Non-lethality in reality: a defence technology assessment of its political and military potential
Orbons, J.B.J.

Citation for published version (APA):
Orbons, J. B. J. (2013). Non-lethality in reality: a defence technology assessment of its political and military potential
Chapter 6
Conclusions
Introduction

In this study an assessment of the utility of NLWs in military operations has been made. As we have seen in Chapter 1, since the early 1990s, NLWs have been claimed, developed and fielded to serve particular political and military purposes. Much of the underlying rationale reflects expectations regarding the performance of NLWs under real world circumstances. Often, these expectations were expressed in general terms, and were largely based on the design specifications of the NLW, abstracting from the circumstances under which they were supposed to be used. As a result they have been criticized by other analysts and practitioners.

The study has been undertaken to enrich and underpin this debate by generating operational evidence. Empirically, it focused on three specific contexts in which military forces were deployed and used various types of NLWs: British control over Northern Ireland (between 1969 and 1998), detainees control in Iraq (between 2003 and 2009), and operations in Afghanistan (2009 and 2010). Within each context, various cases of NLW use were investigated. While most analyses have relied on actual events, in two cases, NLW use was discussed hypothetically, drawing on detailed information of the operational contexts, regular tactical proceedings and the informed judgement of experienced soldiers. Conceptually, the analysis was guided by the heuristic Defence Technology Assessment (DTA) framework presented in chapter 2, comprising the various classes of influence on the effect of actual NLW use: those related to the weapons, the users and the target population.

In this concluding chapter, the findings and phenomena that emerged from the case studies will be further elaborated and discussed. After a synopsis of the purposes and expectations of deploying NLWs in the three cases examined, the next section will review the findings from the NLW deployment, arranged by the components from the DTA framework. Section 4 will then aggregate the impact of these findings on the effect of NLW use. Next, these results will be used in terms of the relationships and interactions found between the tactical and strategic level. In section 6, the claims as extracted from the NLW debate will be validated against the research findings, and this will provide for the answers to the central research questions in section 7. The final section gives recommendations for the way ahead with NLW usage and closes with a perspective on DTA applicability on advanced defence technologies beyond NLWs.

Purposes, expectations and doctrinal underpinnings of NLW deployment

The Troubles in Northern Ireland

The conflict in Northern Ireland emerged from a growing resistance amongst the Catholic community against their political and social marginalisation within the “Province”. The government’s view of the protests as being illegal led to intervention by force. Catholic civil
rights marches met heavy-handed responses from the predominantly Protestant Northern Irish police force, the Royal Ulster Constabulary (RUC). The civil unrest and violence that followed grew to a level that it could not be contained by the RUC. The British Army was deployed to intervene between the sectarian groups in 1969. The absence of any solid political strategy towards a stable province-wide end state created a political vacuum in which the British Army developed its own strategic approach with a focus on winning the “hearts and minds” of the Nationalist community. During more than three decades the British Army was deployed in an environment that had become increasingly hostile to its presence.

Upon deployment to Northern Ireland, the British Army role was governed by a policy of minimal force. Minimal force implied that British Army personnel was to abstain from repression and from inflicting civilian casualties in its mission to prevent and contain violence and to control over public areas. The policy and ensuing doctrine were implemented by adopting a policing posture, coordinated with the Royal Ulster Constabulary, which reflected the British Army’s focus on building and maintaining a positive relation with the population to win their hearts and minds, and to defuse inter-sectarian tensions.

As this posture was challenged by insurgents early-on after its deployment, the British Army had to preserve the delicate balance between force protection against hostile strikes and maintaining public order. CS and baton rounds (BRs) were the primary NLWs assumed to accomplish this requirement. After Bloody Sunday in January 1972, when 13 civilians were killed when the British Army used lethal force, the reliance and expectation on CS and BRs in coping with massive and violent public disorder further increased, as lethal force was now declared as an instrument of last resort. CS was intended to accomplish area denial by causing discomfort to eyes and respiration to individuals present in a targeted area, while BRs should enforce compliance by inflicting pain.

In the course of the Troubles, efforts were made to technologically improve NLWs, in particular of BRs, with the intent to enhance its performance in effectively coping with the public order task, and at the same time to mitigate the risk of serious harm to or casualties among the target population. The further fine-tuning and tightening of the guidelines to security forces in employing NLWs created a Use of Force (UOF) continuum, intended to ensure the legitimate and safe use of NLWs. Within the framework of the UOF continuum, the NLWs were also supposed to help to discriminate between insurgents and ‘normal’ demonstrators, thus separating or isolating militant elements from the non-violent population.

**Detention facilities in Iraq**

The achievement of mission objectives in international counter insurgency (CI) operations is considered to be hinging on the intervention forces’ ability to gain the support and cooperation of the civilian population for the intervention mission objectives. In the case study discussed in chapter 4, concerning detention facilities in Iraq (2003-2009), this was particularly crucial, given the political context.

This ‘hearts and minds’ strategy was gradually extended to include and redirect detainee operations, and motivated by a growing belief that the way detainees were treated was key to reshaping their

---

2 The background and aims of NLW use in Iraqi detention facilities have been addressed at more length in Chapter 4, pp. 82-83.
political motivation towards a more positive orientation regarding the new Iraqi government and the coalition forces. Initially, Iraqi detainees were predominantly exploited by US forces as intelligence source in support of their CI mission. This shift in approach in detainee operations came after the US authorities were publicly confronted in 2004 with the atrocities done by their military personnel against Iraqi detainees in the Abu Ghraib detention facility.

In situations of war and international conflict the Geneva conventions of 1949 provide for a legal framework for the just treatment of detained individuals, stressing the force’s responsibility to protect them. US authorities gradually redressed compliance with these fundamental rights of detainees after the Abu Ghraib turning point. This was also articulated in policy documents, and in subordinated doctrine and manuals on detainee operations.

A second doctrinal lead principle in detention operations was the imperative to keep control of the detention facility under all circumstances. This should be accomplished with the concept of minimal force, elaborated in a graduated response UOF continuum in cases of major disturbances, stressing the prevention of casualties. NLWs were incorporated in the UOF, with the intent and expectation to enforce control and order over the detainee population, without having to resort to lethal force.

The principal NLWs deployed were BRs and other kinetic NLWs. Their deployment was expected to avoid casualties and serious injury while at the same time should enforce compliance by causing pain. Lethal force was only permissible in cases of detainee escapes and threat to life of guard forces. The graduated UOF response against major disturbances authorized the use of NLWs only when preceded and accompanied by verbal warnings to detainees and their leaders urging them to comply with facility regulations.

NLWs were also considered compatible with the hearts and minds strategy that governed the CI mission, including detainee operations later on, as they were expected to be perceived by detainees as proportionate force in major uprisings, and as demonstrably reflecting a minimal force doctrine safeguarding the wellbeing of the detainees.

**Checkpoints and convoys in Afghanistan**

The third case (chapter 5) discusses NLW use in the context of the ISAF forces, deployed to stabilize Afghanistan and to deny the Taliban getting back into power, thereby preventing a renewed creation of a sanctuary for a resurgent Al Qaeda. A dual strategy has been defined by the Coalition forces: on the one hand military containment of the Taliban military strikes; and on the other to rebuild the country to win the hearts and minds of the Afghan population.

The hearts and minds approach was essential to ISAF commanders, as they view the human terrain decisive for a successful outcome of the mission. By its nature, winning hearts and minds is dependent on tactical activities and implies a different mindset in the conduct of military operations: a less coercive approach and emphasizing the minimum use of force. Minimizing civilian casualties can be viewed as one side of the coin of ‘casualty aversion’ as a lead issue for western policy makers and military commanders in Afghanistan. The flip side represents preventing killings among own military personnel during such missions.

---

3 The background and aims of NLW use at checkpoints and with convoys have been addressed at more length in Chapter 5, pp. 110–113.
Efforts to reduce the number of civilian casualties focus on recurring critical tactical level situations, in particular events involving checkpoint and convoy operations. This is where ISAF forces are often confronted with unanticipated non-cooperative behavior of approaching drivers and, forced to take split-second decisions, misinterpretation of their intention may cause control forces to risk innocent casualties. This problematic is compounded by the persistent threat of vehicle borne suicide attacks.

Laser Optical Warners represent a class of NLWs that are considered to be an effective capability to enhance Escalation of Force (EoF) procedures in meeting engagements at checkpoints and with convoys to reduce the risk of unintended civilian casualties. Their intended effect is earlier warning of approaching traffic and forcing drivers to slow down and stop. They are expected to reduce uncertainty by helping to de-conflict the dilemma between force protection of own military personnel and casualty avoidance of innocent civilians. Thus, the tactical level deployment of Laser Optical Warners is believed to effectively contribute to the strategic imperative of winning the hearts and minds of the Afghan population.

**NLW military deployment: review of findings**

This section reviews the findings from the cases investigated in the study and relates them to each other, in order to identify and discuss the mechanisms and phenomena that stand out in defining the outcome of NLW deployment and use. The analysis will be guided by the DTA framework. While, strictly speaking, it will be confined to the set of NLWs examined in the three case studies (CS, kinetic energy NLWs, laser optical warners and the ADS), it will become plausible that these mechanisms will also hold more generally.

The DTA model served to identify and address both the physical and non-physical factors of influence on the use of NLWs, and their possible interactions. Part of these factors feature in the engagement processes of all NLWs examined, whereas others appear to be tied to the application of one or more particular types of NLW. Yet, as we will see, more than the DTA framework assumed, the use of NLWs appears to be influenced by issues that reside at the politico-strategic level of the conflict. Similarly, at the politico-strategic level, policy issues and developments are at play that, once made public, have the potential to reshape the target population’s mindset and attitude towards the user force, and by consequence alter the target population’s physical response against the user’s employment of NLWs.

After addressing the findings that stand out from the three cases at the technical/tactical level, the situation and developments at the politico-strategic level will be discussed separately, in order to identify how they influence the course of NLW events at the — technical/tactical — ground. Conversely, the implications for the outcome of NLW use, both at the tactical level and in terms of mission accomplishment at the politico-strategic level, will be presented.

**The impact of environment and weather on NLW performance**

A range of conditions related to weather and physical environment influences has the potential to influence the performance of NLWs. These conditions contribute to shaping the physical context of an event in which an NLW is used. The ways in which the physical context influences NLW performance have been gathered from the operational cases and will be discussed here.
Visibility conditions have an immediate impact on the operation and effectiveness of all NLWs that require accurate aiming. As these weapons are used at distances of dozens of meters from the target individual, unfavorable weather conditions due to fog and heavy rain or snow deny their reliable use. It has also been found that dust caused by sandstorms and smoke resulting from fires also disturb the applicability of these NLWs. Operations conducted in darkness also suffer from degraded aiming opportunity, unless vision is artificially supported.

Whereas aiming the Laser Optical Warner requires good visibility conditions, its performance in relation to daylight conditions deviates from that of kinetic NLWs. Dark ambient conditions increase the capability to blind an incoming target individual, due to the sharp contrast of the bright laser light in darkness. The opposite occurs under bright daylight, when the laser light intensity has to compete with light intensity produced by the sun. This is particularly critical when the sun is aligned with the line of sight between the laser and the target individual. Apart from visibility conditions to be permissible for aiming the laser, bad weather, dust and smoke are responsible for a context that strongly degrades the laser beam intensity effectively delivered to the target person.

As with the laser optical warner, the ADS performance suffers from atmospheric attenuation. This loss of performance increases with range, as range dependent variations in atmospheric conditions, in particular of humidity, complicate the ability to tune the MMW beam intensity to the required level at target position range. Hence, due to the high sensitivity of safe ADS beam modulation to the atmospheric conditions, ADS applicability is highly dependent on a favorable physical context. In contrast with directional NLWs, non-directional NLWs as CS and the stun grenade are much less dependent on good visibility, and therefore less susceptible to variations in the physical context.

Strong and variable wind conditions interfere with the ability to accurately direct kinetic energy projectiles. This is again a problem that increases with range. In sandy environments, wind also causes dust and sand storms, creating conditions that are prohibitive to the majority of NLWs. This also includes CS, as strong wind denies control over area distribution of the agent, thus enhancing the risk of harming innocent civilians, and early decline of the agent’s required intensity level in the targeted area.

Range issues are also triggered by the presence of buildings, vegetations and other material objects in the area of NLW deployment. They act as obstacles that interrupt the lines of sight and, in the case of ADS, they perform as undesirable and incalculable deflectors of the MMW beam. The probability of meeting such obstacles increases in proportion with target engagement range. Hence, relatively compact built-up environments create a less permissive physical context for NLW, in particular for longer range directional systems.

---

4 The problem of atmospheric humidity degrading ADS performance is not revealed in the public demonstration videos posted on the JNLWD website. Tests and demonstrations are usually performed under clear visibility and dry weather conditions. At: http://www.jnlwp.defense.gov/multimedia/video.html. Accessed on 10 January 2012.
In sum, unfavorable environmental and weather conditions, in particular those degrading atmospheric visibility and directed energy propagation range, reduce the accuracy and performance of the NLW. The susceptibility of the window of non-lethality of most NLWs to the physical context is difficult to cope with the tolerance margins for an NLW to be on the one hand sufficiently strong to acquire a desired physiological effect, and on the other to keep the impact within safety limits, are relatively small. Target populations have in some cases exploited this susceptibility to these contextual physical factors to their advantage.  

**Counteracting NLW physiological effects**

Virtually every deployed NLW proved to be susceptible to countermeasures. They were of a technical nature, or of tactical origine, or applied in combination. Target groups prepared and deployed technical countermeasures adjusted to the specific physiological effect of the NLW they encountered.

Against CS, highly motivated resistive target groups managed to sharply reduce the weapon's effect by covering or wetting techniques to absorb the irritation effect. In addition, in an operational context of protracted and repetitive exposure to the weapon, a decline in physiological sensitivity to the agent has been observed, which even develop into immunity of target individuals who had been frequently exposed to the weapon.

The combination of countermeasures and reduced sensitivity against CS produced a context that contributed to a deadlock at the tactical level, with neither side willing to give way. The user force aimed at conditioning this state by protracted and excessive release of CS. By consequence, collateral damage was inflicted to citizens not involved in the stand-off. The political fall-out included the portraying of the security forces and political decision makers of having failed in properly dealing with the resistance, and a growing alienation and hostility of the target community towards the political leadership and its security agents. In addition, the collateral damage tended to galvanize wider public opposition and closed its ranks, and, politically, widened the gap between the parties involved.

Technical countermeasures against kinetic energy NLWs, in particular BRs, consisted of makeshift body protection gear. Target individuals combined visible or concealed protection gear with hit and run tactics to perform counterstrikes with improvised missiles against the BR user force. Tactics, relying on dynamic behaviour, reduced time windows available to user forces to engage the most violent elements in the target group. The opportunity to effectively apply dynamic tactics was dependent on particular contextual factors, such as the available maneuvering space, and on the presence of natural shielding in the operational space. Alternative combinations of technical and tactical countermeasures were realized through coordinated operations of target group elements holding shields, to fence off other group members, to enable them to launch counterattacks from cover. Indirect kinetic energy NLWs could partly overcome such countermeasures, as their effect does not require particular aiming and works randomly, though their kinetic impact energy is much lower than that of BRs, due to their high risk of striking vulnerable parts of the target bodies from close range. A particular

---

5 As, for instance, occurred in the Abu Ghraib detention facility in Iraq, Chapter 4, p. 94-5.
6 See Chapter 3, p. 70 and p. 72.
set of tactics was practiced in the detention centres in Iraq, exploiting the particular context of physical separation of the maneuvering space available to the user force, i.e. the corridors, and the maneuvering space available to the target population, i.e. the detainee compounds.\(^7\) They could stay out of BR range, and quickly switch the scene of rioting from one compound to another. Finally, tactical countermeasures also exploited the context of the blending of target individuals in large and dense crowds, thus preventing exposure even to very precisely aimed BRs. A most daring tactic used by target individuals was to move as close to the user force as to enter the non-permissive range zone of BRs, thus taking advantage of the sanctuary that formally existed in which the use of BRs would officially be prohibited because of the high risk of lethal effect.

Countermeasures against BRs were generally applied by the most militant part of the target population. Their relative invulnerability in comparison with less prepared target individuals in combination with the former’s intermingling with the latter, shaped an operational context that enhanced the risk of harmful strikes against the less militant target individuals. The dynamic behavior of multiple militant target individuals increased the probability of BRs missing their intended target, and by consequence, striking the wrong, relatively innocent targets harmfully, especially with large and dense target groups present. In an operational context marked by large target populations with many taking part in the rioting, the original one-on-one nature of the BR tended to degenerate into a many-on-many use, which came to bear as barrages of BRs with the synergetic effect of raising the risk of harmful strikes.\(^8\)

The feedback of such adverse BR effects from operations was twofold: upgrading BR accuracy by technical innovations, and by sharpening the RoE and accountability of the user force for BR employment.\(^9\) In Northern Ireland this has slightly reduced the number of harmful strikes over time. At the politico-strategic level, the negative effect of adverse effects of BRs was profound, as it was mostly directly reported to the outside world. Rather than a discriminative NLW serving to contribute to the hearts and minds approach pursued politically, the BR became an enduring symbol of repression and abuse, thus further alienating the target population from the political authorities. In Iraq detention centres, actually being closed communities to the outside world without any significant reports released on upraisings, the coupling to and feedback from the higher levels was largely insignificant. The effectiveness of the target population’s countermeasures against the BRs forced the user forces into protracted stalemate battles within a confined operational space. The failure of BR use to physically enforce compliance and restore order during riots, contributed to defining a context responsible for a ‘pressure cooker’ effect in the closed detention centres, that further estranged the US guard personnel and the Iraqi detainees from each other\(^10\), further impeding a successful hearts and minds approach in the detention centres.

\(^7\) See Chapter 4.
\(^8\) The BR barrage effect has been observed during massive uprisings, in 1996 in Londonderry, Northern Ireland, and in 2005 in the Abu Ghraib detention facility in Iraq. See Chapter 3, pp. 67-8, and Chapter 4, pp. 92-5.
\(^9\) The gradual evolution of the BR system in response to the harmful and politically counterproductive outcome of its use in Northern Ireland was possible only because of the protraction of the conflict over several decades. As regards the application of BRs in Iraqi detention centers, no technological system innovations have been reported.
\(^10\) The ‘pressure cooker’ effect has been addressed in Chapter 4, p. 102.
Countering laser optical warners, basically followed two tracks. In the first, a driver chooses to ignore the blinding effect of the green laser beam, simply by slightly looking away from the laser beam direction, which allows retaining some vision to drive ahead. Slightly maneuvering the car also enables the driver to avoid the laser beam. The other type of countermeasure is to attenuate the laser beam before it influences the target’s vision. This is accomplished by the use of the vehicle’s blinds to interrupt the line-of-sight between the laser and the driver’s eyes, or by the wearing of sun glasses to reduce the beam intensity, making the blinding effect tolerable for the driver to keep moving forward in the same direction.

The motivation of drivers to apply such countermeasures was also depending on contextual factors as the availability of public information regarding the presence and purpose of the largely unknown laser optical warner, and the level of criminal activity in the area. More information on the laser use would increase the willingness to comply. By contrast, drivers unaware of the meaning of the blinding effect would be more inclined to try to ignore it. Non-cooperative behavior would be reinforced if the population would be alerted on the risk of encountering criminal groups who operate checkpoints. Another higher level issue at work to make drivers counteract the blinding effect was related to the deployment rotation of user forces. Some drivers had developed a tradition towards ISAF to provoke freshly incoming forces by ignoring their warning signals, as a means to check their posture and determination. Such irrational behavior is difficult to anticipate or to detect, in particular because it is impossible to distinguish from the other motivations for non-cooperative behavior indicated above.\footnote{The ‘probing’ of newly arriving forces has been reported by Dutch ISAF forces deployed in Uruzgan in 2010. See Chapter 5, p.125 (note 72).}

The effect of the application of countermeasures on user forces could be confusion and misperception regarding the target individual’s identity and intent. It is most likely that non-compliance with the laser optical warning would mark the driver as a hostile subject, authorizing the user force to fire warning shots and, in case the driver would still continue his approach, to engage with lethal fire. Hence, in a worst case context, a driver ignoring the blinding effect creates an image of hostility to the user force, in absence of any other clues to identify the driver as hostile or innocent. The introduction of the laser optical warner, while intended to alert drivers to stop, thus forestalling the need for lethal engagement, may in incidents with drivers ignoring or denying the blinding effect, enhance the risk of wrong judgement of hostile intent and as a consequence may cause innocent fatalities.

The ADS has been deployed only hypothetically within the framework of a single case only, while the system has not been fielded in real world operations elsewhere. Hence, conceivable countermeasures can only be derived from its technical characteristics, taking into account the context of the detention operations case as examined in this study. The MMW directed
energy beam emitted by the ADS can technically be countered by target individuals by wetting their cloths, as water strongly absorbs at this wavelength. The pre-absorption prevents the radiated energy to dissipate into the target’s skin. Furthermore, metal body shielding, such as with thin foils or fine-meshed grids, reflects and scatters the incoming DE radiation, thus preventing the MMW beam to reach and heat the upper skin of the protected individual. For these technical countermeasures, the operational context should facilitate the availability of sufficient amounts of water and suitable metal objects. Normally, these ingredients would have been in short supply within the compounds of the detention facilities in Iraq.

Potential tactical countermeasures include fast maneuvering patterns by the target individuals, as the mechanical and electromagnetic inertia of the current ADS fails to support the agility required to slave, modulate and lock the MMW beam on quickly moving target individuals. Target individuals may also choose to use the presence of large crowds to seek cover, as the MMW beam resolution and modulation is insufficient for discriminate engagement of an embedded target individual. Another potentially applicable tactic to escape the ADS beam for a target individual is to move as close to the ADS platform as to stay below the system’s minimal operational range, which measures up to dozens of meters.

Given the operational context of large groups of detainees rioting, even without the resources available for effective technical countermeasures, the combination of tactics and mass provides for options to deny the ADS effect of helping to get a massive riot under control. If only one or a few ADS platforms are available, the ADS capability may soon become saturated. Although the pain sensation will produce some effect, it is short lived, as it expires very soon after the target’s exposure to the beam stops. The ADS engagement and target response might resemble a ‘dance’ to escape the heat. Target group tactics define a context that complicates accurate targeting of true rioters, as they intermingle with less militant detainees. Consequently, the risk of frequently striking unintended target is high, in particular as precision declines with range. Wrong targeting arouses more opposition. The invisibility of the MMW-beam, together with the platform located out of range for retaliation strikes, is likely to spark aggression that will find its way to the user force in an indirect sense.

If the target population is able to continue rioting massively, it would outlive the sustainability of the ADS operation, depending on the recharging capability of the system. If indeed the rioting detainee population would be able to cope with a technologically superior system as the ADS, it would give them the mental boost of a victory. This, in combination with the alienating effect upon the target population and possibly even felt as torturing by an unouchable opponent, would put the deployment of ADS at odds with the hearts and minds approach vis-à-vis the population. At the same time it would have failed to meet the user forces’ imperative to keep control over the facility under all circumstances. The negative effect would be worsened if target populations perceive the ADS as a symbol of the unjustness of being detained innocently and without charges.

Summarizing, NLWs are generally susceptible to countermeasures from target populations. Such countermeasures tend to become more effective over time, both technically and tactically. Extended or repetitive exposure to the same NLW generally triggers a learning process
amongst determined target populations to progressively resist the NLW effect. Hence, in real world operational contexts, the NLW effect proves to be time-dependent, in the sense that the effect tends to decline against experienced target individuals. Given the well defined characteristics and window of the NLW effect, targets seek to close down the window of regular NLW applicability as far as possible. This mechanism bears the potential to provoke a response by user forces to apply the NLW beyond the safety margins.

User proficiency, performance and posture

The effect of an NLW against a target person or group is viewed as a result of the combination of the weapon’s dedicated design parameters and proper use of the NLW. The examined cases of NLW use demonstrate, that in many situations the physiological impact of NLWs is dependent on the level of skills the user has obtained, both through pre-deployment training and through experience gained during real world operations with the NLW. This observation especially applies to directional NLWs, as their effects critically rely on the operator’s decision making and target engagement process.

Ideally, the user deploys the NLW in such a manner that the weapon perfectly performs according to its specifications. For kinetic energy NLWs, this implies that they strike the target body at the permissible parts only, with the impact energy within the predefined safety margins. Equally, laser warner light projects a blinding but eye safe energy dose, and the ADS raises the skin temperature to level at which the heat becomes painful, but without causing burning wounds.

Although users had to operate within their RoEs to ensure correct NLW use, in reality they often did not meet this requirement, due to a range of contextual factors influencing their task performance. One was the lack of dedicated and realistic pre-deployment training on the weapon for some users, for reasons such as overburdened mission training requirements, forcing commanders to prioritize between training goals, in which NLWs marksmanship development training tended to be squeezed, both in Northern Ireland and Afghanistan. Another resulted from an operational context in real deployments, denying NLW operators a measured application of the NLW, even after dedicated training. In the case of BRs, situational contexts brought users to fire above permissive weapon range, thus compromising the accuracy limits of the NLW and enhancing the risk of serious harm to random target individuals, or to strike innocent targets. Equally, users have shot BRs at prohibitively short ranges, as happened during The Troubles, or fired without any intent or ability to aim the weapon launcher, as has occurred during detention operations. It is obvious that such behaviour causes a higher risk of fatal consequences amongst the target population. Such manifestations of users to be capable of irresponsible uses of NLWs were mostly triggered by the operational context experienced by the user, both mentally and physically.

12 See Chapter 3, p. 69, and Chapter 4, p. 89.
13 See Chapter 3, p. 66, and Chapter 4, p. 101.
The way NLWs were deployed also depended on the user’s attitude and perception vis à vis the target population. The sectarian divide in Northern Ireland also divided the security forces politically from the opponent during protests and riots. Due to their political partiality the user force was biased against the target population. This tended to influence their interpretation of the doctrine of minimal force. In Afghanistan, a minor part of the Dutch forces tended to view Afghans as potential insurgents. US guard forces in Iraq perceived detainees as enemies or terrorists or a threat to them, at least in the first years of the detention facilities (Hedges and Al-Arian 2008: 76). Accountability was marginalized. In Iraq and Afghanistan, political implications of wrong NLW use in detainee centers were low, as long as no killings occurred. Media presence in Afghanistan in the events considered was close to zero, similar as in the detainee facilities, hence NLW use would mostly remain a tactical issue business, no onlookers were present in the closed and isolated settings of the detainee centres. Northern Ireland was entirely different, with the whole world watching the street battles, while the Western populations could identify themselves with the target population in Northern Ireland. When a hearts and minds strategy were in place, this informed the operational context, in the sense that commanders had to implement the political framework in their operations, by tightening the guidelines, including those for NLW employment.

In many disorder incidents the user forces, when faced with the available NLWs failing to produce the desired outcome of target compliance, were inclined to protracted use of the NLW, as to keep the target individuals or group under pressure. In the ensuing stalemate operational context, escalation mechanisms were at work through which users decided to intensify NLW discharges. If the stakes rose high, such as in a detainee facility with a massive riot threatening the integrity of the facility, the RoEs became ‘stretched’, for the sake of getting a critical situation under control. Within the charged context of the struggle for regaining control, users have disregarded the safety limits of the NLW, either by extremely long duration of the effect as occurred with CS in Northern Ireland, by delivering excessive energy levels to targets, or by ignoring weapon aiming protocols.\(^{14}\)

Whether users would correctly or prohibitively use the NLW also depended on their mental and physical state, as it influenced their ability to make adequate judgments and decisions. Users disregarded NLW guidelines for various reasons, many of which emerged from the context of an operation, including pre-occupational views, recent and occasionally stressful experiences, and particular perceptions. They are also influenced by political level issues, such as the insurgency by the IRA during the Troubles. While the security forces in Northern Ireland initially adopted a hearts and minds strategy Province wide, this was gradually undermined by the IRA and its counterparts within the Northern Ireland community. Wider conflict information about threat levels and insurgency strikes shaped the mindset and attitude of the user forces. This added to the pressure users experienced in some situations to make split second decisions on how to proceed, and so contributed to the probability of wrong use of the NLW. This problem was further compounded as operators are usually junior, with less experience and feeling less self-confident in complex and stressful circumstances than more seasoned personnel.

\(^{14}\) See Chapter 3, pp.69-72, and Chapter 4, p.101.
In all cases, the user’s Rules of Engagement include instructions specifying the conditions under which military personnel is allowed to use their armament for force protection and self-defence. A user who finds himself in a life-threatening situation is authorized to use lethal force to neutralize the lethal threat. The authorization to use lethal force includes the option to use an NLW lethally, provided that the weapon is capable of delivering a lethal effect. This option entails that the RoEs implicitly define the NLW as a dual use weapon, both non-lethal and lethal, depending on the mode of employment. The user is tasked to apply the non-lethal mode to control target behavior, while the lethal mode is legitimized for self-defense or may present itself as a consequence of unintentional or intentional wrong use (Wallace 2001). As a result, operational contexts are conceivable, in which there is no sharp demarcation between lethal and non-lethal use of NLW, especially when civilians get seriously harmed in violent and chaotic confrontations. Such situations are apparent when the user has to cope with a relatively small time window available for the Escalation of Force (EoF) procedure, forcing him to quickly judge in which mode the NLW has to be used. This ambiguity that obviously primarily resides in the user domain, has in some cases sparked much controversy over the nature of NLWs, and put their utility into question.

As the user is often confronted with a mixed spectrum of target individuals in terms of their motivation and resistance against the user, some elements amongst the target population are relatively vulnerable when NLWs are used in the potentially lethal self-defence mode. The case of Northern Ireland and, to a lesser extent, that of the detainee operations in Iraq, provide evidence that disproportionate use of NLW has occurred and inflicted lasting harm and casualties. This undesired outcome is more likely to occur in a context when the user’s mindset in decision making is dominated by and reduced to an ‘us-or-them’ choice. The implication of the use of an NLW in a lethal mode for self-defence is likely to be portrayed as a ‘false’ NLW, in fact as a lethal weapon, thereby undermining the political and military confidence in these weapons as genuine NLWs. The accusation of abuse, even if the self defence case was legitimate, will raise doubt and mistrust in regard of the higher level declared benign intent of deploying NLWs as exponents of the hearts and minds approach.

Summing up, the military user who is tasked to apply the NLW according to the weapon specification and guidelines, in reality does not always meet these requirements. The friction of war, a phenomenon that will be addressed at more length in the next section, is what users experience in highly stressful, lethal and unpredictable environments. Stress and uncertainty facing commanders and operators in the operational context bring some of them to regard the availability of NLWs to complicate their task as more response options have to be taken into account in decision making.

**Target group perception and attitude towards the user**

The behavioral response of target individuals and target groups against the user of NLWs has been demonstrated to be influenced by a range of contextual factors. Some of these factors are directly related to the presence and mode of operation of the user force. Others are informed by the wider context of circumstances and developments that originate from outside the actual physical confrontation. To illustrate, when the news of the arrest of Saddam Hussein
by US forces reached the detainees in the detention facilities in Iraq, they responded with a major riot directed against the US guard forces in the camps. Similarly, in other incidents in the cases considered, information about outside and higher level events infuse into the local situation to become, at least temporary, a dominating factor in defining the target group’s perception and attitude towards the user. Such external factors to the confrontation site originate from the politico-strategic level of the conflict environment. The upcoming section will address these factors more specifically.

The target group’s attitude to an important extent defines their response to the use of NLWs against them, in particular their determination to resist the NLW effect. Some specific phenomena at the tactical level stand out in defining the target’s attitude.

The clashes that occurred during The Troubles and in Iraqi detention centers have in common, that the user force and target populations engage each other repetitively over a very long time frame. Target groups memorize previous confrontations, in a sense that the user force is gradually perceived as an instrument of repression. Once the target group’s attitude has evolved into one of predetermined animosity towards the user, any use of force, including the employment of NLWs, is likely to be taken as an attack that serves as an ad hoc legitimization for the target population to fight back. The target group’s learning curve resulting from the experiences in repetitive physical confrontations, provides for a relative advantage over the user who is bound by RoE, as increasing determination and improved techniques and tactics to resist NLWs reinforce each other. In the cases examined, the decline in NLW effectiveness against ever better prepared target groups has triggered the user force to pass the NLW’s beyond safety margins when restoring order was imperative, or considered to be imperative.

If the operational context is such that direct communication between the user force and target population is possible, this has the potential to mitigate the level violence and even prevent the outbreak of disorder. The success of verbal messaging critically depends on the benefits it entails for the target group to stop violence and resistance, and on the credibility of the promises made to the target group. The target group’s interpretation and acceptance is also much dependent on a range of contextual circumstances, such as the sectarian composition of the user force and the user force’s attitudinal track record in the perception of the target population.

If, in the end, the confrontation cannot be defused verbally, the ensuing escalatory cycle tends to compress the NLW window of permissible use. As long as the user force is viewed by the target group as the physical extension of the ruling power it rejects, this image legitimizes and motivates for non-compliance with detainee rules, protest and violent opposition and rioting. Abu Ghraib perfectly demonstrates how political level controversy fuels resistance, when the insurgency emerging in Iraq after the US-led intervention in 2003 was proliferated into the detention centers, and further reinforced after the abuses in a closed section of the center was made public in 2004, and the inhumane treatment of the detainees overall. Given this wider context, the user is not perceived by the target population as the legitimate agent to manage order or to provide for internal security. This negative appreciation is reinforced in an operational context where the user responds to the target group’s protesting and non-cooperative behavior with NLWs to enforce its compliance. In Northern Ireland, cor-
relations have been found between events taking place in which target groups were engaged with NLW, and the outbreak of major disorder and armed resistance in the period after such an event.\textsuperscript{15}

In Afghanistan/ Uruzgan, the user force, acting in a patrolling and controlling role, was often perceived by the population as disturbing their normal life pattern, as for instance was experienced in Deh Rawod, Uruzgan, between 2008 and 2010.\textsuperscript{16} The ensuing irritation occasionally led target individuals to ignore the user force’s directions and warnings, which in turn forced the user to apply armed force within the framework of their EoF procedure, including the use of NLWs. Members of the target population also had developed the habit to probe freshly arriving forces on their alertness and courage. This could trigger the use of NLWs in situations that would appear harmless to more experienced user force personnel.

Concluding, the target population’s view of the military user force is informed by previous confrontations and by the wider political context and reasons of the force’s presence. The attitude of the user force during operations shapes the target group’s response. In some cases, the presence of foreign military forces as such is received with skepticism or even with disapproval, partly because it interferes with their normal pattern of life.

**Overall effects of NLW use**

The previous section has discussed various phenomena observed in the case studies that influence the effectiveness of the NLWs considered in this study. In terms of the DTA scheme, the findings at the technical/tactical level can be arranged as follows:

- weapon & technology complex / situational context interaction: the impact of environment and weather on NLW performance
- target complex / weapon & technology complex interaction: counteracting NLW physiological effects
- user complex / weapon & technology complex interaction: proficiency, performance and posture
- target complex / user complex interaction: target group perception and attitude towards the user

This section addresses the above phenomena in conjunction, as together they shape the processes and mechanism that are ultimately responsible for the NLW effect. This approach will provide the insights into the extent to which the NLWs considered are effective to support the higher level political objectives of the mission. Three possible outcomes will be subsequently discussed:

\textsuperscript{15} After the use of NLWs, a systematic trend of increasing violence was observable in Northern Ireland. This indicates the feeling of repression and unjustness amongst the Catholics. See Wright (1981).

\textsuperscript{16} As reported in the case of the convoy moving through zone north of Deh Rawod in Uruzgan, Afghanistan. See Chapter 5, pp. 118-119.
• NLW performance is being degraded
• NLWs perform counterproductive
• NLW performance is intentionally degenerated,

and complemented by:
• conceiving an NLW counterfactual.

**NLW performance is being degraded**

In all three operational cases, the environmental conditions and situational context has the tendency to reduce the performance of the NLW. The physical situational context as such is often less optimal than those under which the design performance characteristics of the NLW technology and complex are defined. Employing NLW under adverse situational conditions involves the risk that the weapon’s physiological effect falls beyond the design window of effective, and at the same time safe, non-lethal performance.

Target complexes draw upon the situational context by applying physical countermeasures denying the regular employment of NLWs by the user. Countermeasures are much more relevant in the cases of Northern Ireland and the detainee centers in Iraq compared to the Afghanistan/Uruzgan case, as the protraction and repetition of engagements between user forces and target populations enable the latter to better prepare for counteracting NLW effects. Spatial confinements and physical separation of the user force and target populations frame a context from which the latter can take extra advantage.

The ‘seeking’ engagement settings in the Northern Ireland and Iraq operational cases offered target complexes in many cases the initiative for confrontation, while the user complex were operating in a more responsive mode. In contrast, in the ‘meeting’ engagements of checkpoints in Uruzgan the user forces had the initiative, as they were the ones to decide about the time, duration and location of a checkpoint set up and its operation. This offered a relatively favorable context for effective NLW use. The opposite holds for most of the other cases examined. Dynamic scenario settings with target complexes enjoying tactical freedom of manoeuvre challenge the performance of NLWs and ultimately even deny their employment.

Initiative appears to be a key factor in NLW engagements between user and target complexes. To the target complex, which is usually the underequipped side in a physical confrontation, initiative serves as a force multiplier of the relatively scarce resources it usually enjoys. Initiative translates into opportunity for technical and tactical preparation and orchestration, according to a code that focused on de-optimizing the user’s employment of NLWs to enforce compliance. Initiative further amplifies the target complex’s relatively weak and improvised instruments of violence and protection, by exploiting surprise and by matching the location and time of the onset of action with favorable ambient conditions. Once a confrontation is
set on, target complexes can further exploit initiative by confronting user complexes with dynamic action. This further complicates NLW use, in particular that of directional NLWs. Such approaches have clearly been demonstrated in the Iraqi detainee centers, in particular in Abu Ghraib in 2005, when the rioting was switched from one compound to the other, thus forcing the security forces to reposition constantly. The significance of initiative was somewhat less in Northern Ireland, where initiative of target complexes to engage in confrontations was degraded due to a lead-in time, as they were usually correlated to a preceding political event or decision, such the announcement of a Protestant march. This allowed user complexes to anticipate an upcoming disorder.

The protracted conflicts went on for many years. As a result, recurrent patterns between the user complex and the target complex could develop over time that influenced the way NLWs were used and how target groups responded. This repetitiveness was particularly apparent in the Northern Ireland case and the Iraq case, as the user groups and target populations almost became acquainted to each other. As a consequence of the long duration of the status quo, target complexes had abundant amounts of time to develop and prepare countermeasures, even when lacking proper materials. Over time, the counter-optimization efforts tended to shut down the regular window of non-lethal effect of the weapon & technology complex. This was much less the case in Afghanistan, where encounters were of micro scale and scattered over many different locations across Uruzgan and with different user forces and target individuals involved.

**NLWs perform counterproductive**

The motivations to start a stand-off were primarily rooted in existential discontent of the target complexes about the status quo, but could at times also emerge simply from boredom and for entertainment. The mobilization of larger target groups and the consequent sizing up of the responding user force led to many-on-many engagements, ensuing into a degenerated use of the available NLWs.

The origin and duration of the conflict, in absence of an outlook to a mutually agreed end state, were responsible for a ‘pressure cooker’ effect in the scenarios, in which user and target complexes were tied to each other, with one side fighting for a cause and the other keeping the fight under control and de-escalate the situation. This deadlock only built up more pressure, in absence of a way out. The pressure cooker effect was responsible for the degenerate employment of the non-lethal weapon & technology, and pushed its use off-limits towards abuse. NLWs designed as intended for one-on-one directional use were deployed massively and in barrages, as a substitute for the lack of a needed area denial NLWs.

---

17 As reported in the second case in Abu Ghraib, Chapter 4, pp. 94-5.
The need for an area effect NLW was more urgent in Northern Ireland than in the detention centers in Iraq, as in the former case NLWs also served for force protection by keeping target populations at distance. In Iraq, force protection was to a large extent provided for by the physical separation of user force and target population, so the many-on-many engagement was to keep pressure on the target population to wear out their motivation. A possible deployment of ADS, as a long range directional NLW capable of engaging few target individuals simultaneously and quick re-aiming, could be viewed as a semi-area denial NLW. This mechanism produced a counterproductive effect, in symbolizing repression leading to growing discontent of the target population, thus further enhancing animosity between the two sides rather than winning the target population’s hearts and minds.

The recurrent pattern of the many-on-many scenarios gradually rendered the deployed NLWs ineffective as an instrument to restore order, especially in confrontations were the stakes had risen high. The drop in their effectiveness was accelerated by the proliferation of technical and tactical countermeasures across the conflict zone. In contrast to this trend, clashes that emerged out of a desire amongst target complexes for entertainment and ‘sport’, would extinguish quickly after NLWs were used. Obviously, the extent to which pain and discomfort effect of NLWs were felt and resisted, was much dependent on the seriousness of the wider contextual factors that mobilized the target complex into engagement of the authorities and their subordinated user forces.

Other than in Northern Ireland and Iraq detention camps, the use of NLWs in Afghanistan/ Uruzgan is much less determined by recurrent engagement patterns. In contrast with these many-on-many ‘crowded’ scenarios and contexts in the former two cases, stand the few-on-few or ‘individual’ scenarios and contexts in the Afghanistan/ Uruzgan case. From the target complex’s perspective, the confrontations with the user complex involve ‘meeting’ rather than ‘seeking’ events: they are mostly coincidental, not intentional or anticipated. As a result, the course of the engagement tends to be much more governed by contextual factors that reside at the local technical/ tactical level rather than influenced by external issues at the higher level. Hence, the applicability and effect of the non-lethal weapon & technology deployed seems to be predominantly depending on the dynamics of the meeting engagement itself. External factors, related to the local context, can be at work to influence both the user and target complex. For instance, the level of the local hostile threat perceived by the user forces may vary on very short term, as is the target population’s perception of the user force.

The element of uncertainty and unpredictability and surprise that dominates the meeting engagements, can be considered as manifestations of a phenomenon called ‘friction in warfare’. The term was introduced in the early 19th century by the Prussian general Carl von Clausewitz, and implies that friction is the only concept that distinguishes real warfare from warfare on paper. Friction is the accumulation of many difficulties that one encounters that are to a large extent unconceivable, unless one experiences war or conflict. At the micro-level the friction of warfare pushes the user forces to make split-second decisions between ‘us or them’. It is a permanent dilemma plaguing the user forces.

---

18 The notion ‘friction in warfare’ has been addressed more extensively in Chapter 2, p. 31.
when applying their RoEs, in which the use of NLWs is incorporated.\textsuperscript{19} As to the user complex force protection is usually imperative, the availability, as well as the employment of the non-lethal weapon & technology, may be counterproductive, as it complicates the decision making process and leads to wrongful judgment under time pressure.

\textit{NLW performance is intentionally degenerated}

While degenerated use of NLWs may result from mechanisms emerging from stress and the pressure cooker effect, situations occurred in which NLWs were intentionally used in a non-regular or degenerated use. Such incidents took place in Northern Ireland, where civilians have been killed by BRs that were aimed at vulnerable parts of the body, or fired from very short distance.\textsuperscript{20} Non-permissive uses of NLWs, in particular kinetic NLWs, have been found in Iraq detention centers as well. It is difficult to determine to what extent user forces intentionally apply NLWs irregularly or not. The operational context shapes a grey zone in which the imperative of self-defense can hardly be distinguished from unnecessary and excessive harm. NLWs have been used as instruments of punishment and retribution for negative outcomes of previous events or confrontations to the user forces, as the Northern Ireland case demonstrates.\textsuperscript{21} A similar observation has been made in 2011, in the aftermath of the Arab Spring in Egypt.\textsuperscript{22} Lack of discipline and training, and insufficiently restrictive instructions and RoEs for user forces can contribute to the probability of such wrong uses to occur. It is an inherent problematic and risk of many types of NLW weapon & technologies that carry the potential for harmful and even lethal use, when specified safety margins are ignored.

\textit{Conceiving an NLW counterfactual}

Notwithstanding the tendency that NLWs become susceptible to mechanisms mitigating their effect, induced by the wider context of the conflict, it is worthwhile to consider the counterfactual, i.e. the way scenarios would have evolved without the availability and deployment of NLWs, or alternatively, when governed by a fundamentally different operational context.

It is likely that, given the preparedness of target communities to engage the user force with fierce, the latter would ultimately be ordered to apply force to stop the violence and for self defence, which, in absence of NLWs, would necessarily be lethal force. While lethal force may to some extent be applied non-lethally, the aggressive posture of highly motivated protestors and rioters would inevitably lead to casualties amongst them, as Bloody Friday and a number of incidents in Iraqi detention centers have witnessed. The political ramifications of casualties caused by a force using lethal fire have a long half-life time, as history tells.\textsuperscript{23}

\begin{footnotesize}
\begin{itemize}
  \item \textsuperscript{19} For a more extensive discussion of the dilemma’s facing ISAF forces in Afghanistan, see Chapter 5, pp. 109-10.
  \item \textsuperscript{20} See Chapter 3.
  \item \textsuperscript{21} Both CS and BRs have been used consciously with that intent. See Chapter 3.
  \item \textsuperscript{23} The inquiries into Bloody Sunday in Londonderry, on 30 January 1972, when 13 civilians where killed by security forces, have been ongoing for almost four decades. Saville report, 15 June 2010.
\end{itemize}
\end{footnotesize}
How may a favorable operational context be shaped, in order to provide for conditions under which the application of NLWs would come closer to what was initially intended? As many factors are simultaneously and interactively at play that are responsible for shaping the context, it is important to identify those factors that are found to be dominant in this respect. Two have appeared to be particularly significant.

One appears to be political, namely the existence of a widely agreed political end state of a conflict. This has been found in Northern Ireland, comparing the situation before and after the 1998 Good Friday Agreement, and also in Iraq, after the shift in US detainee policy from an intelligence oriented and indiscriminate approach towards a hearts and minds approach, offering detainees fair treatment and outlook towards their release and reintegration. The clashes between the user complex and the target complex appeared to be less massive, less violent, less harmful to target populations and better to manage by the former after narrowing the political gap.

A second factor relates to the user complex, partly in combination with the weapon & technology complex. Preparing the user force more specifically and realistically to the conflict or setting where it is going to be deployed, helps to increase their capability to fine tune their physical and non-physical responses, including communication, vis-à-vis the target complex. Deepening cultural awareness and understanding the ‘couleur locale’ of the people amongst which the user complex is going to be deployed, is a pre-condition to understand their responses to their EoF procedures.24

A third factor involves the performance of the user complex in relation to the weapon & technology complex. As Northern Ireland has shown, sharper guidelines on NLW use and more reliable NLW technical performance reduce the probability of wrong and harmful NLW effects, thereby better meeting the promises of non-lethality these weapons offer. Some results in this respect have been found in the Iraqi detention centers and, to a lesser extent, can be related to the checkpoints in Uruzgan.

The factors of influence addressed in this section, in particular those regarding the mutual perceptions and attitudes between the user complex and target complex, affected the delicate balance during a stand-off between escalation and de-escalation of violence. The next section focuses on the phenomena at work at the political strategic level and their implications for the use of NLWs and their effects on the ground.

---

24 The significance of the user force’s understanding of the people’s culture and habits in the area of operation is illustrated by the violence erupting from an incident in Baghran, Afghanistan in February 2012, when several copies of the Koran had – unintentionally – been burned by US military personnel. At: http://www.isaf.nato.int/article/isaf-releases/isaf-commander-issues-directive-on-handling-of-religious-materials.html. Accessed on 15 May 2012.
The politico-strategic level

While NLWs are to achieve political-strategic objectives through the ways in which they work out at the tactical level, the preceding chapters have, ironically, shown that events at the political-strategic level may have crucial influence over the impact of NLWs. Such events may concern both actions from the political authorities governing the conflict, and from political and strategic stakeholders and interest groups in the wider international community.

At this highest level policies and strategies are formulated, decisions are made and guidelines issued, that clearly have implications for the actors on the ground, including the user forces as well as the target communities. If such policies, or rather, in some cases, lack of change in ruling policy, interfered with the interest of the target population, they met disapproval that found its expression in protest and physical resistance at the local level. While these tactical level responses were triggered by target community’s appreciations of politico-strategic level developments in both the Northern Ireland and Iraq detention centers case, it was less obvious in the Afghanistan/Uruzgan case. The much stronger galvanizing effect in the former two cases can be attributed to the fact that the target community was physically more concentrated and interconnected, either because of clustering as a consequence of urbanization, or by forced concentration in a confined space. In contrast, in Uruzgan, predominantly a rural environment, the target community was much more scattered and much less linked to the central authority in the conflict. Hence, the impact of the highest authorities on developments at the local tactical level was much less compared to the other two conflict cases.

The norms by which the user forces operate, provide the rationale underlying the deployment of NLWs, namely the prevention of civilian casualties, in support of the politico-strategic level ‘hearts and minds’ strategy. In cases with an insurgency going on, this norm is challenged by militant opponents, who, by launching terror acts and conducting IW, shape an atmosphere of lethal threat, fear and uncertainty. This operational context tends to prevent the user force from enhancing security and control, the conditions favoring the avoidance of innocent casualties. Proceeding along irregular and unpredictable patterns, insurgents add to the ‘friction in warfare’ facing the user forces. This friction thus becomes a weapon to the insurgency in the political contest with the intervention coalition over the hearts and minds. The friction adds to the ‘us or them’ dilemma to user forces, which on the one hand are tasked to implement the overarching mission strategy of winning the hearts and minds in the conflict region, while on the other are expected to protect their own lives, for the sake of maintaining political support at home for the intervention. While NLW deployment is conceived as an instrument to de-conflict the ‘us or them’ dilemma, the friction induced by the insurgents creates an operational context that is less permissive for NLWs to serve that role.

25 In Afghanistan, the dilemma posed a fundamental problem at the strategic level. US General Stanley McChrystal (US Marines Corps), ISAF Commander until June 2010, stressed the importance of the hearts and minds approach over the force protection imperative. This position was vehemently disputed during his tenure, and was one of the reasons he left his position within less than a year. His successor, US General Petraeus (US Army), diplomatically redressed the balance. See Chapter 5.
A key role in the linkage between the political level on one hand and the tactical level NLW events on the other, were played by the media and modern communication infrastructure. Real-time information dissemination of decisions and declarations at the political strategic level could therefore trigger short-time responses at the local physical level that, depending on the content of the political message received, defined the approach during confrontations with the user force, including the response to NLW use. To illustrate, the political decision of approval of a contested Orange march to pass close to a Catholic neighborhood not only immediately infuriated and mobilized large numbers of the target community from the city involved, but also in wider parts of Northern Ireland. The decision by the Coalition Government in Iraq that detainees were to be kept in internment for an indefinite time, caused desperation amongst detainees and raised their motivation to riot against the user forces, as the only possible expression of their discontent and anger. This also triggered a rise in their level of pain acceptance against NLWs.

The relevance of the political and strategic situation for the course of physical confrontations at the tactical level also becomes apparent when comparing the situation on the ground before and after a significant change in strategic policy and its implementation. Both the Good Friday Agreement in Northern Ireland and the incorporation of detainee populations in the hearts and minds approach in Iraq marked an important shift in the level, scale and persistence of violent opposition vis-à-vis the user force. With an agreed or acceptable end in sight, the pressure cooker was decompressed, and the negative vicious circle of violence was broken. Violent confrontations were politically largely defused, and the use of NLWs was obviously understood and accepted as a necessary evil to manage public order, leaving much less hard feelings behind. Obviously, NLWs work best when there is least at stake.

Media would also spread information about casualties amongst the target groups, in particular when caused by NLWs. The media could magnify the news value by capitalizing the infliction of casualties by NLWs, as the use of NLWs presumes that no casualties at all should be caused by such weapons. This contrasts with incidents where the use of lethal force is authorized, implying that circumstances were such that lethal fire was legitimized. Hence, casualties caused by NLWs suggest innocence of the victims, thus shaping and disseminating a negative image of the user forces for abusing their power. At the same time, NLWs are depicted as symbols of repression, far from the original intent of their purpose and deployment. The way NLWs were used during urban clashes in the Arab Spring between user forces and target populations, reinforced this negative reputation. Much depends on the presence of the capability to disseminate information of events, which sharply increases with the emergence of social media, but was largely absent in closed scenarios such as detention centers. Obviously, a dialectic between the political and tactical level is at work that will be more closely addressed.

The political level / tactical level dialectic

At the political level mission accomplishment strategies call for instruments at the tactical level compatible with the spirit and objectives of the military mission. It means the balanced use of force, with a measured application of armed force. In situations where civilians are involved, compliance should be accomplished without causing harm. NLWs are considered...
and assigned as appropriate instruments for that task: they are expected to enable humane military operations and performance, in support of the hearts and minds strategy. The implementation and purpose of NLWs is publicly announced: intentions and expectations are declared explicitly.

As in real world situations NLW deployment is fraught with problems related to the operational context, the level of control over NLW effects is much less than what is militarily and politically desired. Most soldiers are far from perfect in dealing with the dynamics and uncertainty on the ground. Moreover, the political rationale for NLW deployment is counteracted and undermined by opponents who force the military user into the lethal part of the spectrum of violence, thus denying the non-lethal intent.

But progress in hearts and minds efforts at the tactical level, conversely and ironically, may under circumstances also be affected by trends and events at politico-strategic level. If these trends have the effect of antagonizing user forces and target populations, the ensuing operational context will frustrate the outcome of NLW deployment as politically intended and expected. Hence, the political level rationale of NLW deployment becomes annihilated at the tactical level if particular developments at the political level meet disapproval and trigger agitation on the ground. Obviously, with regard to the non-lethality incentive, a dialectic is at work between the political and tactical level. This dialectic is fueled when operational context mechanisms as friction and confusion produce fatal errors, and further amplified by the media connectivity between the tactical and political level. The tragedy is that the media are inclined to report only the mishaps (innocent casualties, despite or even caused by NLWs), while refraining from spreading good news about NLWs performing ‘normal’ as expected and announced: good news is “bad” news.

Hence, if NLWs perform badly, their deployment backfires at the political level. If, however, the tactical/political dialectic link is weakened or cut through flaws in reporting along the chain of command or in public information, chances of optimal NLW increase. The flip side of this condition is the growing risk of abuse due to the tactical isolation of physical engagements, as accountability mechanisms would be dysfunctional, and only have a delayed political impact at best. In the latter case, abuse will surface sooner or later, and will give NLWs a bad reputation after all.

In coping with the dialectic, which in essence is a product of Rupert Smith’s (2006) ‘war amongst the people’ paradigm, some planners and developers search for non-lethal technological options to physically disengage the user complex from the target complex. The ADS, with its long range and semi-area denial capability, is the ultimate material expression of this quest. Apart from the technical and tactical level operational contextual complications for this weapon & technology identified in this study, the technology fixed approach ignores that disengaging the user force from the target population is at odds with the hearts and minds approach. This reflects another dialectic, namely that between (community) policing and military operations.
Although Krulak invented the 3-block soldier to conceptualize the different manifestations of a military professional in a contemporary conflict setting, the reality check laid down in this study may refute the feasibility and existence of such a multi-tasking military chameleon.

Validating the claims and counter-arguments in the NLW debate against the DTA results

In this section, the set of claims and counter-arguments identified from the NLW debate in Chapter 1 will be matched and validated against the aggregated findings from the three research cases as presented and discussed in the previous section(s) of this chapter. The validations have been arranged under the three complexes that frame the DTA model, and under the strategy effect of NLW employment respectively.

Claims related to Non-Lethal Weapons & Technology

Claims by the technological optimists (e.g. Morris and Morris 1991; Gompert et al. 2009; Foster 2010):

- NLWs enable casualty-free military intervention
- The uncertainties encountered in real world scenarios can be mitigated and compensated by technological innovations

Claims from the sceptics (e.g. Grin 2000; Rappert 2003; Koplow 2006):

- In real world deployments NLWs may not perform as designed for, and may even malfunction
- The situational context in which an NLW is deployed influences its effect

The expectations of NLWs to enable ‘bloodless war’ or ‘war without casualties’ have been demonstrated to be far from realistic. Operational circumstances in real world contexts have in many cases denied the use of NLWs for the intended effect, as such conditions prevented accurate aiming of directional NLWs or weakened the intensity of the effect (Ch.6, pp.132-4). Most NLWs examined appear to be considerably susceptible to one or more types of adverse physical circumstances such as darkness, fog, humidity, wind and bright sunlight, interrupted lines-of-sight. Even worse, NLWs caused casualties or severe injuries, as has in particular been found for BRs (Ch.6, p.130).

Hence, rather than offering compensation for uncertainties as unanticipated weather conditions in real world scenarios, performance of NLWs tends to be degraded by these circumstances. Assumptions on the potential of innovative NLW-concepts such as the ADS to overcome these problems so far have not been proven successful. Regarding variability in human behavioural response, no straightforward answer can be given about the potential of NLWs, even upgraded ones, to compensate for the uncertainties in this realm, without taking

---

the full context of the specific operational situations into account. Moreover, it has been demonstrated that the introduction of NLWs in itself may compound uncertainty, for instance by inducing a sudden change of the target population’s perception of the user force. Ultimately, their deployment may even end up to be counterproductive (Ch.6, pp.141-2).

As the context of the situation appears to be of strong influence on the NLW effect, coping with uncertainty rather calls for a better understanding of the context, including the ‘couleur locale’, than by merely relying on injection of NLW ‘solutions’ (Ch.6, p.147). A combined approach of non-violent measures and NLW deployment is likely to enhance the acceptability of the use of NLWs.

**Claims related to NLW target groups**

Claim from the careful supporters (e.g. Leech 2002; Alexander 2003):

- NLWs may help discriminate between irregular militants and innocents within the target population, as they will respond differently to the NLW effect.

Claim from the sceptics (e.g. Pittman 2005; Koplow 2006):

- The target population may respond in a different manner than expected in the design and purpose of the NLW.

The underlying assumption here is that the compellent effect of NLW by inflicting pain or severe discomfort would enforce compliance amongst the normal, non-violent population from the motivated, resisting and militant elements. It has been found that in ‘meeting engagements’ such as road blocks, the scenario is prepared, hence largely manageable. The use of NLWs to ‘interrogate the intent and identity’ of the target person(s), thus supporting the discrimination between benign and malign individuals, is relatively effective (Ch. 6, p.143). It is important that in this situation the target population is unprepared, and the initiative in the confrontation is with the military forces. Furthermore, the innocent target individuals and the hostile ones are largely unconnected from each other.

Yet, in more complex and to the military forces less unpreparable scenarios such as riots, the ‘seeking events’, the utility of NLW for discriminative purposes is problematic. The use of non-discriminative NLW such as CS against crowds in which hostile elements are intermingled, has the potential to blur the distinction between militants and innocents, as members of the latter group may become motivated to support or join the former, which as occurred in the Northern Ireland case (Ch. 6, p.144-6). Such mechanisms have also been provoked with directional NLWs, as the use of BRs in the Iraq detention centres has demonstrated, due to the ‘pressure cooker’ effect resulting from the repetitive and protracted engagement of target populations (Ch.6, pp.135-6).

Counteractions against the use and effect of NLWs have been found to be wide-ranging, and have been applied in all seeking event scenarios considered in this study. Every NLW assessed in this study is susceptible to countermeasures, either of tactical nature, or as technical measure, or in combination (Ch.6, pp.134-6). Counteractions tended to become progressively effective after repetitive exposure to the NLW effect, which was an important factor in the protracted cases in Northern Ireland and in the Iraqi detainee centres (Ch. 6, p.135). While the NLW effect does not change significantly over time, motivated target populations ma-
naged to invent and proliferate increasingly effective countermeasures. The non-cooperative behaviour of target populations is largely motivated by contextual factors as dissatisfaction with the political situation (Ch. 6, p.136 and p.144). Furthermore, the target populations’ perceptions of the military forces using NLWs is another determining factor in obstructive behaviour, and are also correlated with and informed by previous confrontations (Ch. 6, p.141). Over time, combinations of behavioural and technical countermeasures tend to be increasingly effective to close the window of regular and permissible use of the NLW, in particular in protracted conflict settings (Ch.6, pp.138-40).

Yet, in protracted conflicts, the flip side of the coin is the possibility and application of direct verbal communication and negotiation between the military forces and the target population. This may have a mitigating effect on the opposing behaviour from the target population, which the continued use of NLWs would fail to achieve (Ch.6, p.141).

**Claims related to military users of NLWs**

Claim from the careful supporters (e.g. Bunker 1997):

- **Doctrinal and organizational adjustments are needed to effectively incorporate NLWs in military organizations.**

Claims from the sceptics (e.g. Siniscalchi 1998; Coppernoll 1999):

- **The attitude, preparedness and guidance of the user are more important for the NLW effect than the technology itself**

- **The user of the NLW may not perform as directed and expected.**

The claim and counter-arguments made regarding the military user force are compatible. Yet, although doctrine and organizational adaptations are a pre-condition to adopt NLWs, further specification in terms of dedicated guidance and instructions are required. Dedicated and realistic pre-deployment NLW training have been proven to be pre-conditional for the military user to employ the NLW as intended (Ch.6, p.138 and p.147). RoEs are to provide for specific fine-tuning of the military user’s posture with respect to the specific conditions in the deployment area. These necessary conditions of preparedness were not always met in the cases considered in this study (Ch.6, p.138).

Irrespective the level of preparedness of the military user force, and the appropriateness of guidance, and the RoEs, operational circumstances had an important impact on the extent to which the forces correctly applied the NLWs. In situations where countermeasures had become so effective that regular use of the NLW no longer produced the desired effect, user forces became inclined to employ the NLW beyond the pre-set safety margins (Ch.6, pp.138-9). The wrongful use of NLWs could also be triggered by intentional disregard of the RoE, in cases
where the user forces’ developed a negative attitude towards the target population, leading to a disregard of the human rights and safety of the target population (Ch.6, pp.138-40).

Even stronger, in the CI context, insurgents sought to provoke the military forces into decision dilemmas between their own safety and that of the target population. This phenomenon has been found in all three case-studies. The awareness of military forces of the continuous presence of lethal threat creates conditions and dynamics that are less permissive to NLW employment, thereby jeopardizing the security of the potentially innocent target population. Insurgents thus induce ‘friction in warfare’ facing the user forces with unpredictability of threats, which in effect serves as a weapon to heat up the ‘us or them’ dilemma of the user force. (Ch.6, p.148).

**Claims related to the strategic effect of NLW application**

Claim from the careful supporters (Fenton 1999; Leech 2000, Gompert et al. 2009):

- NLWs have positive strategic implications, either in term of supporting a hearts and minds approach, or by immediate strategic effects of -future- NLWs.

Claim from the sceptics (e.g. Grin 2000; Pittman 2005):

- Overly optimistic expectations of the potential of NLW concepts and technologies are illusive and potentially counterproductive.

It has been demonstrated, that in a considerable number of situations of NLW use examined in this study, the target population does not comply with the objective that the intervention forces were tasked to achieve. The pre-dominant motivation of target populations for non-cooperative behaviour was their discontent with their political and societal status and with the lack of perspective on improvement of their political situation. The outcome of tactical level deployment of NLW was influenced by events and developments related to the politico-strategic level communicated across the conflict zone by the media and alternative sources of information, as has become evident in the Northern Ireland and Iraq cases. (Ch.6, pp.148-9).

While the politico-strategic level rationale of employing NLWs is to prevent innocent casualties to win the hearts and minds of the local population, in reality a dialectic exists between the political and tactical level. The mere fact that intervention forces actually use armed force, irrespective their non-lethal properties and intent, against the target population, in itself is counterproductive to a hearts and minds approach (Ch.6, p.150). The counterproductive effect is compounded when insurgents push the military forces into an ‘us-or-them’ dilemma, and subsequently exploit accidental innocent casualties by spreading the news on such mistakes (Ch.6, p.150). Hence, winning the hearts and minds of the local population is subject of a struggle between multiple actors, rather than a one-side strategy of the intervention forces, promoted by the deployment of advanced NLWs to prevent innocent casualties. It is a contest with the insurgents and dissatisfied population who, although in different levels of intensity, oppose the actions of the intervention forces, including their effort to mitigate violence by the deployment of NLWs.
Revisiting expectations from an operational outcome perspective

The findings from the validation of the claims in the previous section regarding the military and political effects and implications of NLW deployment will now be related to the two central research questions of this study.

- to what extent do real world operational circumstances affect NLW mission performance and effect?

The DTA framework served to analyze the real world use of NLWs, within the specific operational context and against the political backdrop of the situation where they were deployed. It has become apparent that the generalistic nature of the claims of the technological optimists prevented them from being instrumental to a DTA approach using real world case studies of NLW employment. Their claims largely ignore the fact that NLWs are tactical level capabilities that are used to produce direct tactical level effects, with the intent to indirectly support political level objectives. It is therefore the tactical level at which the analysis needs to focus. The claims from the careful supporters and the sceptics reflect the significance of the tactical level phenomena that influence the outcome of NLW deployment. By validating the claims from these groups, some of the assumptions underlying the claims from the technological optimists group have been tackled, thereby serving to validate the optimists’ claims in an informed manner.

The operational cases have made clear that many situational circumstances interfere with the original aim of deployment of NLWs, which is the use of minimal force to prevent innocent casualties on the one hand and protect own forces on the other. The interactive mechanisms between the forces using the NLWs to keep their operational area of influence under control, and the groups and individuals that were to be submitted to the control conditions, and the performance of the non-lethal weapon and technology, tended to reduce the NLW effectiveness and, ultimately, compromised the utility of NLWs to support the control task. The interactions also appeared to be strongly influenced by the political situation: in case of confrontation (‘seeking’) events, the use of NLWs by security forces became counterproductive for achieving compliance. Political imbalances created a permanent climate of discontent and at times armed resistance amongst large parts of target communities that could not be resolved by NLWs. At best, NLWs could merely contain the violence to a certain level, but at the cost of a widening gap between the security forces and the targeted community.

The narrowing window of NLW effectiveness, caused by the posture and counteraction of target populations, also pushed the user to apply NLWs beyond the non-lethal mode, under the panacea of legitimized and authorized force protection. While the feedback loop of operational experiences into technological innovations and reviewed RoEs provided for slightly better results for some of the NLWs, these were not as decisive and revolutionary as to meet the initial expectations of their effect.
In ‘meeting engagement’ scenarios, other than the ‘seeking engagement’ (crowd) scenarios, the element of uncertainty about a target’s intent also played a key role. The underlying rationale to deal with uncertainty is gaining (decision) time by enlarging the NLW range, in order to enable the identification the intent of the unknown target individual. However, similar as with the seeking engagement scenarios, the situational context frequently denies NLW engagement opportunities that optimally fit the NLW design characteristics. The analysis has demonstrated, that the more the user was able to reduce uncertainty by defining, preparing and managing the operational scenario in which the NLW was deployed, the more the intended effect of the NLW could be attained.

- given the answer to the previous question, what may we say on the degree at which NLW use meets the expectations that underlie current strategic frameworks?

In the cases considered in this study, the strategic frameworks are relying on the winning of the hearts and minds of the local population. The strategic imperative to accomplish this is to prevent excessive harm and casualties amongst the population during military intervention operations, and the deployment and application of NLWs is expected to meet that requirement.

Moreover, the study has demonstrated, that the extent to which the deployment and use of NLWs is supportive to winning the population’s hearts and minds decisively hinges on the political perspective offered to the population. Without an acceptable political perspective for the target community, NLWs are not perceived as an expression of a benign hearts and minds approach. Rather, NLWs become increasingly viewed as instruments of repression, aggravated when declining physical effectiveness of NLWs result in large scale protracted battles. Even under conditions of optimal technical performance and use, NLWs lack strategic yield to substitute for the absence of a desired politico-strategic end state. NLWs appear to perform optimally under the existence of such a broadly agreed or projected political end state.

**Recommendations and outlook**

**Recommendations**

R&D efforts on NLWs have predominantly been focused on the development and testing of novel NLWs and innovations in existing NLW concepts. However, merely concentrating on the precision of the technical performance of NLW ignores the impact of many other factors influencing NLW performance. As this study has endeavored to point out, the collection and analysis of data from real world uses of NLWs is of key importance to provide a more thorough assessment of NLW performance. Analogously to law enforcement organizations, the military establishment should therefore put more effort in the detailed analysis and evaluation of the performance of NLW used by military forces in real world events.
A deeper analysis of NLW performance in real world operational cases could benefit from the DTA approach applied in this study. A more extensive collection of data to feed the DTA model components would enhance the quality and validity of the findings.

Given the susceptibility of NLW performance to the operational context of its deployment, and in particular the intentional denial of NLW effects by target complexes, a closer look into the operational context is required in order to reduce the probability that NLW employment becomes counterproductive. The more accurate the situational picture is, the better the military user force can assess the effect the use of NLW will produce.

The risk of performance degradation of NLWs due to countermeasures may be reduced by presenting target individuals or populations with more complexity by applying multiple types of NLWs simultaneously. Such an approach could be embedded in a non-lethal manoeuver concept, including the employment of airborne NLW capabilities.

To the extent that forces perform in a well-restrained, de-escalating and just way, more intensified public information campaigns, for instance by using social media, might support the target population’s perception of the forces, thus enhancing the acceptance of the employment of NLWs.

**Outlook**

The military employment of NLWs must be contextualized in a type of military force deployment. It is intended to deal with non-combatants, and to deliver precision effects. Given the current emergence of technological advances, more precise effects will be feasible, using novel system concepts. The introduction of invisible effects, like the MMW energy delivered by the ADS, is likely to be the opening of a new era. The fielding of microsystems to deliver dedicated and invisible effects against individuals has the potential to make the monitoring of military actions an increasingly challenging task. Effects may become more intrusive to the human body, yet less visible to observers and to society in general, including the media.

The emergence of capabilities fusing ‘micronization’ with unmanned effect delivery will introduce new forms of warfare. They will further stretch the spectrum of military options and coexist with current modes of warfare. As these new options increasingly draw from civilian technologies it is conceivable that they will become available to irregular military actors as well. They will provide the empowered individual with still more options. The risk of this type of proliferation increases with the relatively low cost of small system concepts. Similar as with various types of NLWs, they will become available through the internet. Hence it is important to assess the wider implications of such novel concepts before fielding and marketing them. DTA methods may be further tailored to support such assessments.
The growing probability of warfare to become more urban oriented will make military operations more delicate and complex. On the target side the distinction between combatants and non-combatants will further blurred, while on the user side the divide line between policing and military action will be more diffuse as well. The vulnerabilities inherent to current and future urban infrastructure will require more discriminative and restrictive operational capabilities to apply in mega cities.

The military applicability of technology to avoid human casualties was the central theme of this study. Although many challenges in this area are still unresolved, it will be complemented by the avoidance of environmental damage, as human security will increasingly depend on the uninterrupted availability of critical services and connectivity provided by the urban infrastructure. In a quickly urbanizing world Sun Tzu’s idealistic approach to warfare will become a conditio sine qua non to prevent Von Clausewitz’s friction in war to become apocalyptic.

References


