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Orbons, J.B.J.

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Chapter 2

Do Non-Lethal Capabilities License to ‘Silence’?*

Do Non-Lethal Capabilities License to ‘Silence’?

SJEF ORBONS
Faculty of Military Sciences, Netherlands Defence Academy, Breda, The Netherlands

ABSTRACT Most contemporary conflicts can be characterized as ‘wars or conflicts amongst the people’. International military forces deployed in such conflicts are confronted with complex operational environments where the distinction between combatants and non-combatants is often impossible to make. At the same time, there is a moral requirement imposed on Western coalition forces to perform in a humane manner and to keep casualties to a minimum. Non-lethal weapons are expected to enable military forces to accomplish their mission without having to kill or destroy. The extent to which these weapons meet that promise in real world conditions is the subject of debate. A defence technology assessment of non-lethal weapons is proposed that validates their utility and moral implications by considering the user, the weapon and the target in the context of the deployment situation. It will be illustrated that the technical parameters of the non-lethal weapons are no guarantee that the weapons will perform as intended as the user and target introduce many factors of uncertainty in real world situations. Although such uncertainties undermine the moral acceptability of non-lethal weapons, it is argued that the principle of non-lethality is compliant with the Just War Tradition principle of proportionality. The principles of non-combatant immunity and discrimination need to be re-calibrated given the human-centricity of many military intervention operations.

KEY WORDS: Non-combatant immunity, non-lethal weapons, discrimination, proportionality, defence technology assessment, baton rounds, CS gas, active denial system

Introduction

In the post-Cold War security environment, military intervention forces have increasingly been facing situations where the use of lethal force in the presence of the civil population is prohibitive.1 The complex circumstances under which peacekeeping intervention forces have to accomplish their tasks are further exacerbated by the irregular methods and tactics warring factions employ to deny traditional military practices and weapons used by peacekeeping forces. The blurred distinction between combatants and non-combatants, including warriors’ chameleon behaviour, has become especially troublesome with the operational scene often being the urban environment. The nature of this new operational context can be described as a ‘war...
amongst the people’ (Smith 2006: 267). It is the people that have become the critical ground in most contemporary conflicts.

Military options during such UN-led interventions have mostly been constrained by political mandates to which the missions are submitted. Forces are facing the dilemma between either doing nothing or talking and using lethal fire as the last resort. They perform their tasks and operations under scrutiny of the media and any mistake, including the – unintended – killing of innocent victims, is magnified and may politically jeopardize the accomplishment of the mission.

Soon after the end of the Cold War non-lethal weapons (NLWs), some of which were already in use with police forces for several decades for domestic purposes, have been claimed as promising to close the conceptual gap in the spectrum of military capabilities to meet the challenges in contemporary conflict patterns. Since then, a broad range of technological concepts has been explored, developed and tested for employment by military forces in current operations. However, despite the promises ascribed to NLWs and the efforts invested in such concepts, only a very few new devices have been fielded so far.

Today, more than 15 years after the emergence of the military requirement for non-lethality, considerable scepticism and even opposition still exists concerning the military employment of NLWs, including ethical controversy on their applicability and acceptability as military instruments. It is still the subject of intensive debate whether non-lethal weapons are as benign as to provide the military with a license to ‘silence’ when the use of traditional military force is prohibitive or undesirable. The ethical dimension of the debate is informed by the Just War Tradition, to explore to what extent non-lethality as a military capability can be justified under Rupert Smith’s new paradigm of ‘war amongst the people’. The moral dimension resides in the military organization and its personnel that field and operate NLWs, as their practical application depend on the norms, values and virtues incorporated in military education and training.

Some analysts discuss issues of ethics and morality with NLWs based on assumptions that these weapons function precisely as expected (Mayer 2007). This article takes as the departure point that NLW performance is not perfect and effects can be different from those intended.

This article therefore endeavours to discuss and explain factors that underlie the discrepancy between the design expectations of NLWs and their military utility and how the associated uncertainties affect the ethical acceptability of NLWs and the moral implications of their use. After a brief discussion of the military rationale of non-lethality and the official policies that define and guide the development and use of NLWs, this article addresses two main questions:

1) Do NLWs always perform as they are designed for? One of the problems with NLWs is that while they are designed and intended to attain a well defined non-lethal effect, this is not always accomplished under real operational circumstances. This article introduces an assessment approach that takes into account factors other than merely technological to enable a
more comprehensive validation of NLWs. Three NLW-devices have been selected, to which this assessment approach will be applied.

(2) Given the outcome of the above assessment, can NLWs use be in compliance with the jus in bello principles of discrimination and proportionality from the Just War Tradition? The technology assessment approach also informs the moral problematic which is associated with the application of NLWs. The author contends that while NLW design, employment and effects may raise moral concerns on the one hand, they can also alleviate existing moral dilemmas facing politicians and military operators on the other.

The Military Rationale of Non-Lethality

In Western societies, drawing from their democratic culture and tradition, ethical and moral issues increasingly have come into play when dealing with conflict. War has begun to have a human face, or from an antagonist’s point of view: respect for human life was becoming a critical vulnerability for Western nations. The desire for a society without war, which emerged after the deadly wars in the first half of the twentieth century, was seemingly accomplished with the military introduction of ‘clean’ weapons that were far less destructive than the previous generations. The ethical imperative emerged that armed conflict should be far less lethal than before.

In war amongst the people the utility of lethal precision weaponry that had excelled during the 1991 Gulf War would appear to be limited soon thereafter. The expectation of many analysts, such as forecasting that precision strike technology could mitigate war’s terror and even prevent to hit innocent civilians inadvertently, would soon appear overoptimistic (Freedman 1998). Others question the utility of precision-guided munitions if certain conditions are not met. For instance, when fighting non-state terrorists or insurgent groups in urban settings, the effectiveness of precision weaponry may end up being at its lowest because some targeting discriminations are not simply a function of advanced technology (Mandel 2004). Although sensors and intelligence systems constantly improve, it is highly unlikely that the level of detail necessary to obtain perfect knowledge of battlefield conditions needed for a long range precision strike will be achieved. Furthermore, the role of the media continuously increases in shaping world opinion. Therefore it would be incumbent on the military to make an extra effort to limit collateral casualties, which should include rapid development of area effect NLWs (Alexander 2007a).

The notion of non-lethality has been expressed in NLW definitions contained in official national and international policy documents on NLWs. For the purpose of this article, a definition of NLWs has been taken from a formal NLW policy document published by the North Atlantic Council:

Non-Lethal Weapons are weapons that are explicitly designed and developed so as to incapacitate or repel personnel, with a low probability of fatality or permanent injury, or to disable equipment, with minimal undesired damage or impact on the environment. (NATO 1999: 1)
The definition stresses the intended effect of an NLW. However, earlier experiences with NLWs, in particular of police organizations that have extensively used a growing set of NLWs, indicate that while non-lethals are an accepted core capability in policing, casualties and other unwanted effects still occur. These adverse effects have triggered a continuous debate between human rights organizations and law enforcement organizations on the moral and ethical acceptability of NLWs. While this debate generally focuses on the domestic use of NLWs, the sensitivity of the issue has the potential to be further compounded when peace-supporting military forces employ NLWs in a civil environment in foreign states.

The NATO policy document provides guidance for the development and use of NLWs. It includes aims and requirements that express expectations on non-lethality. NLWs should enhance the capability to accomplish military missions and tasks in situations and conditions where the use of lethal force, although not prohibited, may not be necessary or required. Furthermore, they should enhance the capability to limit or control escalation, to discourage, delay or prevent hostile action and to improve force protection. The policy also specifies that NLWs may be used in conjunction with lethal weapons to enhance the latter’s effectiveness and efficiency across the full spectrum of military operations.

The latter requirement seems to be at odds with the original rationale of non-lethality and this policy clause immediately triggers the debate on the ethical acceptability of NLWs: NLWs would appear to be nothing else than just another means to raise the effectiveness of one’s own operations, irrespective of casualty reduction considerations. Hence this widened applicability of NLWs disregards the original benign motive to introduce NLWs, which precisely is to minimize fatalities, permanent injury and undesired damage. The explicitness in the NATO policy of a ‘dual use’ role of NLW potentially fuels political and public concern about the way NLWs will be used by the military.

Although the policy does not explicitly state that NLWs are also to be used against non-combatants, it appears from scenario analysis and technical studies performed by NATO bodies that such options are fully taken into consideration. Whether non-lethal engagement of civilians by military forces is compatible with current international law and ethical standards is the subject of ongoing debate. It is questionable whether the intentional use of NLWs against non-combatants, ignoring the principle of discrimination and the associated non-combatant immunity (NCI) is ethically rejectible. It can be argued that military forces using NLWs should not be exempted from those principles (Mayer 2007; Kaurin 2008). Others contend that NLWs ought to be taken into consideration to diminish the disproportionate harm to civilians caused in contemporary conflicts (Alexander 2007a; Gross 2008).

With the rationale of non-lethality in the military domain being translated into formal policies to guide its military implementation, the question arises whether the intent of NLWs as expressed in those policies is feasible when put to the test in real world circumstances. It is conceivable that NLWs cause unwanted human suffering or even death due to the dynamics, particularities
and responses of the actors in relation to the political, operational and physical environment in which the military needs to act. The ideal of achieving political objectives relying on non-lethality is degraded by the friction resulting, amongst others, from non-cooperativeness and from hostile counteractions.

**Between Expectation, Intent (‘The Ideal’) and Operational Reality (‘Friction’)**

The emergence and institutionalization of the military rationale of the concept of non-lethality and the associated questions on its real world performance and moral desirability can be put in a broader perspective based on the notions of ideal and friction applied to warfare. The idealist approach has been expressed in a maxim from Sun Tzu, the Chinese strategist who lived over 2000 years ago. He was the first person who considered restraint from killing and destruction, and thus limiting casualties and damage to the environment, of strategic importance. In his book *The Art of War* the maxim reads as follows:

> The general rule for use of the military is that it is better to keep a nation intact than to destroy it. It is better to keep an army intact than to destroy it. It is better to keep a division intact than to destroy it, it is better to keep a battalion intact than to destroy it, it is better to keep a unit intact than to destroy it. (Sun Tzu [ca. 500BC] 1963: 77–79)

The concept of non-lethality is quite compatible with Sun Tzu’s thesis. From his perspective, non-lethality in warfare can be interpreted as the ultimate form of controlled use of military force: it strives to achieve a strategic or operational objective without destroying or killing. It is the idealistic approach to warfare.

In 1831, in his famous opus *On War*, Von Clausewitz focuses on the natural features of warfare (Von Clausewitz [1831] 1984). He introduces the phenomenon of friction in warfare and argues that friction is the only concept that enables one to distinguish real war from war on paper. Friction, he contends, is the accumulation of many difficulties and is inconceivable unless one has experienced war. Friction is a force that can never be defined by theory. To Von Clausewitz the key challenge in the conduct of warfare is to remain faithful in action to the principles that have been laid down by ourselves.

When related to the contemporary situation and the introduction of non-lethality, the concept of friction can help understand that while NLWs are designed to achieve a well-defined effect, it is still submitted to many factors of influence and chance that erode the effect in practice. Only from real world experience can one learn how far the principles of non-lethality and intended effects of NLWs are affected by specific situational conditions or even denied by friction due to resistance and countermeasures.

During the early days of the contemporary debate on the promises of non-lethality, the idealist approach was adopted by analysts who believed that war could now be waged and opponents subdued without, or with minimal, killing (Morris & Morris 1990; Toffler & Toffler 1994; Lewer & Schofield 1997). Their
vision was inspired by a climate of euphoria that accompanied the new world order which followed after the Cold War. The idea of bloodless or humane warfare persisted throughout the 1990s, describing NLWs as instruments to eliminate the incivility of modern warfare (Coker 2001).

The belief in benevolence in warfare through NLWs also relies on the implicit premise in the idealist’s views that non-lethal technologies and concepts in themselves are equivalent to non-lethality in military practice. Other analysts who adhere to a more realistic approach question such expectations of NLWs as being premature. They stress the lack of objective data to test the effectiveness of NLWs. These data should be generated by combat testing, exercising and military experience, but are in short supply. Bloodlessness of warfare by the use of technology to defeat an enemy without casualties appeals to our sense of morality but is, unfortunately, unrealistic (Siniscalchi 1998). The concept of ‘weapons of mass protection’ is considered one-sided, based on predominantly technologically determined expectations, emphasizing technological capabilities while operational limitations are de-emphasized (Grin 2000).

Obviously, the tension between the ideal (expectation and intent) and friction (uncertainty and reality) can be projected on to the assessing of NLW designs on their performance on the ground. Three NLW concepts have been selected to consider the feasibility of their intended effect.

**Realities on the Ground: Assessing NLWs**

NLWs, like any other technology, could be assumed and presented as neutral tools. In contrast, one school of thought, as expressed by Rappert, suggests that there is a subtle and complicated inter-relation of technology and action. Rappert argues that technology enters into, and helps reconstitute, existing patterns of social relations. The meanings ascribed to technologies in particular circumstances bear on the manner in which these technologies are used (Rappert 2002: 63). In an earlier study, Grin argued that an assessment of military technologies has to take into account the operational circumstances in which they are applied and judge their implications against the background of the security-political situation (Grin 1990).

Technology assessment (TA) is a research analysis approach that seeks to validate innovative technological concepts within a contextual framework to provide a balance judgement of its utility and political desirability. More specifically, defence technology assessment (DTA) considers new military concepts within the operational context, including human and procedural factors, in which the system is to be applied (Smit et al. 1992).

The effect of NLW use, therefore, not only depends on the technical specification of the NLW, but also on the skills of the operator to employ the weapon in the prescribed manner. Still, optimal employment of NLWs against individuals or crowds is no guarantee that determined opponents are always incapacitated. Their attitude and response may even be based on an entirely different code.
These considerations highlight that the question of how lethal or excessively harmful non-lethality can become under real circumstances largely depends on the appropriateness of its application. Ongoing efforts in the technological domain to ensure reliability of the NLWs themselves have steadily improved the safety of the effect when properly employed. However, the risk of serious harm increases when the operator is forced to use the NLW beyond the design conditions. Technological system innovation may be supportive to prevent improper use by overruling the human operator. The probability of unintentional misuse much depends on the professionalism, preparedness and skills of the operator. Intentional abuse or disproportionate use is always possible with NLWs in the hands of those who disregard the human rights of the target individual.

A DTA of non-lethal technology concepts should therefore take into account all factors that interplay and together determine the operational outcome of an NLW used. A scrutinized analysis, also considering the operational realities, should, complementary to the weapon-technological characteristics of the NLW, address issues specifically related to the user/operator as well as to the target, as has been visualized below. All three components are presented as complexes, because of the numerous and partly unforeseeable factors affecting the responses and performance of each of them.

The weapon & technology complex represents the physical and technical parameters and performance characteristics of the NLW, the immediate and longer term impact the weapon is designed and expected to have on the human target or target group, the manageability of target effects given the type of NLW and technology, and the sensitivity of the NLW effect for operator performance and intent. The technical properties and intended effects of the spectrum of NLWs vary widely and may, therefore, be validated from an ethical perspective.

The user complex includes the factors that influence the attitude and performance of the military organization and personnel that deploy and employ the NLW. Factors such as skills, experience, training and education, concept of operation, guidance, rules of engagement, mental and physical state, judgement and perception of the potential target population or target individual are determinants of the user complex. These factors also shape, implicitly and explicitly, the moral attitude and approach of the military organization and its personnel.

The target complex incorporates factors of influence that depend on the individual or group exposed to the NLW engagement. These include the attitude, mental and physical state of the individual(s), perception of the user and its organization and background, motivation, experience, preparedness for armed engagement and against NLWs, specific countermeasures and target group dynamics.

The three components are interlinked into a system that in itself is embedded in a specific context coloured by the situation and circumstances in which the NLW is deployed. As the analysis will point out, the incompleteness and uncertainty of the system components, as well as the difficulty to
capture and anticipate the operational (and strategic) context of NLW deployment make performance prediction and control of NLW use under field conditions a fuzzy process. In turn, this unpredictability will complicate the judgement about the moral implications of the employment of NLWs.

The analysis provided here is not exhaustive, but rather intended to be indicative with an aim to assess whether NLWs do what they are claimed to.

**Three NLW Devices**

The spectrum of NLW effects is very diverse. NLW taxonomies and overviews of NLWs, including in some cases hundreds of NLWs, have been widely published (Rademaker 2003; Davison 2007). Categories of effectors specifically designed to be used against humans include kinetic and mechanical weapons, chemical agents, electrical devices, light emitters, directed energy and sound generators. What these effects have in common is that they inflict interaction with the physiology of the human being, with the intent to manipulate or influence the behaviour of an individual or even deprive a person from the control over his body. Each of the devices has a more or less critical window of design effect. Within these margins there is a high probability that the energy transmitted to the target individual produces the desired effect, i.e. a partial or full incapacitation or compliance of the individual or of a group of individuals. Outside the margins the effect may either be too weak or too strong. In the first case the target individual(s)’s behaviour is insufficiently affected by the NLW, in the latter there is a considerable risk that the target will be seriously or permanently injured, or even killed. Hence a residual risk remains that the effect will be excessive.

Three examples from the spectrum of anti-personnel NLWs have been selected for this paper for a more scrutinized review. Two of them are first generation NLWs already in use for several decades, while the third is a technologically highly innovative second generation NLW design:

![Diagram](image-url)

**Figure 1.** A simplified Defence Technology Assessment approach of NLWs.
- the *baton round*, a widely employed kinetic impact weapon against individual target persons;
- *CS gas*, better known as ‘tear gas’, a chemical agent in use as an area denial weapon against crowds of individuals; and
- the *Active Denial System* (ADS), a directed energy weapon emitting millimetre wave radiation against individuals or small groups of individuals.

**Baton Round**

The baton round is a kinetic energy projectile that for several decades has been deployed by law enforcement organizations worldwide. The baton round is designed to cause pain, irritation and minimal injury to the subject. The physiological effect is directly related to the location of the body where the projectile strikes the subject to induce blunt force trauma to the individual (Vilke & Chan 2007). The operator employs the weapon within a certain distance margin to the target. Firing the round from close distances has the potential to cause serious injury, while extended firing ranges may not result in insufficient stopping power to the target. In addition, the aiming accuracy, depending on technical performance of the weapon as well as the operator skills, declines with increasing range. This raises the risk that the round hits critical parts of the body, in particular the head. Adverse weather conditions and low visibility contribute to the probability of aiming errors. The desired target response is to dissuade or prevent a violent or potentially violent person from the intended course of action, thereby neutralising the threat.

**CS Gas**

CS gas is an irritant agent which can be used to disperse large gatherings or to temporary incapacitate individuals. These agents are commonly dispersed as gases, liquid, smoke or aerosols. Dissemination can be achieved through explosive devices, spraying or by pyrotechnics.

The effect of CS is irritation and inflammation of the skin, airways and mucous membrane tissues, starting within minutes of exposure and continuing as long as the individual is exposed to the substance. The sensation is typically one of skin burning. These effects worsen with increased concentration and duration of exposure. The symptoms improve after the exposure is removed, and gradually disappear within an hour. Some types of CS are insoluble and can remain active for several weeks and therefore require decontamination of buildings or other items. This is critical due to the high-flammability of CS (Vilke & Chan 2007). CS can also be applied as a hand-held liquid irritant projector that fires a stream of irritant agent in solution, thus making it a better directive against individual persons (Davison 2006). High temperature and humidity make the effect of exposure to CS more severe and the eyes are strongly affected by CS and may not open for several hours. Some people can develop a tolerance to CS, especially after being exposed regularly (Sutherland 2008).
The Active Denial System (ADS)

The Active Denial System (ADS) is a directed electromagnetic (EM) energy weapon. It is a millimetre wave (MMW) emitter at a frequency of 95Ghz. The system uses an antenna to direct a focused beam toward a selected target individual.

The MMW energy strikes the subject and reaches a skin penetration depth of less than a millimetre. It produces a heat sensation that within seconds becomes intolerable and forces the targeted individual to instinctively move. The sensation immediately ceases when the individual moves out of the beam or when the operator turns off the beam. When the system is operated properly there is minimal risk of injury because of the shallow penetration depth of energy into the skin at the short wavelength, the safety features designed into the system, and normal human instinctive reactions (US Department of Defense Joint Non-Lethal Weapons Program 2007). The heating effect experienced by target individuals is caused by the stimulation of pain nerves in the upper skin (Murphy et al. 2003). Only if the subject remained in a sustained beam while ignoring or resisting the pain sensation could permanent damage occur. From experimental research the risk of eye injury is found to be very low, as a subject will close or shield their eyes well before the heat induced pain threshold is attained. Nevertheless, it is to be evaluated whether long duration low-level exposure may affect vision (Annati 2007).

The vehicle-based ADS incorporates computerized control systems to modulate the beam transmission to achieve a safe and effective non-lethal repel effect. The operational range can be chosen between 15 and 500 metres. The MMW beam can be slightly widened to target three or four individuals grouped closely together (Magnuson 2006). The ADS is to be positioned in such a way that an uninterrupted line-of-sight over a considerable sector is ensured. The system’s accuracy is advertised to enable discrimination between single target persons who are at least 2 metres apart from each other. Such accuracy levels can generally be attained at moderate engagement ranges and degrades with extending distances. Range-to-target measurement accuracy is a critical factor for selecting the correct emission power level (Alexander 2007b). ADS fielding is foreseen for 2010.

The three NLW devices will be submitted to the assessment framework in order to consider their performance in a conceivable real world environment.

The Weapon & Technology Complex

Many efforts have been and are still being undertaken to enhance the technical performance and reliability of non-lethal devices. What experience teaches us is that NLWs cannot be claimed to be technically perfect. As has been pointed out earlier, the margins between effective performance of the devices and unacceptable weapon impact are small. Even a slight malfunction can have severe consequences.

Baton rounds should strike the human body only at specified parts. Yet, the ballistic accuracy of the projectile to ensure safe impact appears to be limited.
A considerable percentage of the projectiles fired during tests demonstrated unacceptable deviations from the aiming point (Kendig 2001). While this assessment might appear somewhat dated, the necessarily blunt front end of the baton round, required to prevent penetration of the skin, compromises accuracy. Whatever the design of a baton round or any other kinetic projectile, the need to optimize between the engagement range, the impact energy of the round, and its ballistic accuracy, results in a residual risk that can hardly be reduced with current technology.

The experiences with baton round use in Northern Ireland since the early 1970s show a steady decline in casualties. This is, to a large extent, due to improved weapon design resulting in a more reliable performance. Between 1994 and 2001, a total of 13,500 baton rounds were fired with no fatalities (Burrows 2002). However, more recent evaluations of the use of such rounds conclude that the risk of unintended but serious harm is still real (Northern Ireland Office 2004).

CS gas is designed and deployed as an area effect weapon. The technical limitations associated with the use of CS gas are related to the inherent impossibility to manage the amount and concentration of CS gas an individual in the deployment area inhales. As the CS gas doses an individual receives depends on a range of factors, including his proximity to the location of the releasing CS grenade or canister, the user’s ability to control the individual doses of the agent is very constrained. Usually considerable variations of concentrations in a given area occur, in particular during the first seconds after the agent has been released. Apart from the enhanced risk for individuals suffering from respiratory illnesses, such as asthma, who may be affected critically by the agent even at low doses, there may also be unknown long term effects to individuals who have inhaled considerable amounts of CS gas.

Other factors, including the environmental circumstances in the area of deployment, can vary considerably, which potentially lead to variations of effect upon the target group. In Northern Ireland, where CS gas has commonly been used in urban areas, the combination of wind and specific built-up configurations has complicated the predictability and control of agent dispersal (Thornton 2007). Due to its indiscriminate effect against generally inhomogeneously composed crowds, CS impact on individual crowd members may vary widely, ranging from very limited or no effect on some individuals to excessive or even toxic incapacitation of others.3

The ADS system is still in a testing phase. As an anti-personnel directed energy device, its performance and reliability under practical circumstances is still unknown. An extensive testing programme including the exposure of thousands of volunteers has optimized the design. Tests are usually run under controlled conditions. Despite the highly successful performance of the system during extensive testing series, the technical malfunction of system components or improper tuning of energy levels transmitted may result in adverse effects against the target individuals. Given the extended engagement ranges of up to hundreds of metres, combined with the invisibility of the skin heating effect of the ADS, feedback of a possible harmful engagement caused
by technical unreliability may be difficult to detect in the absence of close observers. One of the factors that influences actual radiation energy levels received by a target person is his physical environment. If the operational setting is a confined space, as is often the case in urban missions, radiation reflections may occur which raise the energy level locally to unacceptable intensities. Furthermore, the response performance of the ADS control system to adjust the amount of energy transmitted and other tuning parameters of the radiation beam may be insufficient to follow the behaviour of individuals and group dynamics in the target zone. Such problems can be further exacerbated by poor visibility conditions.

This brief account of the potential technical uncertainties and risks of NLW devices to perform beyond the non-lethal mode illustrates that even when operators of NLWs act as trained and expected, and target persons behave or respond as anticipated, the demarcation between effectiveness in terms of temporary incapacitation and undesirable harmful effects is fragile. It also shows that the effect of area denial weapons such as CS gas are fundamentally less controllable than those NLWs which are aimed against selected individuals, like baton rounds and ADS. The implication of the former category is that innocent civilians nearby may be harmed. Hence, from an ethical perspective, area denial weapons like CS gas should not be used if innocent people will be affected who are not part of the crowd or riot but nevertheless cannot leave the risk zone. This comparison of the two categories of NLWs also tells us that NLWs, from their technical characteristics alone, have to be judged on ethical acceptability on a one by one basis.

As will be argued hereafter, in real world circumstances technical imperfection may be a lesser risk than the human factor, i.e. the attitude and performance of the holder and operator of the NLW.

The User Complex

The baton round is intended to provide the policeman or soldier with an option to keep an aggressive or dangerous individual at safe distance. In Northern Ireland the weapon was used to prevent protesters being able to hit police and military forces when hurling stones and Molotov cocktails. Without the availability of the baton round, on many occasions they would have been authorized to use lethal weapons for self defence.

The reliability and precision of CS gas when used in crowd and riot control situations depends, amongst others, on factors related to appropriate use by trained personnel. Such factors include the availability of a suitable range of capabilities to dispense CS gas and the selection of the most effective method of delivery for the situation at hand.

General agreement exists among experts in the field of NLWs that these weapons have been, and potentially will be, misused by regular police and security forces as well as irregular actors in various parts of the world. International organizations as Amnesty International and Human Rights Watch have frequently reported on human rights violations in a range of countries. Most of the cases documented refer to domestic situations, where
police or security forces have applied NLWs in an excessive and unlawful manner. Such abuses included CS gas in many cases, and also baton rounds, as well as electro-shock weapons. In particular, the use of CS gas in confined and even closed spaces, which is prohibitive given the unacceptably extended periods of exposure to high concentrations of the gas, has been reported.

Human Rights Watch made public the abuse of CS gas in Venezuela. It reported that tear gas powder was being sprinkled on the faces and bodies of individuals in custody, as well as about the use of tear gas and pepper spray against prisoners kept in closed vehicles. Gas used in confined spaces is more concentrated and lasting in its effects than when used in the open and could cause individuals who are incapacitated or unable to move to suffocate. It is also potentially fatal to those with lung or heart ailments (Human Rights Watch 2004).

There are situations, however, in which the use of CS gas in confined spaces is regarded as an effective and acceptable method to resolve a crisis situation in the absence of alternatives that would not put the security forces in considerable danger themselves. In Northern Ireland, in prison barracks where IRA detainees were held, the prisoners took control over their own prison building in 1972. As they had blocked their prison physically and were using improvised arms, security forces decided to chase the occupants out of their huts by inserting CS grenades before overwhelming the prisoners. The tactic worked, with no prisoners suffering from enduring after-effects of the exposure to CS. A similar use of CS gas in a confined space has occurred as an approved practice applied during inmate uprisings in US prisons. Here too, CS gas has been used to prevent security personnel from being exposed to high risk and also to avoid the use of lethal arms in these situations.

Baton rounds have also been abused as a weapon of punishment in, amongst others, Northern Ireland and in the conflict between Israel and the Palestinians. This has led to fatalities in both conflict areas. Wright speaks of a systematic abuse in both situations where baton rounds have been used on a regular basis rather than in urgent cases. He lists a number of ways the abuse can take form:

These abuses include doctoring projectiles to enhance lethality, breaching guidelines on use only as a last resort, firing below the minimum distance, firing at areas of the body that should not be targeted (such as head, face, neck, or chest), shooting out of moving vehicles, use as street punishment during zone clearing operations. (Wright 2002: 80–81)

Besides the numerous written accounts, the internet provides an abundance of footage of abuse of a variety of NLWs. To mention but one example, in March 2007, a video was posted showing Israeli soldiers firing rubber bullets indiscriminately from a range above 50 metres at a crowd of demonstrating Palestinian women. Various women were reported to have been severely injured, in part because some bullets had a steel kernel inserted in a rubber casing to give the round a false non-lethal appearance (Gaelli 2007).

Abuse is a risk that may also arise in the context of suppression of people fighting for a just cause. Whether or not abuse may occur depends on a range of factors and circumstances, of which the attitude and intention of the user
of the weapon is the most important. Such behaviour is also determined by the enforcement ‘culture’ of the forces that deal with the conflict situation. Furthermore, it also depends on the way they view the non-cooperative ‘other side’, and on their professional skills, self control and self confidence. It is in the operator’s hand, or else in the unit commander’s directions, whether the effect is tuned such that the NLW performs within the design safety margins, or turns into an instrument of excessive harm, torture or lethal force. In physical terms this basically comes down to selecting the intensity of the energy or concentration of agent delivered to the target individual or group, the duration and repetition of the effect and, for a number weapon categories, the part of the body at which the effect is aimed.

The technological status of the NLW is usually of limited relevance for the operator’s options to misuse it, as long as there is no automated self-control mechanism built into the device, similar for instance to controlling the speed of a car in cruise control mode. First generation NLWs, like the baton round or CS gas, allow the operator to freely choose the mode of employment. The ADS, as a new generation NLW, is integrated on an advanced platform and supported by a computerized weapon control system, facilitating the system to be set to disable operation beyond the predefined safety margins of engagement distance, radiation energy level and pulse emission duration. The operator can only select the targets to be engaged and decide when to activate the beam.

The likelihood of abuse of NLWs to occur is correlated with the types of effect at the user’s disposal: electro-shock weapons, and to a certain extent, sound directed energy weapons such as the ADS and lasers, bright light sources and chemical agents, leave no traces on the victim, which makes after-action investigation into alleged abuse or excessive use of NLWs harder. In particular the electro-shock weapons have been reported in numerous cases to have facilitated human rights violations, including torture. In a 1997 report Amnesty International documented electric shock torture in 50 countries worldwide since 1990 (Wright 2002).

What is easily overlooked or even ignored by security forces and police is the disproportional vulnerability of children to NLWs. The design parameters of most NLWs are based on what is required to temporary incapacitate an adult of average size. Using the same weapon indiscriminately against children mixed in crowds has caused fatal injuries or lasting damage to their body. The ADS, as a next generation NLW, may be one of the very few non-lethal system concepts exempted from this concern, as the radiation only interacts with the upper skin, hence it is indifferent for the size of the target individual.

Whereas the possibility of intentional abuse of NLWs appears obvious, the unintentional improper employment of NLWs is of significance as well. This may occur in situations where the military or the police are pressed or feel forced to act. When, for instance, a crowd turns into a mob and threatens the security forces, personnel may use their weapons for self defence, including NLWs. Inaccurate aiming of the weapon or being pressed to use the weapon too close to the target enhances the risk of non-lethals becoming lethal or
causing serious harm. Apart from kinetic energy weapons, such as the baton round, this also may occur with riot control agents such as CS gas. The initial intended effect of deploying NLWs, i.e. supporting the control of disorder using appropriate levels of violence, may not be achieved and occasionally rather the opposite may happen. This illustrates that the friction which Clausewitz refers to in conventional war is also present in military operations other than war. A specific example is the excessive use of CS gas by the British Army in Northern Ireland in a particular confrontation between Unionists (Catholics) and Loyalists (Protestants) that has been claimed to have decisively destroyed the confidence of the Unionists in the Army as their safeguard (Thornton 2007).

There is a growing concern that the increasing availability of NLWs to security forces as a complementary capability to lethal options may give rise to a tendency that operators become more ‘trigger happy’. It is easier to physically incapacitate an individual or group to control behaviour than accomplishing compliance through negotiation or warnings. This translates into a trade-off between the security forces preparedness to accept risk and the exposure to forced action of the opposing or non-cooperative party. The moral consequence of this trade-off can be linked to Mayer’s analysis of the justification of NCI in relation to the question of targeting non-combatants non-lethally:

Combatants must make a concerted effort and accept risk to minimize noncombatant harm. (Mayer 2007: 223)

While Mayer considers non-combatants as complete ‘outsiders’ in the context of armed exchanges between warring parties, it becomes clear that minimizing harm to civilians in a ‘war amongst the people’ context is a moral imperative as well, even when intentional – non-lethal – targeting of them is an option for the military intervention forces. What tends to be overlooked in the ethical debate is that military intervention forces operating in today’s conflict zones predominantly act as stabilization forces with a focus on de-escalation of force. They should not be defined as combatants in the traditional sense, bound as they are by strict rules of engagement (RoEs), prohibiting the deployment of a major part of their military power. Recognizing this shift in role and status of the military force would redefine the relative notions of combatants and non-combatants.

The Target Complex

The reaction of a person struck by a baton round will vary depending on the area of the body struck and the degree of motivation of the individual. Responses may vary more when individuals are under the influence of alcohol, drugs or suffer from a mental disorder. Furthermore, very motivated individuals may be capable of continuing their initial resisting behaviour. There is evidence that it may require repeated firing to stop and incapacitate a very aggressive person. Crowds may anticipate the use of baton rounds by
security forces with improvised body protection. Countermeasures against CS gas are possible by covering the face with wet tissue or even gas masks. Protection against the ADS energy beam is possible by wearing a radiation reflective suit on the body.

The level of preparedness of target groups significantly depends on the history of the conflict or crisis in which the NLW is being deployed. This is an illustration of the importance of context for the effectiveness of NLW use. Enduring conflicts are often characterized by fixed patterns of exchange between security forces and resistant groups. This may go as far as to trigger an arms race between both sides. This was the case in Northern Ireland where, after a short while, CS gas was considered largely ineffective against the intended targets and was even counterproductive as extended release of CS gas in populated areas did harm to local residents who were not involved in the confrontation.6 Ironically, whereas CS gas is designed to be used in open air, CS gas effects turn out to be more controllable in confined spaces as it is easier to tune doses.

The development of counter tactics is also an outcome of prolonged and repetitive engagement between security forces and non-cooperative targets individuals and groups. The use of cover in dense built-up areas denies NLWs like the baton round and the ADS the ability to exploit the necessary standoff distance due to lack of free line-of-sight. Militants in crowds may use innocent civilians as a fence and perform their aggressive act from behind.

In general, mixed crowds composed of passive bystanders, peaceful demonstrators, militant persons and ringleaders pose a considerable challenge to security forces in selecting the right approach. Selective engagement with NLWs is often complicated by chaos and by the impossibility to discriminate between aggressors and non-violent group members.

The mental state of an individual or crowd, the motives for their resistance or fight and their perception of the forces and their political masters in charge of the security mission potentially have a deep impact on the susceptibility for and response to the employment of violence, including NLWs. Such contextual factors of NLW deployment may profoundly affect the impact of NLW use. If the use of (non-lethal) violence by security forces is seen as fundamentally unjust by the target population and wider public, it is possible that such use may escalate rather than de-escalate violent resistance. Hence, the target complex embodies frictional factors that potentially deny the NLWs’ intended effect.

**Assessment Synthesis**

The discussion and assessment of the three ‘system components’ above has demonstrated that situational factors to a considerable degree determine the tactical and operational effect of the three NLWs considered. It appears that the general expectations of NLWs as expressed from an idealist point of view will often be thwarted by the Clausewitzian frictional factors encountered in the contextual reality. The fact that NLWs are designed to be effective in a narrow window of technical opportunity is by no means a guarantee that this
window will always present itself in a real world scenario. It proves to be fairly easy for a creative opponent to escape that window of permissible non-lethal exposure. Upon that, it can not be excluded that military security forces would not, intentionally or unintentionally, operate the NLW beyond the safety margins of the designed non-lethal window. The planners of non-lethal force employment are facing fundamental uncertainties about the impact of its actual use. Any wrong outcome of NLW use causing excessive harm, in particular against civilians, will be perceived as disproportionate use of force and judged as morally rejectible behaviour of the user.

The result of a DTA applied to NLWs may vary widely, as it depends on the particular type of non-lethal effect considered. It is difficult to generalize about NLWs as there is so much diversity in their characteristics and breeds that they are often not really closely related. Some analysts even suggest that it might be intellectually cleaner not to speak of a category of NLWs at all (Koplow 2006). Such an approach supports the preference for a conceptual separation of the notions of ‘non-lethality’ and of ‘non-lethal weapon’, as has been adopted in this paper.

Whereas from a functional and technological point of view, non-lethality would seem instrumental to cope with the tactical, operational and even strategic problems of the impossibility of discrimination between benign and hostile targets in irregular scenarios, the question remains whether indiscriminate use of non-lethal force would be legitimate. As we have seen, in contemporary conflict scenarios the civilian population can often no longer be considered an outsider in relation to the type of mission and tasks the military intervention force is performing. To give another example, when a crowd in an urban scenario does not behave aggressively, but at the same time there is a high probability that hostile and armed elements hide in that crowd, would it be acceptable to neutralize or disperse the crowd by means of ‘mass-incapacitation’? In this situation, the NLW is used pre-discriminately, because after the mass-incapacitation has been achieved, forces could approach and single out the opposing militants (Enemark 2008). A particular group of NLWs that would facilitate such an operation can be labelled as area effect weapons. Their intent is to engage a group of individuals that are gathered within a certain space, either in the open or indoors. Advocates of the operational need for this capability argue as follows:

What are needed with absolute certainty, are NLWs that can reliably incapacitate, or otherwise initiate control of targeted persons dispersed over a fairly large area. Applications of NLWs in counterterrorism, counterinsurgency, peace support and other law enforcement-like operations, make these systems imperative. (Alexander 2007a: 4)

Resolving uncertainty through indiscriminate targeting is also a relevant issue in asymmetric conflict scenarios involving singular actors. In one case, international security forces in Afghanistan have been confronted with situations in which military convoys passing through villages or towns were attacked by vehicle borne suicide Improvised Explosive Device (IED) attacks. In response to the threat, force protection procedures led to various civilian casualties when car drivers or motor bikers did not respond to
warning signs and warning shots from the passing military vehicles to respect the minimal safe distance from the convoy. Non-lethality is being considered by operational commanders as a method to be able to stop or neutralize individuals indiscriminately. In an effort to accomplish this, a stepwise approach is considered, with increasing levels of non-lethal physical effect when the target would continue to approach the convoy.

Whether or not the capabilities called for are ultimately feasible, they inform the debate on the ethical implications of engaging a population indiscriminately to reduce the uncertainty problem beleaguering current military missions.

**NLW and Just War Tradition**

The paradigm shift in the nature of conflict defines new roles and challenges for the military. The new roles are to a large extent other than war-fighting. These changed circumstances have implications for the interpretation of the Just War Tradition. In the absence of overt war, the *jus in bello* principles of proportionality and discrimination, as well as NCI, need to be re-calibrated. The ongoing NLW debate, in particular the ethical and moral ramifications of the new military options, is a clear indication of this need.

NLWs have already been deployed and used by the military forces of a variety of countries in a range of international intervention missions. This includes the use of NLWs against civilians in particular circumstances, and in situations where the discrimination between combatants and non-combatants is not possible. Some analysts criticize the use of NLWs as a technical fix to reduce this uncertainty problem. Kaurin (2008) argues against the use of NLWs as a way to circumvent or make irrelevant moral distinctions like combatants/non-combatants. However, the DTA approach in this article tells us that the military forces are morally still committed to accept a considerable level of risk and show restraint before using force, even with a non-lethal option at their disposal. While NCI obliges the military to treat non-combatants as different from militants, the blurring distinction between combatants and non-combatants requires the operational commander to take decisions on the use of force in situations where the universal immunity of non-combatants in the classic sense is no longer a workable concept.

Those in favour of the permissible use of NLWs against non-combatants argue that the intentional harm to civilians requires that the principle of NCI be subjected to a ‘lesser evils’ test that compares the small intentional harm with a greater level of non-intentional harm that comes from lethal force. If the former is significantly less than the latter than there are moral grounds to targeting civilian non-combatants with NLWs (Gross 2008). NCI needs a new interpretation in order to effectively serve as an effective moral compass for the military commander and operator in complex situations when the use of NLWs is contemplated. The DTA method can be used to match NCI ‘new style’ with the application of non-lethal force against non-combatants, in part by checking the moral standards educated and trained to the military forces equipped with NLWs.
Abuse and proliferation are by-products of non-lethal technologies and weapons that deserve due attention and response. Immoral uses of NLWs will occur, and have the potential of becoming political showstoppers for non-lethality, even when regular forces would generally use NLWs in an operationally and morally rightful manner. Any technology, including dedicated non-lethal ones, has the potential of human rights violations, although particular technologies which leave no marks pose a particular challenge to finding evidence of abuse. Besides abuse of NLWs, it is important to assess the likelihood of an NLW to be unreliable regarding its non-lethal performance. It would appear ethically inappropriate to field any NLW that poses a significant risk of excessively harming people, albeit unintentional.

One of the issues interfering with the rationale of non-lethality is the permissibility and acceptability of intentionally inflicting pain, harm and suffering against civilians. The principle of proportionality of a certain military action is usually tested by assessing whether the significance of the military objective of the action outweighs the unavoidable civilian casualties. Asymmetrical warfare, by its very nature, carries a greater risk of disproportionate, unnecessary and intentional harm than conventional fighting between two relatively well-matched forces. NLWs may not solve these problems entirely, but do offer an avenue for limiting disproportionate harm to civilians in contemporary armed conflict (Gross 2008). In analogy to the DTA approach to consider the military utility of NLWs contextually, a judgement of NLWs on moral and ethical acceptability and on proportionality could be performed contextually as well.

Some analysts consider the use of NLWs by military forces directed against civilian populations as a radical change in military strategy (Enemark 2008). For the appreciation of the moral acceptability of such a strategic shift it is relevant to refer to Fidler’s proposal suggesting an amendment in international law that reflects the changing nature of conflict and its implications for the position of NLWs:

The Selective Change Perspective, which accepts that the nature of conflict have changed and will continue to change. Consequently, rules for NLW can be different from those for lethal weapons, but NLW needs to be clearly defined to enable change of particular parts of international law regimes on a case by case basis. (Fidler 2001: 198)

Fidler requires a clear definition of (an) NLW, in order to enable that a change in international law can be formulated. DTA tells us, however, that it is not only the NLW itself that has to be clearly defined, but also the attitude and approach of the user who employs it. A change in international law, therefore, seems premature for NLWs with effects that are ‘user sensitive’.

Conclusions
In Western societies, drawing from their democratic culture and tradition, moral and ethical issues increasingly have come into play when dealing with conflict. In the Western way of war, in particular in wars of choice rather than necessity, respect for human life has become a key issue. A need has emerged
for more fine-tuned effects of weapons as to make them perform non-lethally. The Just War Tradition, in particular the *jus in bello* component expressed in the requirements of proportionality and discrimination, needs to be adjusted to the human-centric operational environment.

From an idealist perspective, NLWs are technologically designed and expected to make military operations more benign and even bloodless. In reality the performance of NLWs is submitted to operational friction, comprising many factors of influence and chance that erode the expected effect. Contemporary conflict is therefore characterized by uncertainty.

A Defence Technology Assessment of NLWs considers the user, the weapon and the target as complex components of a system that is exposed to the influences of the specific context of the scenario of deployment. The DTA application demonstrates that apart from technical constraints, NLW effectiveness is strongly affected by independent factors within the user and target complexes. The target population may respond in widely diverging ways, depending on situational circumstances. The risk of serious harm or fatalities predominantly depends on the training, skills and attitude of the military user. Hence, a home-tested functioning technological concept in itself is no guarantee for successful operational utility in real scenarios. Instead, the DTA approach would help to unravel the operational complexity and thus enable an uncertainty reduction. This approach also informs the ethical and moral issues that guide NLW use.

The occurrence of abuse of NLWs is impossible to rule out, as any technology can be employed in a harmful manner, especially with types of NLWs that leave no traces on the victim.

In this respect it would be ethically appropriate to consider the infliction of temporary harm as a lesser evil. The concept of non-lethality appears to be implicitly compliant with the imperative of proportionality. Ultimately, a partial review of International Humanitarian Law would facilitate the mitigation of the risk of inflicting innocent casualties by allowing a wider deployment of non-lethality. Such a review would provide the military with a license to non-lethally and temporarily silence a violent or risk situation in international intervention missions. It is therefore recommendable that a thorough assessment of NLW performance in a contextual framework precedes amendment of law.

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**Notes**

1 The article is based on a paper that I presented at the international conference Emerging Technologies, Ethics and Leadership, organized by the Netherlands Defence Academy, 5–7 November 2008, Amsterdam.
2 A distinction is made between the notions of non-lethality and non-lethal (weapons or capabilities). Non-lethality refers to wider strategic and operational concepts that guide the use of force that is supposed to deliver non-lethal effects. Non-lethal refers to the properties and effects of weapons. Compare Rappert (2002: 55, 73).

3 In an interview with the author, J. Bolle stated that in US prisons the spraying of CS gas to control turmoil in gatherings of inmates was less effective and led to replacement of the agent by the much stronger pepper spray, also dispersed as an area effect aerosol (Ossendrecht, Netherlands Police Academy, October 2007).

4 Interview by the author with Col (rtd) J. Wilson, who gave an account of the prison incident that took place in the 1970s (Upavon, HQ UK Army, 16 December 2008).

5 Interview by the author with a commander of an arrest team in the Dutch armed forces. The name of the interviewee is not disclosed for security reasons (March 2008).

6 Interview by the author with Brig (rtd) T. Longland (Shrivenham, DCDC, 18 December 2008).

7 Anecdotal accounts of such situations have been taken from interviews by the author in 2007 and the first half of 2008 with Dutch officers who have served with the Dutch Battle Group of Task Force Uruzgan in Afghanistan. Respondents are not quoted in this paper for security reasons.

References


**Biography**

Sjef Orbons joined the Ministry of Defence of the Netherlands in 1989. He is currently a researcher at the Netherlands Defence Academy and preparing a PhD thesis on the topic of non-lethality. Previous staff positions include the Department of Defence Concepts of the MOD and the NATO Defense College in Rome. He received his Master of Science from Eindhoven University of Technology.