] In other words, the NPT deals with nuclear weapons, the CWC with chemical weapons, and the BWC with biological weapons, without needing to use the term 'weapons of mass destruction' in order to confer legal meaning. Carus maintains, however, that a definition of WMD does exist in the form of that offered by the UN Commission for Conventional Armaments in 1948, and that this is what informed negotiations on the Outer Space and Seabed treaties in which the term appears. Thus, he argues, 'it is inconceivable that treaty negotiators thought that WMD was an amorphous term that could mean whatever anyone wanted it to mean'.[94] This is consistent with Carus' central claim that WMD-based language is 'inseparable' from the 'disarmament lexicon' on account of having 'precise meaning'.[95] The more plausible counterargument to this is that the 1948 definition is amorphous and deliberately so. That is, it was a way of leaving room for dealing with non-nuclear 'weapons developed in the future which have characteristics comparable in destructive effect to those of the atomic bomb'.[96] Vague language imbues an international legal text with potential for flexible interpretation and application, and this may be an important factor in attracting signatories, but it comes at the cost of precision. It is not clear, for example, that placing biological or chemical weapons in outer space or on the seabed (assuming they could survive there) is illegal. Arguably, clarity rather than conflation is a virtue when devising responses to prospective mass destruction. Not only would the removal of WMD-based language not distort the meaning and intent of the few existing treaties that use the term, the substitution of 'nuclear, biological, and chemical weapons' would clarify and thus improve those treaties.

Conclusion

In governmental and scholarly discourse on security policy, few terms inspire as much dread as 'weapons of mass destruction'. But where there is so much (mass destruction) allegedly at stake, great care should be taken with the language of analysis and decision-making. The ongoing and widespread use of this term is misleading and potentially dangerous, so it should cease. Conflating the technologically and strategically distinct threats posed by nuclear, biological, and chemical weapons confuses the tasks of accurately assessing and effectively addressing these threats. WMD-based language obscures the paramount threat of nuclear weapons, exaggerates the destructive power of chemical weapons, and is unhelpful or counterproductive when used in the context of biological weapons. Due to technical, meteorological, and other factors addressed in this article, the destructive effect of

a biological attack is unlikely to resemble that of a nuclear attack, and chemical weapons do not warrant such comparison at all. It is important to understand why this is the case so that efforts and resources for prevention and response can be channelled appropriately. If the problems uniquely associated with biological weapons and chemical weapons are to be addressed effectively, these must be rescued from the awkward WMD rubric. And as nuclear weapons are the only true weapons of mass destruction, they need only be referred to as 'nuclear weapons'. Some governments might see political advantage in using the vague and apocalyptic term 'weapons of mass destruction', but there are also dangerous downsides to doing so.

By mischaracterizing weapons challenges, WMD-based language potentially generates adverse security consequences flowing from the implementation of inadequate or misdirected countermeasures. Thus it may be undermining attempts to address the very problems it purports to describe. In matters of deterrence, the strategic equivalency implied by WMD-based language can lead to overestimation of the value of both non-nuclear weapons and nuclear weapons in deterring attacks. There are problems also with conflating nuclear, biological, and chemical threats when it comes to pre-emptive and responsive defence. The 2003 invasion of Iraq might have been harder to justify had it only been an exercise in chemical and biological (and not nuclear) disarmament, and the deployment of WMD first-response military units would be ineffective in the event of a nuclear explosion or an unannounced biological attack. Lastly, in matters of non-proliferation, applying a nuclear-oriented approach to all WMD leaves largely unsolved the problem of biological weapons in particular; any sense of security derived from an approach focused on tangible aspects of biological proliferation can only be a false one. For these reasons, it is desirable to abandon the term 'weapons of mass destruction', and such abandonment can and should extend to the language of international agreements. Where references to WMD in arms control texts are redundant because a definition exists, abandoning the term would not deprive those texts of meaning. And where such references are vague and undefined, substituting the words 'nuclear, biological, and chemical weapons' would serve to clarify and improve international law. As the term is more trouble than it is worth, it is time to bid farewell to 'WMD'.

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