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Precision-Guided Munitions and the Principle of Distinction: The tactical challenges that military forces face in applying the principle of distinction in urban warfare environments despite the use of precision-guided munitions

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Precision-Guided Munitions and the Principle of Distinction

The tactical challenges that military forces face in applying the principle of distinction in urban warfare environments despite the use of precision-guided munitions

A thesis submitted in partial fulfillment of the requirements for the degree

MA International Relations: Global Conflict in the Modern Era

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Abbreviations

| | |
|----------|--|
| C4ISR | Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance |
| CJTF-OIR | Combined Joint Task Force – Operation Inherent Resolve |
| DOD | Department of Defense |
| GC | Geneva Convention |
| GPS | Global Positioning System |
| ICJ | International Court of Justice |
| ICRC | International Committee of the Red Cross |
| IED | Improvised Explosive Device |
| IHFFC | International Humanitarian Fact-Finding Commission |
| IHL | International Humanitarian Law |
| IRAM | Improvised Rocket Assisted Munition |
| IS | Islamic State |
| LOIAC | Law of International Armed Conflict |
| MSF | Médecins Sans Frontières |
| NGO | Non-Governmental Organisation |
| NSL | No-Strike List |
| PGM | Precision-Guided Munition |
| SDF | Syrian Democratic Forces |
| UK | United Kingdom |
| UN | United Nations |
| UNAMA | United Nations Assistance Mission in Afghanistan |
| UNHCR | United Nations High Commissioner for Refugees |
| US | United States |

I. Introduction

Precision attacks conducted by precision-guided munitions (PGMs) have become a crucial and integral part of military strategies in contemporary warfare. A PGM, often referred to as a ‘smart weapon’, is defined by the US Department of Defense (DOD) as a “guided weapon intended to destroy a point target and minimize collateral damage” (Congressional Research Service, 2022). A variety of PGMs exist, including air- and ship-launched missiles, multiple-launched rockets, and guided bombs. The guidance systems of PGMs can be based on the global positioning system (GPS), laser guidance, or inertial guidance (Congressional Research Service, 2021).

PGMs have transformed aerial warfare as these munitions have drastically improved the accuracy and precision of weapons. Instead of having to use hundreds of unguided bombs to strike a specific target, a single strike by a PGM can effectively hit that same target while minimizing collateral damage (Congressional Research Service, 2021, p. 2).

Because of the precision capabilities of PGMs, it is often believed that the use of these weapons makes it easier to distinguish between civilians and combatants in warfare and to spare civilians (Andresen, 2017).

The principle of distinction is a cornerstone of International Humanitarian Law (IHL), the law that regulates armed conflict (ICRC, 2004). The principle of distinction obligates parties to an armed conflict to distinguish between civilians and combatants and between civilian objects and military objects. It stipulates that civilians and civilian objects must be spared and protected during hostilities, whereas combatants and military objects are legitimate targets at all times (ICRC, n.d.). The application of the principle of distinction has become increasingly complicated as warfare has moved to urban centres and hostilities increasingly take place among civilian populations (Melzer, 2014, p. 298).

Because PGMs are capable of great precision, a belief has risen that PGMs can solve this problem by making it easier to distinguish between civilians and combatants and solely target combatants (Kaag & Kreps, 2012). However, the reality of modern urban warfare has taught us that PGMs are not the panacea they are often believed to be (Andresen, 2017). Multiple urban conflicts that have taken place throughout the 21st century, including the recent outbreak of violence in Gaza (Ramdharie, 2023), have shown us that despite the use of PGMs,

militaries still face challenges in applying the principle of distinction and often fail to protect civilians in warfare.

The use of PGMs in warfare has not received the academic attention that could be expected, given the prominent position that PGMs have acquired in contemporary warfare. The studies that have been conducted on the use of PGMs have mainly focused on the military effectiveness of these weapons and the question of whether PGMs have made war more ethical or not.¹ However, few studies have been devoted to gaining an understanding of the effects of the use of PGMs on the application of IHL principles. The question why military forces still struggle to comply with the principle of distinction despite using PGMs has received little academic attention. This is surprising considering that PGMs have transformed the accuracy and precision capabilities of military forces in warfare.

This thesis aims to make a modest contribution to closing this gap in the existing literature by attempting to answer the following research question: *What tactical challenges do military forces face in applying the principle of distinction in urban warfare environments, despite the use of PGMs?*

In an attempt to answer this research question, a comparative case study is conducted in this thesis. Three cases of urban conflict in which military forces relied on PGMs have carefully been selected: the battle for Kunduz in 2015, the battle for Mosul in 2016-2017, and the battle for Raqqa in 2017. Each of these battles is characterized by distinct circumstances and the military forces that fought in these battles underwent different experiences in their endeavours to adhere to the principle of distinction and to protect the civilian population. By analyzing and comparing these experiences, this thesis attempts to gain a deeper understanding of the intricate relationship between the use of PGMs in urban warfare, the principle of distinction, and the protection of civilian lives.

In the subsequent sections of this thesis, the tactical challenges that military forces face in applying the principle of distinction in urban warfare scenarios despite the use of PGMs are explored.

Section II reviews the existing academic literature on urban warfare, PGMs, and the principle of distinction. Section III is the methodological section, which discusses the selection of

¹ See e.g. (Anderson, 2011); (Andresen, 2017); (Kaag & Kaufman, 2009) (Kaag & Kreps, 2012); & (Zehfuss, 2010).

cases, the structure of the comparative case study, and the sources that this thesis relies upon. Section IV provides an analysis of the use of PGMs and the tactical challenges that military forces faced in applying the principle of distinction despite the use of these weapons in the battles for Kunduz, Mosul, and Raqqa.

Section V is the final section, which discusses the findings of the case studies and provides an answer to the research question of this thesis. In this section, three main tactical challenges are identified that military forces faced in applying the principle of distinction in the battles for Kunduz, Mosul and Raqqa despite the use of PGMs: the complexity of striking targets in densely populated urban centres without causing collateral damage to civilians; the complexity of gathering accurate and up-to-date information regarding the status of intended targets and the presence of civilians in the target area; and the defence tactics of adversaries aimed at making it more complicated for the military forces to distinguish between civilians and combatants and to adhere to the principle of distinction.

In addition to discussing the key findings of the comparative case study, this section also engages with the implications of the research conducted in this thesis, limitations of the research and recommendations for further research.

II. Literature Review

This section engages with the existing literature on the use of PGMs and the principle of distinction. First, the historical background and the meaning of precision are discussed. Second, different arguments for and against the idea that more precision in warfare is better are analyzed. Finally, it is explored how PGMs relate to the principle of distinction and how this issue is reflected in the existing literature.

The rise of precision-guided munitions

Precision-guided munitions gained prominence in the Vietnam War, which took place between 1955 and 1975 (Hoehn, 2021, p. 2). After the Vietnam War, the technological advancement of PGMs continued and the use of precision systems in airstrikes started increasingly rapidly (Markham & Schmitt, 2013, p. 672). Markham and Schmitt show this rapid increase in the use of PGMs by noting that during Operation Desert Storm (1991), PGMs were used in only 8.8% of attacks. In contrast, in the initial phases of Operation Enduring Freedom (2001) and Operation Iraqi Freedom (2003), PGMs were used in 65% and 68% of attacks, respectively (Markham & Schmitt, 2013, p. 673). This sharp increase in the use of PGMs in military operations illustrates the prominent role that these weapons have gained in the conduct of war in contemporary conflicts.

As the prominence of PGMs grew over time, these weapons also started receiving more academic attention. However, when discussing PGMs, M. Schmitt argues that scholars often confuse the terms ‘precision’ and ‘accuracy’. He explains that the term accuracy refers to “a weapon’s capacity to strike the precise point at which it is aimed” (Schmitt, 2005, p. 446). Although accuracy is a key element of precision, these terms do not mean the same according to Schmitt. He defines precision as “the ability to locate and identify a target, strike it accurately in a timely fashion, and determine whether desired effects have been achieved or restrike is needed” (Markham & Schmitt, 2013, p. 670). This means that for a strike to be precise, more is needed than accuracy alone. Schmitt argues that precision is equally dependent on “command, control, communications, computers, intelligence, surveillance, and reconnaissance”, which are also known as C4ISR (Schmitt, 2005, p.446-447).

Is more precision in warfare better?

In the existing academic and military literature, there is a division between those who support the idea that more precision in warfare is better and those who critique this idea. Two main arguments for the idea that more precision in warfare is better are discussed here.

The first argument for the idea that the use of PGMs can improve warfare is that because of the precision capabilities of PGMs, these weapons improve military effectiveness.

J. Acton has argued, for example, that PGMs have “dramatically improved force exchange ratios...by reducing the likely number of weapons required to destroy individual targets” (Acton, 2017, p. 45). Similarly, L. Kahn and M. Horowitz have argued that the accuracy that PGMs offer “not only improves military effectiveness, it also helps reduce collateral damage, aiding the ability of states to use force in ways that comply with the law of war” (Kahn & Horowitz, 2023, p. 3).

A second argument for the idea that more precision in warfare is better is the argument that the use of PGMs makes warfare more ethical. This argument stems from the idea that because PGMs are capable of great precision, these weapons can reduce collateral damage and thereby reduce civilian casualties in warfare. This idea is supported by N. Wheeler, who has argued that “the development of precision-guided weapons in the last decade has opened up new possibilities for reducing the risks of civilian casualties without sacrificing military effectiveness” (Wheeler, 2002, p. 210). Similar to Wheeler, J. Stone has praised the ability of PGMs to reduce civilian casualties. He has argued that because precision bombs generally fall very close to the intended target “the level of collateral damage associated with any given attack will be very low by historical standards” (Stone, 2007, p. 140).

Because of the capability of PGMs to reduce collateral damage and civilian harm, a belief has thus risen that PGMs make war more ethical. This belief is illustrated by the claim of W. Thomas that advancements in weapons technology since World War II have made it “easier to be good” (Thomas, 2001, p. 172).

Although both of these arguments for the idea that more precision in warfare is better have received support from multiple scholars and military experts, these arguments have also received a lot of critique. A. Fox, for example, has critiqued the argument that the use of PGMs in urban warfare environments improves military effectiveness. Fox argues that when PGMs are used in dense urban terrain, they often do not succeed at effectively striking a

target at the first attempt. This will cause the intended target to flee and move from structure to structure. Because of this, new precision strikes are launched and the initial effect repeats itself. Fox refers to this paradoxical targeting loop as the ‘precision paradox’ and he argues that because of this paradox, PGMs do not improve military effectiveness when used in dense urban terrain (Fox, 2018).

In addition to critiquing the argument that the use of PGMs improves military effectiveness, the precision paradox argument also critiques the idea that the use of PGMs reduces civilian casualties in warfare. Fox argues that because new precision strikes need to be launched when PGMs are ineffective at eliminating the threat at the first attempt, this increases the potential for collateral damage to civilians (Fox, 2018).

This idea that rather than reducing civilian casualties, PGMs increase civilian casualties is expressed by other scholars besides Fox. J. Andresen, for example, has argued that PGMs are being used in civilian populated areas where less precise weapons would not have been used, as they would not be able to comply with IHL standards. He argues that because PGMs are being used in these areas, they “introduce new harm into areas where strikes had previously been thought infeasible” and therefore cause more civilian casualties (Andresen, 2019, p.2). Y. Dinstein also recognizes that the use of precision weapons might lead to attacks in civilian areas that would have been prohibited if less precise weapons were used. He has noted the following regarding this issue: “When a sledgehammer is excluded by LOIAC owing to the expectation of ‘excessive’ collateral damage to civilians/civilian objects, the availability of a scalpel may open the legal door for an attack against a lawful target” (Dinstein, 2004, p. 195).

Besides the argument that rather than reducing civilian harm, PGMs increase civilian harm, scholars have expressed other critiques on the idea that the use of PGMs makes war more ethical as well. P. Owen has argued, for example, that because of the belief in the precision capabilities of PGMs, we no longer expect collateral damage to occur to civilians. When civilian casualties occur, they can only be an ‘accident’ (Owens, 2003). Owen expresses her worries that if civilian casualties are normalized as accidents, they will become permissible and responsibility cannot be assigned. In addition, she worries that the legitimization of civilian casualties through the notion of accidents “forms an integral part of the project of justifying war” (Owens, 2003, p. 616).

In addition to Owens, other scholars have expressed their concerns that the belief in the capabilities of precision weapons has adverse ethical implications. J. Kaag and S. Kreps, for example, argue that increasingly sophisticated technology is wrongly conflated with ‘increasingly sophisticated individual judgment’ (Kaag & Kreps, 2012, p. 261). They warn against overestimating the ethical progress that has been made in warfare as a result of technological advancement in weaponry as “a misplaced sense of moral legitimacy can lead to a dangerous lack of vigilance about ethical and legal matters” (Kaag & Kreps, 2012, p. 284-285). Similar to Kaag and Kreps, Kaag and W. Kaufman warn that the belief that we can eliminate the challenge of difficult moral choices and dilemmas in warfare by relying on ‘smart weapons’ is dangerous, as it may stop us from engaging in moral deliberation and it may lead to a lower threshold to go to war. They therefore argue that “technology can never be a substitute for ethics itself; the decision to go to war, and the means of fighting war, will always belong in human hands” (Kaag & Kaufman, 2009, p. 605).

The question of whether more precision in warfare is better thus remains debated. Scholars and military experts hold contrasting viewpoints on the effects of the use of PGMs on military effectiveness and ethics in warfare. The following part goes into the international legal principle of distinction and the literature on the implications of the use of PGMs for this principle.

Precision-guided munitions and the principle of distinction

The use of PGMs in warfare is governed by International Humanitarian Law (IHL), which is the law that regulates armed conflict and seeks to limit its effects (ICRC, 2004). The principle of distinction is a ‘cardinal’ and ‘intransgressible’ principle of IHL (ICJ, 1996, paras 78-79). The principle of distinction obligates parties to an armed conflict to distinguish between civilians and combatants and between civilian objects and military objectives. It stipulates that civilians and civilian objects must be spared and protected during hostilities, whereas combatants and military objects are legitimate targets at all times (Melzer, 2014, p. 297). The principle of distinction is codified in the 1949 Geneva Conventions and the 1977 Additional Protocols (ICRC, 2004). These legal documents are legally binding and ratified by almost all states in the world (ICRC, 2002). Even states that have not ratified the Geneva Conventions and Additional Protocols are legally bound by the principle of distinction

because the principle of distinction has obtained the status of customary international law, which is applicable in both international and non-international armed conflict (ICRC, n.d.a).

The categories of combatant, civilian, military objective and civilian object are defined by the Geneva Conventions and Additional Protocols. Under these documents, combatants are defined as the members of armed forces of a party to a conflict (GC III, 1949, Art 4; Protocol I, 1977, Art. 43 & 44). However, medical and religious personnel of armed forces are excluded from the category of combatants (Protocol I, 1977, Art 43(2)). Persons who are not members of the armed forces of a party to a conflict but who directly participate in the hostilities are also considered combatants (Van Engeland, 2011, p. 38).

Combatants have a right to directly participate in the hostilities and they may not be punished for their mere participation. Combatants are a legitimate target at all times (ICRC, n.d.b). However, when combatants no longer participate in the hostilities because they were captured by the enemy and have become prisoners of war, they are protected by IHL and may no longer be targeted (GC III, 1949, Art 13-16). This same rule applies to combatants who no longer participate in the hostilities because they are wounded, sick, shipwrecked, or parachuting from an aircraft in distress (GC I, 1949; GC II and Protocol I, 1977). Similar to combatants, military objectives are also a legitimate target at all times. Military objectives are defined in Additional Protocol I as “those objects which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage” (Protocol I, 1977, Art 52(2)).

In contrast to the category of combatants, the Geneva Conventions and Additional Protocols do not contain a straightforward definition of who is a civilian. They do, however, contain a negative definition: a civilian is a non-combatant (Van Engeland, 2011, p. 29). A civilian can thus be defined as a person that does not belong to the armed forces or any other organized group that is a party to the conflict nor takes direct part in the hostilities (Van Engeland, 2011, p. 29). Civilians as well as civilian objects are protected by IHL and may not be targeted. Civilian objects are defined in Additional Protocol I as “all objects which are not military objectives” (Protocol I, 1977, Art. 52(1)). In contrast to combatants, civilians do not have the right to participate in the hostilities and they may be punished for their mere participation (ICRC, n.d.b).

Even though the distinction between civilians and combatants and between civilian objects and military objectives is clear in theory, it is not always as clear in practice. N. Melzer explains that at the time of the formulation of the principle of distinction after World War II, it was still relatively easy to distinguish between civilians and combatants because wars were generally fought by uniformed soldiers on specific battlefields far away from the civilian population. However, this pattern of warfare has changed fundamentally, as military operations have shifted into urban centers where civilians live (Melzer, 2014, p. 297). V. Sehwat explains that combatants often attempt to blend with the civilian population of urban centres by not wearing proper uniforms and by hiding in civilian structures (Sehwat, 2017, p. 186). According to Melzer, these changes in warfare have put ‘considerable strain’ on the application of the principle of distinction and increased the potential for collateral damages to the civilian population (Melzer, 2014, p. 297-298).

As described above, PGMs are often considered a solution to this problem because of their precision capabilities. However, it has also been explained that the idea of PGMs as a panacea is critiqued as it has been argued that the use of PGMs leads to an increase rather than a decrease in civilian casualties and to a failure to engage in moral deliberations in warfare. Although the effect of PGMs on military effectiveness and the ethical implications of the use of PGMs have been studied relatively extensively, the legal implications of the use of PGMs for the application of IHL principles have not received the same academic attention. Scholars who have performed research in this area have mainly focused on the legality of PGMs, and especially drones, under international law. Examples of scholars who have focused on these issues include J. Andresen (2017), E. Crawford (2016), M. Schmitt (2005 & 2013), V. Sehwat (2017), and R. Vogel (2010).

Although these scholars have shed light on the legality of PGMs under international, they have not explored the practical application of these principles when employing PGMs. This thesis aims to contribute to closing this gap in the academic literature by conducting a comparative case study to examine the relationship between the use of PGMs in urban warfare and the application of the principle of distinction.

III. Methodology

In an attempt to answer the research question for this thesis, a comparative case study is conducted. The research conducted in this thesis is explorative in nature because it explores what tactical challenges military forces face in applying the principle of distinction in urban warfare environments, despite the use of PGMs.

Urban warfare is chosen as the specific context for this comparative case study because of its significant position in contemporary warfare. Although urban warfare has existed since humans began building cities, this type of warfare has become more prominent in the last few decades. Considering the violence that has taken place in large cities in the Middle East in recent years, it can also be argued that cities will remain primary battlegrounds in future wars (Gisel et al., 2021). Besides the relevancy of urban warfare in contemporary and arguably future warfare, urban warfare is chosen as the context for the comparative case study of this thesis because, as discussed above, the application of the principle of distinction is particularly challenging in urban warfare environments. It is therefore particularly interesting to conduct a comparative case study into the tactical challenges that military forces face in applying the principle of distinction despite their use of precision weapons in the context of urban warfare.

The cases that have been carefully selected for the comparative case study conducted in this thesis are the battle for Kunduz (2015), the battle for Mosul (2016-2017), and the battle for Raqqa (2017). These three battles were chosen as case studies because they fit the scope of the research conducted in this thesis: they were fought in urban warfare environments, featured significant use of PGMs, and resulted in civilian harm despite the use of PGMs. This choice allows for an analysis and comparison of the tactical challenges that the military forces encountered in applying the principle of distinction in each of these cases, despite their use of PGMs.

In addition, the battles for Kunduz, Mosul, and Raqqa are selected as case studies because these battles were fought in the context of the wars in Afghanistan, Iraq, and Syria, respectively, which are wars that have received a lot of academic attention. Because of this, a variety of reliable sources with information about these battles is already available and can be consulted when conducting the comparative case study.

This thesis engages with a variety of primary and secondary sources with the aim of taking on a broad perspective when conducting the case studies and gaining a comprehensive understanding of the use of PGMs in the battles of Kunduz, Mosul, and Raqqa and the application of the principle of distinction in these battles.

Concerning the primary sources, this thesis refers to the four Geneva Conventions of 1949 and the two Protocols Additional to the Geneva Conventions of 1977, as the principle of distinction is codified in these international legal documents. In addition, primary sources are consulted which contain information regarding the use of PGMs in the battles for Kunduz, Mosul and Raqqa. These primary sources include official statements and press releases by military officials, interviews with operators of precision weapons, and official military and government reports regarding military operations in the battles for Kunduz, Mosul and Raqqa. Besides these primary sources, this thesis also focuses on a variety of secondary sources, including reports by Non-Governmental Organisations (NGOs), academic articles, articles published in military journals, posts on military blogs, articles by news websites, etc.

In the following chapter of this thesis, the three case studies are analyzed. The case studies are performed in chronological order, so the next section starts with analyzing the battle for Kunduz (2015), continues with analyzing the battle for Mosul (2016-2017), and ends with analyzing the battle for Raqqa (2017). Each case study is conducted in three different steps that together are aimed at gaining an insight into the tactical challenges that military forces face in applying the principle of distinction in urban warfare environments despite the use of PGMs.

The first step of the case study is that the battle is contextualized by providing information on the historical background of the battle and the course of the battle.

The second step is that the use of PGMs in the battle is explored by analyzing the type of PGMs that were used, the parties that used these PGMs and the role that these weapons played in the battle in comparison to other unguided weapons. Primary sources regarding the specific use of PGMs in the battles for Kunduz, Mosul and Raqqa are very limited. This may be the case because information about military operations is often sensitive and not disclosed to the public. This thesis therefore mostly relies on the information provided by NGOs and reliable news sources about the weapons that were used in the battles for Kunduz, Mosul and Raqqa to provide insight into the use of PGMs in each of these battles.

The final and most important step in the examination of the case studies is the analysis of the tactical challenges that military forces faced in the application of the principle of distinction despite using PGMs. This is done by zooming in on the harm that PGMs caused to civilians and civilian objects in each battle and by studying why that harm could occur despite the great precision capabilities of the weapons that were used. Errors in the use of PGMs and the application of the principle of distinction are identified and further analyzed in this final part of the case study.

Given the limited scope of this thesis, the analysis of civilian harm caused by PGMs solely focuses on direct harm to civilians and civilian objects. The analysis does not focus on indirect harm to civilians caused by the overall impact of the use of PGMs, such as the destruction of infrastructure and the disruption of essential services.

In order to gather evidence regarding the civilian harm that was caused by PGMs in each battle and why that harm occurred, this thesis mostly relies on NGO reports. These reports contain detailed information about specific cases of civilian harm that took place in each battle and were caused by PGMs. In addition, these reports discuss the actions of military forces and other contributing factors that led to these cases of civilian harm.

Besides NGO reports, this thesis also relies on information provided by military forces to gather evidence regarding the challenges that military forces faced in protecting civilians in the battles for Kunduz, Mosul and Raqqa despite the use of PGMs. This includes investigations of military forces into their operations and actions that led to civilian harm and statements and press releases by military officials regarding their efforts to spare civilian lives.

By going through these three steps and by relying on a variety of sources to gather evidence in each case study, it is attempted to gain a comprehensive understanding of the challenges that military forces faced in applying the principle of distinction in the battles for Kunduz, Mosul and Raqqa despite the use of PGMs. The results of the case studies are further discussed, compared and interpreted in the final section of this thesis to answer the research question.

IV. Analysis

This section delves into the comparative case study of the battles for Kunduz, Mosul and Raqqa. Each case study starts by examining the background to the battle. Secondly, it is explored which PGMs were used and what role they played in the battle. Thirdly, the challenges that military forces faced in applying the principle of distinction despite the use of PGMs are analyzed. Finally, the case study is concluded by summarizing its key findings.

Case study 1: The battle for Kunduz

§1.1 Background to the battle

In April 2015, the Taliban started launching offences to take over the Kunduz province from the Afghan government. The Taliban succeeded in gaining control over multiple parts of the Kunduz province. After several months of intense fighting, the Taliban launched an attack on the capital of the Kunduz province, Kunduz city. This attack was launched on September 28, 2015, and it was the start of the ‘Battle for Kunduz’ (UNAMA, 2015, p. 1). The Taliban was able to quickly seize government buildings and the Afghan government announced that Kunduz city had fallen to the Taliban (Terpstra, 2022, p. 258).

In the days following the attack on Kunduz city by the Taliban, Afghan security forces, supported by US military forces launched a counterattack (Terpstra, 2022, p. 258). This counterattack resulted in a high-intensity urban battle in Kunduz city (Bouchet-Saulnier & Whittall, 2018, p. 342). By 1 October, the Afghan government announced that it had re-captured large parts of Kunduz city. However, heavy fighting continued for around two more weeks. The battle for Kunduz ended on 13 October when the Taliban announced its withdrawal from the city (UNAMA, 2015, p. 2).

The United Nations Assistance Mission in Afghanistan (UNAMA) has published a special report on human rights and the protection of civilians in the Kunduz province (UNAMA, 2015). This report provides that the battle for Kunduz caused extreme suffering for civilians. The findings in this report were later supplemented by the UNAMA annual report on the protection of civilians in Afghanistan (UNAMA, 2016).

Between 28 September and 13 October, UNAMA recorded 896 civilian casualties (318 deaths and 578 injured) (UNAMA, 2016, p. 27). In the preliminary findings of the civilian casualties in Kunduz by UNAMA in its 2015 report, UNAMA noted that the number of civilian casualties was almost equivalent to “10 per cent of all civilian casualties documented by UNAMA in the entire country during 2014, the most violent year documented by UNAMA since 2009” (UNAMA, 2015, p. 5). The majority of the civilian casualties were caused by ground fighting between the Taliban and Afghan security forces according to UNAMA. The remaining civilian casualties were caused by deliberate killings and aerial operations (UNAMA, 2016, p. 27).

§1.2 The use of precision-guided munitions

Relatively little public information is available about the type of weapons that were employed during the battle for Kunduz. The Bureau of Investigative Journalism, which is a non-profit news organization, has reported that the US conducted 80 airstrikes in Afghanistan in October and 11 of these strikes were concentrated on Kunduz city (Serle, 2015). The Bureau further reported that the US used a variety of aircraft in its missions in Afghanistan in 2015, including jets, drones and AC-130 gunships. The type of munitions that these aircraft fired is not known according to the Bureau because of a lack of official US information (Serle, 2015). However, it is stated on the official US Air Force website that all US AC-130 gunships are modified with precision strike packages and that they carry low-yield precision-guided munitions (US Air Force, n.d.).

In its annual report on the protection of civilians in Afghanistan, UNAMA noted that the Afghan Air Forces relied on Mi-35 attack helicopters, Mi-24 attack helicopters, 10 MD-530 light attack helicopters and Mi-17 transport helicopters modified with fixed forward-firing machine guns in its missions in 2015. All of these helicopters have the capacity to deploy unguided rocket systems, but not guided ones (UNAMA, 2016, p. 62).

Concerning the ground engagements in the battle for Kunduz, the UNAMA special report on the Kunduz province notes that unguided weapons were used by both parties to the conflict. The pro-government forces and the Taliban both used rockets, mortars and other explosive weapons. The Taliban also used rocket-propelled grenades (RPGs) and Improvised Explosive Devices (IEDs), (UNAMA, 2015, p. 5).

§1.3 The application of the principle of distinction

Although it is not known how much of the civilian harm that took place in the battle for Kunduz was the result of the use of PGMs or the result of the use of unguided weapons, we do know that one specific attack by a PGM caused at least 85 of the estimated 896 civilian casualties in the battle for Kunduz (UNAMA, 2016, p. 61). This attack was the bombing of the Médecins Sans Frontières (MSF) hospital in Kunduz city on 3 October.

In the middle of the night of 3 October, a US AC-130 gunship conducted a series of precise airstrikes on the MSF hospital. At the time that the attack started, at least 249 people were present in the hospital, including 119 patients and caretakers and 130 MSF staff members. The airstrikes destroyed the hospital building, causing at least 85 casualties (42 deaths and 43 injured). (UNAMA, 2016, p. 61). By studying why the attack on the MSF hospital occurred, we can gain insight into the tactical challenges that the military forces faced in applying the principle of distinction in the battle for Kunduz, despite the use of PGMs.

Soon after the attack took place, MSF conducted an internal review to investigate the airstrikes and this review was made publicly available (MSF, 2015a, p. 1). In this review, MSF stated that it had sent the exact coordinates of the hospital to the Afghan and US military forces at the beginning of the conflict in Kunduz and that it had received confirmation of receipt from both (MSF, 2015a, p. 5). In addition, MSF stated that prior to the attack, all parties to the conflict in Kunduz had agreed to respect the neutrality of the MSF hospital in line with IHL. MSF further concluded in its report that at the time of the airstrikes: MSF was in full control of the hospital; there were no combatants present; there was no fighting in the direct vicinity of the hospital building; and MSF rules, including the ‘no weapons’ policy, were implemented and respected. (MSF, 2015a, p. 13).

Based on these findings, it can be argued that the MSF hospital did not lose its protected status under the principle of distinction and the US had no reason to target the hospital.

The MSF review shed light on the internal view of the hospital on the attacks. However, to be able to understand what really happened, MSF called for an independent investigation by the International Humanitarian Fact-Finding Commission (IHFFC) (MSF, 2015a, p. 1). This investigation never happened because the Afghan and US governments never gave their consent and launched their own separate investigations instead (Bouchet-Saulnier & Whittall, 2018, p. 354). The Afghan investigation was never made public (UNAMA, 2015, p. 4).

The findings of the US investigation were summarized by the Commander of the US forces in Kunduz by stating that the airstrike was “the direct result of human error, compounded by systems and procedural failures” (US Department of Defense, 2015). A report by the DOD on the investigation states that the US military forces mistakenly believed that they were firing on the intended target, which was an “insurgent-controlled site approximately 400 meters away from the MSF Trauma Center” (US Department of Defense, n.d.). The report identified multiple factors that combined resulted in the misidentification of the MSF hospital as a legitimate target and the airstrikes on the hospital.

Firstly, the AC-130 ship had to leave in haste because of an emergency call, causing it to not receive all the information it would normally receive before a mission (Margulies, 2018). Secondly, one of the AC-130’s crucial communications systems failed, hindering communication with command headquarters (US Department of Defense, n.d.). The coordinates of the MSF hospital were entered into the US ‘No-Strike List’ (NSL), which lists the names and coordinates of protected sites. However, the investigation concluded that the aircrew did not have access to this list at the moment of the strike, which caused confusion between the ground forces and the aircrew (Margulies, 2018).

Thirdly, the aircrew could only give vague and generic descriptions of the intended target as the mission took place at night. The target was described by the aircrew as having an arch-shaped gateway. However, both the MSF hospital and the building containing Taliban forces that were 400 meters away from the hospital had an arch-shaped gateway, resulting in a wrong confirmation of the MSF building as the intended target (Margulies, 2018, p. 35).

MSF responded to the findings of the US investigation by stating that “It is shocking that an attack can be carried out when US forces have neither eyes on a target nor access to a no-strike list, and have malfunctioning communications systems” (MSF, 2015b). MSF argued that the findings illustrated gross negligence by the US forces and a violation of ‘the rules of war’ (MSF, 2015b).

§1.4 Conclusion

The battle for Kunduz took place between 28 September and 13 October of the year 2015. This battle was fought between the Taliban and Afghan military forces, supported by US military forces, over the control of the capital of the Kunduz province in Afghanistan. This

battle resulted in 896 civilian casualties and 85 of these casualties were caused by the attack on the MSF hospital by a PGM.

The attack on the MSF hospital illustrates that even when employing weapons capable of great precision, military forces can still face obstacles in successfully striking the intended target and adhering to the principle of distinction. The US forces experienced several obstacles that culminated in the attack on the MSF hospital, including malfunctioning systems and miscommunications between the US aircrew and Afghan ground troops regarding the status of the intended target.

Case study 2: The battle for Mosul

§2.1 Background to the battle

In 2014, the Islamic State (IS) forcefully took over the city of Mosul from the Iraqi government. On October 16, 2016, the Iraqi government launched a military operation to take back the city of Mosul from IS (Mosul Study Group, 2017, p. 4-5). During this operation, the Iraqi Security Forces (ISF) received support from the Combined Joint Task Force – Operation Inherent Resolve (CJTF-OIR), which is a US-led international coalition fighting against IS (Operation Inherent Resolve, n.d.). The launch of the military operation to drive IS out of Mosul was the start of the ‘battle for Mosul’ (Mosul Study Group, 2017, p. 4-5).

The battle for Mosul consisted of two phases: the first phase was the liberation of east Mosul and the second phase was the liberation of west Mosul. The battle lasted until 10 July 2017, when Iraqi Prime Minister al-Abadi announced that Mosul was fully liberated from IS. Airstrikes conducted by the US-led Coalition in support of the Iraqi forces played a key role in the successful isolation and destruction of IS in the liberation of Mosul (Mosul Study Group, 2017, p. 6-8).

The battle for Mosul was the largest military operation since the US-led invasion of Iraq in 2003 (Arnold & Fiore, 2019, p. 58). This battle took place in a dense urban environment as Mosul was the second largest city in Iraq and a heavily populated city at the time (BBC, 2016). US officials have referred to the battle for Mosul as the toughest urban battle since World War II (Airwars, 2017, p. 2). The battle is known for causing a civilian catastrophe as

thousands of civilians were killed in Mosul and 65% of the housing units in the city were either partially or completely destroyed (Zajac, 2022, p.161).

§2.2 The use of precision-guided munitions

A report by Airwars, which is a non-profit organization that investigates civilian harm claims in conflict zones, provides that air and artillery units of the Coalition forces fired more than 29,000 munitions on the city of Mosul. Airwars states in its report that the US was responsible for two-thirds of the airstrikes on Mosul and that the UK, Belgium, Australia and France were also key contributors to the airstrikes (Airwars, 2017, 6).

Although the report does not provide how many of the munitions fired by the Coalition forces were guided ones, it can be expected that most of these munitions were guided as the Coalition forces themselves have repeatedly stressed the accuracy of their weapons in the battle for Mosul (Airwars, 2017, p. 4). In addition, an article by the Modern War Institute on the battle for Mosul states that the Coalition's use of PGMs in the battle for Mosul was so high and frequent that it "severely and dangerously reduced the United States' strategic stockpile" (Spencer & Geroux, 2021).

A report by Amnesty International, which is a prominent human rights organisation, on the battle for Mosul provides that the Coalition forces heavily relied on PGMs in the battle for Mosul. In addition, this report engages with the type of PGMs employed by the Coalition forces. The report states that the Coalition forces employed guided rockets, missiles and bombs that were either laser-guided or GPS-guided munitions with high levels of accuracy (Amnesty International, 2017a, p. 12).

The report further provides that the Coalition forces used 500lb general purpose bombs that "contain about 90kg of high explosive and are lethal within a radius of 230m" (Amnesty International 2017a, p. 12). Concerning the guided rockets employed by the Coalition forces, Amnesty International notes that the coalition forces used GPS-guided M31 GMLRS (Guided Multiple Launch Rocket System) rockets, which are accurate within 10m of their intended target and can be lethal within 230m of impact when containing 90kg of high explosives (Amnesty International, 2017a, p. 12).

Besides the Coalition forces, ISF also heavily employed explosive weapons in Mosul (Airwars, 2017, p. 6). The Iraqi forces used guided munitions as well as unguided munitions,

including mortars, howitzers, grad rocket launchers, and a makeshift weapon known as the IRAM (Improvised Rocket Assisted Munition). The Amnesty International report provides that the accuracy of these unguided weapons is generally much lower than that of guided weapons (Amnesty International, 2017a, p. 11-12).

IS also heavily relied on unguided weapons in the battle for Mosul, including heavy mortars and IEDs (Improvised Explosive Devices) (Airwars, 2017, p. 6).

§2.3 The application of the principle of distinction

The Coalition forces have lauded the precision of their weapons and their efforts to minimize civilian harm in the battle for Mosul. Shortly after the battle for Mosul, US Defense Secretary Mattis stated “There has been no military in the world’s history that has paid more attention to limiting civilian casualties and the deaths of innocents on the battlefield than the coalition military (US Department of Defense, 2017)”. This mantra was repeated by outgoing Coalition commander Lt.G Stephen J. Townsend who wrote: “I challenge anyone to find a more precise air campaign in the history of warfare” (Townsend, 2017). The Mosul Study Group, which is a team that was commissioned to produce a report on the US Army’s involvement in the battle for Mosul, also praised its use of precision weapons in the dense urban terrain of Mosul (Mosul Study Group, 2017).

Even though the use of PGMs may have helped the Coalition forces in their efforts to protect civilians in the battle for Mosul, a civilian catastrophe occurred despite the use of PGMs. Initially, up to 1,5 million civilians were present in Mosul, but mass displacement occurred throughout the battle, leaving an estimated 100,000 civilians trapped in west Mosul towards the end of the battle (United Nations, 2017; UNHCR, 2017). Although the exact death toll of the battle is unknown, a survey conducted by the Associated Press led to an estimated death toll of between 9,000 and 11,000 civilians. The Associated Press estimated that at least a third of these civilian deaths were caused by bombardments by the Coalition and Iraqi forces (George et al., 2017). The extent to which PGMs caused these civilian deaths is unknown but given the heavy reliance on PGMs by the Coalition forces, it may arguably be expected that a large part of the civilian deaths caused by the Coalition and Iraqi forces were caused by PGMs.

How could such a civilian catastrophe occur despite the heavy reliance on precision-guided munitions in the battle for Mosul? Several tactical challenges can be identified that the Coalition forces and Iraqi forces faced in their efforts to apply the principle of distinction and protect civilians despite the use of PGMs. It can be argued that these challenges can help explain why high numbers of civilian casualties were caused in the battle for Mosul despite the use of PGMs.

According to US Army Major Amos C. Fox, one of the challenges that the military forces faced in Mosul was that of the precision paradox, which has been discussed in the literature review. This paradox entails that when precision strikes are ineffective at striking the target at the first attempt, the target will move from structure to structure and new precision strikes need to be launched, increasing the potential for collateral damage to civilians (Fox, 2018). In response to the publication of the report by the Mosul Study Group, Major Fox has written an essay in which he addresses what he regards as shortcomings of the report. One of the shortcomings of the report according to Major Fox is that “the report failed to articulate the paradoxical role that precision-strike capabilities and precision-guided munitions played” (Fox, 2020, p. v). Fox argues that the precision paradox resulted in mass death and destruction in the battle for Mosul and contributed to the displacement of 800,000 civilians who fled from Mosul to camps in Northern Iraq (Fox, 2020, p. 7-8).

A concrete example of the devastating consequences of the precision paradox is provided in the Amnesty International report. This example is an air strike on the al-Thawra neighbourhood by the Coalition forces on 20 April 2017. Mustafa, a witness to the attack, told Amnesty International that an IS fighter entered the house where he and 103 other civilians were staying at the time of the attack. The IS fighter entered the house via a hole in the wall. IS made holes in adjoining houses so they could use them to enter and exit houses without being seen by the pro-government forces. An hour after the IS fighter left the house, the house was attacked and two civilians were killed and many severely injured (Amnesty International, 2017a, p. 31-32). This case is an example of the precision paradox as it shows that precision strikes can cause IS fighters to flee to civilian houses and that this results in new strikes and ultimately in more civilian harm.

In addition to illustrating the precision paradox, this case also addresses another tactical challenge for operators of PGMs in the application of the principle of distinction; the

challenge of obtaining accurate and up-to-date information about the status of targets and the presence of civilians in the target area. Although the Coalition forces have not provided an explanation for the attack in the al-Thawra neighbourhood, it was likely the result of a discrepancy between the information that the Coalition forces received about the presence of an IS fighter in the building and the actual location of that fighter at the time that the attack was approved (Amnesty International, 2017a, p. 31-32).

The complexity of gathering accurate information about the status of targets and the presence of civilians in target areas in Mosul was also expressed by Coalition officials in an interview with Stars and Stripes, a US military news organization. A helicopter pilot illustrated the complexity of identifying targets by stating “I can’t see into houses” (Garland, 2017).

Coalition officials further stated that civilian casualties were sometimes unavoidable because “In some cases, civilians aren’t observed before a strike, or they enter the target area after weapons have been released” (Garland, 2017).

The Airwars report provides a concrete example of what can happen when military forces do not possess accurate and up-to-date information about the presence of civilians in the target area at the time of approving an attack.

In March 2017, the Coalition forces fired a 500-pound precision bomb on a building in the al-Jadida neighbourhood, which resulted in more than 100 civilian deaths. The Coalition investigated the incident and concluded that IS had baited them into bombing the building where civilians had deliberately been placed as targets. The Coalition stated that it had no idea that civilians were in the building when approving the strike (Airwars, 2017, p. 17).

Airwars argues that the investigation of the incident by the Coalition revealed that there are limits to the accurate information that Coalition personnel could obtain about the target and civilians present in the target area. The Airwars report therefore concluded that: “Strikes may hit their intended target with a great deal of precision, but the nature of the urban battlefield neuters much of the claimed value of such actions” (Airwars, 2017, p. 17).

Besides illustrating the complexity of gathering accurate information, the al-Jadida attack illustrates another issue that makes the application of the principle of distinction and the protection of civilians when using PGMs more complicated. This issue is that IS systematically displaced civilians and forced them to serve as ‘human shields’.

Amnesty International has argued that IS severely violated international humanitarian law in the battle for Mosul by “deliberately putting civilians in harm’s way to shield their fighters

and impede the advance of Iraqi and coalition forces” (Amnesty International, 2017a, p. 5). According to Amnesty International, IS forced civilians to stay in their new houses by welding the doors shut or booby-trapping the entrances. Even if civilians tried to escape the captivity of IS, their only option was to escape directly through the front line of the battles. Amnesty International noted that because of these actions by IS, IS-controlled zones became crowded with civilians (Amnesty International, 2017a, p. 15). It can be argued that this made it increasingly difficult for the Iraqi and Coalition forces to apply the principle of distinction and to conduct precision strikes against IS without causing collateral damage to civilians.

§2.4 Conclusion

In the battle for Mosul, the Iraqi Security Forces, supported by CJTF-OIR, fought against IS to liberate the city of Mosul from IS control. The battle took place between October 16, 2016, and 10 July, 2017. Both the ISF and Coalition forces heavily relied on PGMs in the battle for Mosul. Even though PGMs helped the ISF and Coalition forces in their efforts to spare civilians in the battle of Mosul, these weapons still caused great civilian harm. Several tactical challenges are identified that the ISF and Coalition forces faced in applying the principle of distinction despite the use of PGMs, which arguably give insight into the reasons why PGMs caused great civilian harm in the battle for Mosul.

One of these challenges is that of the precision paradox. Because PGMs did not succeed at killing all IS fighters at a target site on the first attempt, the remaining fighters fled and more precision strikes were launched, resulting in a paradoxical targeting loop that caused great civilian harm. Another challenge that the ISF and Coalition forces faced was the difficulty of obtaining accurate and up-to-date information about the status of intended targets and the presence of civilians and combatants at the target site. What made it even more complicated for the ISF and Coalition forces to apply the principle of distinction is that IS systematically displaced civilians and forced them to stay in certain areas to act as human shields for IS fighters.

It can be argued that the combination of these challenges made it really difficult for the ISF and Coalition forces to adhere to the principle of distinction despite the use of PGMs and that this contributed to the civilian catastrophe in Mosul.

Case study 3: The battle for Raqqa

§3.1 Background to the battle

In early March 2013, the city of Raqqa was captured by a coalition of antigovernment rebel groups. IS used this opportunity to exploit tensions among the antigovernment forces and launched a systematic campaign to force them out of the city. This campaign was successful and IS had full control over Raqqa by the end of 2013. In 2014, CJTF-OIR started striking IS targets in Raqqa. However, actual proposals to recapture Raqqa from IS were not made because the Coalition forces did not have a reliable ground partner to support them (Wasser et al., 2021, p. 180-181). The Coalition forces ultimately found this partner in the Syrian Democratic Forces (SDF), which was formed in 2015 to create a national military to fight IS and build democracy in Syria (Amnesty International, 2017b, p. 9).

On November 6, 2016, the SDF and Coalition forces launched a campaign to recapture Raqqa from IS (Mcnerney et al., 2022). During this campaign, SDF troops fought IS on the ground and these troops were supported by Coalition ground troops and air forces. The SDF also located targets and provided coordinates to the Coalition forces so that they could strike IS targets (Amnesty International, 2018, p. 9).

In the six months following the launch of the Raqqa campaign in November 2016, SDF and Coalition forces focused on recapturing villages and towns near Raqqa. On 6 June 2017, the final phase of the campaign began, which was the offensive on Raqqa city, also referred to as ‘the battle for Raqqa’ (McNerney et al., 2022). The battle for Raqqa lasted around four months and concluded on 17 October 2017, when the SDF and Coalition forces had fully recaptured Raqqa city from IS (McNerney et al., 2022, p. v).

Airwars and Amnesty International conducted a comprehensive investigation into the civilian harm that occurred in Raqqa. They discovered that thousands of civilians were trapped in Raqqa during the battle and that air- and artillery strikes by Coalition forces caused the death of more than 1,600 of these civilians. In addition, Coalition strikes destroyed more than 11,000 buildings, leaving up to 80% of the city uninhabitable (Amnesty International, 2019). The Coalition forces have, however, only admitted responsibility for killing 159 civilians.

They dismissed the remainder of the civilian deaths estimated by Airwars and Amnesty International as ‘non-credible’ (Amnesty International, 2019).

§3.2 The use of precision-guided munitions

Throughout the battle for Raqqa between June and October 2017, thousands of air and artillery strikes were conducted by Coalition forces in Raqqa in support of the SDF forces (Amnesty International, n.d.). Out of all the strikes launched on Raqqa, more than 4,000 were airstrikes. The US carried out 90% of these airstrikes and the UK and France carried out the other 10%. The US forces were also responsible for all of the artillery strikes into the city (Amnesty International, 2018, p. 49).

A report on civilian casualties in Raqqa by RAND, which is a non-profit research institution, provides that both the air forces and ground troops of the Coalition employed PGMs in an effort to minimize civilian harm when conducting airstrikes and artillery strikes in the battle for Raqqa (McNerney et al., 2022). The Coalition air forces employed Predator Drones and Reaper Drones, armed with laser-guided munitions, and MK 82 and MK 84 bombs, fitted with Paveway and JDAMs kits. In addition, the report provides that the Coalition air forces employed low-yield weapons, such as the GBU-39 Small Diameter Bomb, and low-fragmentation weapons, such as the GBU-54(v), to reduce collateral damage (McNerney et al., 2022, p. 54-55).

The Coalition ground troops employed a variety of PGMs according to RAND, including M777 A2 Howitzers that launched 155-mm shells equipped with the XM1156 Precision Guidance Kit and GPS-guided High Mobility Artillery Rocket Systems with 227-mm rockets (McNerney et al., 2022, p. 58).

Besides guided weapons, the Coalition forces and SDF also used a substantial amount of unguided munitions. According to Amnesty International, the majority of the M777 howitzers that were employed by the US were not fitted with the XM1156 Precision Guidance Kit but were unguided M795 high-explosive projectiles with an average margin of error of over 100m. In addition, the SDF used a lot of M934 120mm mortars, which are unguided weapons that were delivered to the SDF by the US (Amnesty International, 2018, p. 51). Amnesty International argued that the use of these unguided munitions posed an unacceptable risk to the civilians trapped in Raqqa (Amnesty International, 2018, p. 8).

§3.3 The application of the principle of distinction

Officials of the Coalition forces have repeatedly emphasized their efforts to minimize civilian harm in the battle for Raqqa and to act in compliance with international humanitarian law (Amnesty International, 2018, p. 14). Besides relying on PGMs, the Coalition forces also employed particular weaponry techniques in an attempt to mitigate civilian harm. It is stated in the RAND report that Coalition pilots, for example, tried to minimize the time that a weapon remained in the air before hitting its target, to prevent IS fighters from moving into areas that were densely populated with civilians. In addition, pilots chose delayed fusing times for weapons to minimize the amount of fragmentation of the bomb after its detonation, which could cause collateral damage (McNerney et al., 2022, p. 54-55).

The investigation of Amnesty International into the battle of Mosul revealed that in many of the strikes carried out by the Coalition forces, they succeeded in minimizing civilian harm and complying with IHL standards (Amnesty International, 2018, p. 14). However, despite the use of PGMs and the best efforts of the Coalition forces, there were also many cases in which the Coalition forces failed to protect civilians and to comply with IHL principles according to Amnesty International. This led to injury and death of civilians and the destruction of civilian objects (Amnesty International, 2018).

The exact numbers of civilian casualties and destroyed buildings that were caused by Coalition strikes with PGMs are unknown. However, it can be expected that a relatively large part of the total amount of civilian harm caused by the Coalition forces during the battle for Raqqa was inflicted by PGMs, considering that the Coalition forces heavily relied on the use of these weapons.

One of the reasons that PGMs caused civilian harm in the battle of Raqqa according to Amnesty International is that the Coalition forces made extensive use of PGMs with wide-area effects, meaning that these weapons cause damage to a large area rather than to a specific target. In addition, Amnesty International notes that the Coalition forces relied on weapons with large margins of error. This was for example the case with the use of artillery rounds that had a margin of error of up to 50m, even when fitted with precision guidance systems (Amnesty International, 2018 p. 15). When using these types of weapons in the densely populated urban environment of the city of Raqqa, it is really complicated to strike IS targets without causing collateral damage to civilians and civilian objects.

Even when employing PGMs that did not have wide-area effects and that had a much smaller margin of error, Coalition forces still struggled to conduct precision strikes without causing collateral damage to civilians in Raqqa. According to the RAND report, one of the reasons for this is that the ‘fog of war’ in Raqqa made it complicated for Coalition forces to collect accurate and up-to-date intelligence on the status of IS fighters and the presence of civilians in the target zone (McNerney et al., 2022, p.74).

In addition, even when the Coalition forces were able to obtain accurate information about the exact location of IS fighters, it remained very challenging to strike these targets without causing collateral damage to civilians according to RAND.

The RAND report notes that this was partly due to the layout and architecture of the city of Raqqa. Many neighbourhoods in Raqqa consisted primarily of concrete, mid-rise apartment blocks that were close together (McNerney et al., 2022, p. 54). A US air unit operator stated in an interview with RAND that the Coalition forces needed to get creative to be able to strike IS targets near these apartment blocks without causing collateral damage to the civilians residing in them. Although the Coalition forces were able to learn from their previous engagements in urban warfare scenarios, such as in the battle of Mosul, US air operators described the urban battle for Raqqa as a “very, very challenging tactical and operational problem” (McNerney et al., 2022, p. 54).

The defence tactics of IS made it even more complicated for the Coalition forces to apply the principle of distinction and minimize civilian harm despite their use of PGMs. IS used a variety of tactics to make it extremely difficult for Coalition forces to be able to distinguish between civilians and combatants and between civilian objects and military objectives.

One of these tactics is that IS relied on a complex structure of military, civilian, and dual-use institutions, to plan, execute, and support its military operations (McNerney et al., 2022, p. 47). The RAND report provides that IS “converted entire neighbourhoods into networked fortresses, removing any distinction between protected buildings and legitimate targets and moving rapidly among buildings, bunkers, and tunnels” (McNerney et al., 2022, p. 48).

Another tactic is that IS deliberately trapped civilians in their neighbourhoods so that they could serve as human shields. Exit routes were made impassable by mines and booby traps and even if civilians tried to escape, they were shot (Amnesty International, 2017, p. 23). A civilian described the situation in an interview with Amnesty International by stating: “Daesh kept us like rats in a cage; they blocked all the exits, while missiles and shells were falling on

us from the sky” (Amnesty International, 2017b, p. 23). IS also imposed the same dress code on civilians and IS fighters, making it even more difficult for the SDF and Coalition forces to distinguish between them and apply the principle of distinction. (Amnesty International, 2018, p. 11).

It can be argued that these defence tactics by IS made it very complicated for the Coalition forces to apply the principle of distinction and that these tactics negated the promise of precision-strike capabilities in Raqqa.

Even though all of these challenges made it more complicated for the Coalition forces to adhere to the principle of distinction, the Coalition forces did attempt to apply this principle and spare civilian lives in many of the strikes that they conducted according to Amnesty International. However, Amnesty International has argued that the Coalition forces also conducted strikes in Raqqa where they deliberately did not distinguish between combatants and civilians (Amnesty International, 2017b, p. 21-22).

Although the only way for civilians to flee Raqqa was to cross the Euphrates River, the Coalition forces dropped leaflets in March 2017 warning civilians not to use boats and ferries. The Coalition forces said that they were going to strike all boats and ferries because IS was also using them to transport weapons and fighters (Amnesty International, 2017b, p 21).

In an interview with the New York Times, the US commander of the Coalition forces stated: “And we shoot every boat we find. If you want to get out of Raqqa right now, you’ve got to build a poncho raft” (Gorden, 2017). Amnesty International condemned this statement, arguing: “Strikes on “every boat” crossing the river on the assumption that every boat carries IS fighters and weapons, without verifying whether that was indeed the case on each separate occasion, are indiscriminate, and as such unlawful” (Amnesty International, 2017b, p. 22).

According to Amnesty International, the Coalition forces not only threatened to strike boats without verifying if IS fighters were present on the boat but actually conducted such strikes in violation of the principle of distinction. This resulted in the death of dozens of civilians that were trying to flee the city of Raqqa (Amnesty International, 2017b, p. 21).

An example includes a Coalition air strike on a small boat with two teenage boys and other passengers that tried to cross the river in an attempt to flee from IS. The Coalition strike on the boat killed the two boys, as well as many other passengers (Amnesty International, 2017b, p. 22).

§3.4 Conclusion

In the battle for Raqqa, the SDF and Coalition forces worked together to recapture the city of Raqqa from IS. This battle started on 6 June and ended on 17 October, when Raqqa was fully recaptured by the SDF and Coalition forces. Intense urban fighting in Raqqa led to the death of 1,600 civilians and the destruction of more than 11,000 buildings, leaving 80% of the city uninhabitable.

Both the aircrew and ground troops of the Coalition forces heavily relied on PGMs in the battle for Raqqa. The use of PGMs helped the Coalition forces in their efforts to comply with the principle of distinction and minimize civilian harm. In many of the strikes conducted by the Coalition forces with PGMs in Raqqa, they succeeded in complying with the principle of distinction and minimizing civilian harm. However, despite the use of PGMs, the Coalition forces still faced tactical challenges in complying with the principle of distinction and protecting civilians and civilian objects.

One of these challenges is that the architecture and dense population of the city of Raqqa made it really difficult for the Coalition forces to know whether a strike would result in harm to civilians. In addition, the Coalition forces used a lot of PGMs with wide-area effects, making it really difficult to strike a target without causing collateral damage to civilians or civilian objects. Another challenge that Coalition forces experienced was that IS used defence tactics that were aimed at making it more complicated for the Coalition forces to be able to distinguish between civilians, combatants, civilian objects and military objectives.

Although the Coalition attempted to comply with the principle of distinction in most of the strikes that it conducted, Amnesty International also documented cases where Coalition forces violated the principle of distinction by striking boats without verifying whether there were civilians or IS fighters on them.

V. Discussion

This thesis explored the tactical challenges that military forces face in applying the principle of distinction in urban warfare environments, despite the use of PGMs. In order to examine these challenges, three cases of urban conflict that resulted in great civilian harm despite the extensive use of PGMs were carefully selected; the battle for Kunduz (2015), the battle for Mosul (2016-2017) and the battle for Raqqa (2017). For each of these battles, the use of PGMs and the experiences of military forces in applying the principle of distinction were analyzed. This analysis revealed multiple tactical challenges that military forces faced in applying the principle of distinction despite the use of PGMs.

Although the military forces that fought in the battles for Kunduz, Mosul and Raqqa underwent different experiences in their efforts to adhere to the principle of distinction, patterns between these experiences exist as well. Three main tactical challenges that the military forces faced in applying the principle of distinction in these battles despite employing PGMs are identified and discussed below. These three main challenges provide an answer to the research question for this thesis and thereby enrich our understanding of the tactical challenges that military forces face in applying the principle of distinction in urban warfare environments despite the use of PGMs.

The first main tactical challenge that the military forces experienced in the battles for Kunduz, Mosul and Raqqa in their efforts to comply with the principle of distinction despite using PGMs is that the urban features of the environments in which these battles were fought made it complicated for the military forces to strike targets without causing collateral damage to civilians and civilian objects. The dense civilian population and architectural structure of the urban centres in which the battles took place made it very challenging to estimate what the exact consequences of an attack were going to be and whether that attack would result in collateral damage to civilians and civilian objects, even when employing very precise weapons.

Although conducting strikes on targets in densely populated urban centres without causing collateral damage is complex in general, it is even more complex when these strikes are conducted by weapons with wide-area effects, meaning that these weapons affect a significantly greater area than that of the intended target. In both the battle for Mosul and the battle for Raqqa, Coalition forces relied on PGMs with wide-area effects. Even though these

weapons were precise, the wide-area effects of these weapons made it more complicated for the Coalition forces in Mosul and Raqqa to conduct strikes without causing collateral damage to civilians and civilian objects.

The second tactical challenge that the military forces faced in the battles for Kunduz, Mosul and Raqqa was the complexity of gathering accurate and up-to-date information about the status of targets and the presence of civilians in the target zone.

In the battle for Kunduz, we saw that a misidentification of the intended target resulted in the attack on the MSF hospital, which caused great civilian harm. This misidentification was the result of a series of miscommunications between the US aircrew and Afghan ground troops regarding the status of the intended target. Similarly, in the battle for Mosul, Coalition forces struck a building in the al-Jadida neighborhood which led to more than 100 civilian casualties. This attack presumably took place because at the moment of approving the strike, the Coalition forces wrongly assumed that the intended target was present in the building and they did not know that rather than the intended target, multiple civilians were present. Although such specific examples as the attack on the MSF hospital or the building in the al-Jadida neighbourhood have not been discussed in the Raqqa case study, the complexity of gathering up-to-date intelligence regarding the status of intended targets and the presence of civilians in target zones also played a role in the battle for Raqqa.

The third main tactical challenge that can be identified is the use of defense tactics by adversaries aimed at making it more complicated for the military forces to distinguish between civilians, combatants, civilian objects and military objectives and to adhere to the principle of distinction.

In both the battle for Mosul and the battle for Raqqa, we saw that IS used a variety of defence tactics aimed at making it more complicated for the Coalition forces to apply the principle of distinction. One of these tactics is that IS used civilian structures to plan and execute its military operations. In addition, IS created holes in adjoining civilian houses so that they could hide in these buildings and easily move between them without being seen. Another tactic is that IS systematically displaced civilians and forced them to act as human shields. IS also forced IS fighters and civilians to wear similar clothing so that it was harder to distinguish between them. These defence tactics by IS made it very complicated for the military forces in Mosul and Raqqa to apply the principle of distinction, even when employing PGMs.

In addition, these defence tactics by IS aggravated the difficulties that Coalition forces experienced in gathering accurate and up-to-date information about the status of IS targets and the presence of civilians in target zones. By quickly moving between civilian structures, forcing civilians to stay in buildings and dressing IS fighters and civilians the same, IS made it even harder for Coalition forces to know who was a combatant and who was a civilian and where both combatants and civilians were at specific moments in time.

The analysis and discussion of the tactical challenges that the military forces faced in applying the principle of distinction in the battles for Kunduz, Mosul and Raqqa despite the use of PGMs enriches our understanding of the intricate relationship between urban warfare, the use of PGMs and the principle of distinction.

Existing academic literature on the relationship between the use of PGMs in urban warfare and the principle of distinction is very limited. By conducting a comparative case study into the tactical challenges that military forces faced in applying the principle of distinction in Kunduz, Mosul and Raqqa despite employing PGMs, this thesis has aimed to contribute to closing this gap in the existing literature.

The results of the comparative case study provide insight into the spectrum of tactical challenges that military forces face in applying the principle of distinction despite the use of PGMs. In addition, the identification of patterns in the challenges that military forces faced in applying the principle of distinction in Kunduz, Mosul and Raqqa in this thesis is an important step in gaining an understanding of the reasons why military forces continue to struggle to comply with the principle of distinction, despite the use of weapons that are capable of great accuracy and precision.

Even though this thesis has provided new insights into the challenges that military forces face in applying the principle of distinction in urban warfare environments despite the use of PGMs, it is important to acknowledge and address certain limitations of the research conducted in this thesis. Although these limitations do not undermine the significance of the findings, it is important to discuss them in order to create an understanding of the boundaries of the research.

Firstly, it needs to be noted that the choices that were made regarding the cases that were examined in this thesis inevitably affect the generalizability of the findings. The battles for Kunduz, Mosul and Raqqa were chosen as case studies for the comparative case study of this

thesis because all of these battles are cases of urban conflict in which PGMs played a significant role and military forces faced tactical challenges in applying the principle of distinction despite the use of PGMs. Although all of these cases are characterized by unique circumstances and different experiences of military forces in applying the principle of distinction, the US was the main user of PGMs in all of these cases.

This may affect the generalizability of the findings because even though these cases give insight into the challenges that the US and other Coalition forces faced in applying the principle of distinction despite the use of PGMs, this does not mean that other states experience the same challenges. Other states, such as non-western states, for example, might experience different challenges in their efforts to apply the principle of distinction in urban warfare environments despite their use of PGMs.

A second limitation that needs to be addressed relates to the limited availability of comprehensive and detailed public information regarding the use of PGMs in the battles for Kunduz, Mosul and Raqqa, as well as the experiences of military forces in employing these weapons and applying the principle of distinction. The limitedness of the available information may partly be due to the fact that information about military operations is often sensitive and therefore not disclosed to the public. Although the military forces that participated in the battles for Kunduz, Mosul and Raqqa gave several press releases and published several reports, this thesis mostly had to rely on reports by NGOs and articles by credible news sources to gather evidence regarding the use of PGMs in the battles of Kunduz, Mosul and Raqqa and the challenges that military forces faced in applying the principle of distinction in these battles despite their use of PGMs.

While this thesis has drawn on the best available information and attempted to gather as detailed evidence as possible, it needs to be addressed that the limitedness of the publicly available information may restrict the depth of the findings and insights in this thesis.

A third and final limitation that needs to be noted arises from the fact that discrepancies exist between the information and narratives provided by military forces and NGOs, especially regarding the number of civilian casualties and details about the course of specific events in the battles for Kunduz, Mosul and Raqqa. It is important to acknowledge that military forces and NGOs often have different objectives and stakes and that this may result in potential bias in the information that these entities share with the public. Information on the battles from

Kunduz, Mosul and Raqqa from military forces and NGOs has therefore been interpreted with caution and with an awareness of potential biases throughout this thesis.

Although efforts have been made in this thesis to provide a comprehensive and balanced overview of what happened in the battle for Kunduz, Mosul and Raqqa and what challenges the military forces faced in applying the principle of distinction in these battles despite the use of PGMs, it needs to be acknowledged that potential bias and divergence in perspectives between the sources used in this thesis may limit the objectivity of the findings.

The limitations of the comparative case study conducted in this thesis illustrate the need for continued research efforts aimed at expanding our understanding of the relationship between urban warfare, the use of PGMs and the principle of distinction and our knowledge of the tactical challenges that military forces face in applying the principle of distinction in urban warfare environments despite the use of PGMs. Several possible avenues of future research can be recommended.

A first possible avenue of future research that can be recommended is to explore a broader range of cases in which PGMs played a significant role. This could include cases of urban conflict where multiple states or non-state actors relied on PGMs. In addition, this could include cases that involve different types of warfare scenarios besides the urban warfare scenario. Studying a variety of cases involving different military actors and warfare scenarios could help create a more comprehensive understanding of the challenges that military forces face in applying the principle of distinction despite the use of PGMs.

A second notable avenue of future research involves shifting the focus from cases where military forces experienced tactical challenges in applying the principle of distinction despite the use of PGMs to cases where military forces succeeded in adhering to the principle of distinction and protecting the civilian population while using PGMs.

By studying cases where military forces effectively used PGMs and successfully applied the principle of distinction, we can gain insight into the practices, tactics and factors that contributed to this success. These insights can be very valuable in the development and implementation of new mechanisms by military forces that are aimed at complying with the principle of distinction. In addition, this shift in focus may contribute to gaining a broader and more balanced understanding of the relationship between PGMs, the application of the principle of distinction and the protection of civilians in warfare.

All in all, it can be argued that this thesis has shown that although PGMs can be a very helpful tool for military forces in adhering to the principle of distinction and safeguarding civilian lives in urban warfare, PGMs are not a panacea and military forces still face tactical challenges in applying the principle of distinction and protecting civilians despite the use of these weapons. This thesis has attempted to shed light on these tactical challenges by conducting a comparative case study on the battles of Kunduz, Mosul and Raqqa.

Although the research conducted in this thesis has contributed to gaining an understanding of the relationship between the use of PGMs, the application of the principle of distinction and the protection of civilians in urban warfare, it is important to acknowledge that this research has its limitations. Therefore, more research into this matter needs to be done to be able to gain a more comprehensive understanding of the tactical challenges that military forces face in applying the principle of distinction in urban warfare environments despite the use of PGMs. Developing a comprehensive understanding of these challenges is a crucial step in the endeavour to improve the effective application of the principle of distinction and the protection of civilian lives while using PGMs. Continued research efforts in this realm are especially important considering the anticipated increasing prominence of PGMs in future warfare.

Bibliography

Acton, J. (2017). Cyber Weapons and Precision-Guided Munitions. In Perkovich, G. & Levite, A. (Eds.) *Understanding Cyber Conflict: Fourteen Analogies*. Georgetown University Press, 45-60.

Airwars. (2017). *Death in the city: High levels of civilian harm in modern urban warfare resulting from significant explosive weapons use*. Airwars. <https://airwars.org/wp-content/uploads/2018/05/Airwars-Death-in-the-City-web.pdf>

Amnesty International. (2017a). *At Any Cost – The Civilian Catastrophe in West Mosul Iraq*. Amnesty International. <https://www.amnesty.org/en/latest/campaigns/2017/07/at-any-cost-civilian-catastrophe-in-west-mosul-iraq/>

Amnesty International. (2017b). *“I won’t forget this carnage” Civilians trapped in battle for Raqqa, Syria*. Amnesty International. <https://www.amnesty.org/en/documents/mde24/6945/2017/en/>

Amnesty International. (2018). *“War of annihilation” Devastating toll on civilians, Raqqa – Syria*. Amnesty International. <https://www.amnesty.org/en/documents/mde24/8367/2018/en/>

Amnesty International. (2019, April 25). *Syria: Unprecedented investigation reveals US-led Coalition killed more than 1,600 civilians in Raqqa's death trap*. Amnesty International Press Release. <https://www.amnesty.org/en/latest/press-release/2019/04/syria-unprecedented-investigation-reveals-us-led-coalition-killed-more-than-1600-civilians-in-raqqa-death-trap/#:~:text=Collating%20almost%20two%20years%20of,from%20June%20to%20October%202017.>

Amnesty International. (n.d.). *War in Raqqa: Briefing*. Amnesty International. <https://raqqa.amnesty.org/briefing.html>

Anderson, K. (2012). Efficiency *in bello* and *ad bellum*: making the use of force too easy? In Finkelstein, C., & Ohlin, J., & Altman, A. (Eds.) *Targeted Killings*. Oxford University Press, 374-399.

Andresen, J. (2017). Putting Lethal Force on the Table: How Drones Change the Alternative Space of War and Counterterrorism. *Harvard National Security Journal*, 8, 426-472.

Andresen, J. (2019). The Paradox of Precision and the Weapons Review Regime. *The Philosophical Journal of Conflict and Violence*, 1, 1-21.

Arnold, T. & Fiore, N. (2019). *Five Operational Lessons from the Battle for Mosul*. Army University Press. <https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/Jan-Feb-2019/Arnold-Mosul/>

BBC. (2016, October 18). *Mosul: Iraq's beleaguered second city*. BBC News. <https://www.bbc.com/news/world-middle-east-37676731>

Bouchet-Saulnier, F., Whittall, J. (2018). An environment conducive to mistakes? Lessons learnt from the attack on the Médecins Sans Frontières hospital in Kunduz, Afghanistan. *International Review of the Red Cross*, 100(1-2-3), 337-372.

Congressional Research Service. (2021, June 11). Precision-Guided Munitions: Background and Issues for Congress. Congressional Research Service. <https://sgp.fas.org/crs/weapons/R45996.pdf>

Congressional Research Service. (2022, November 15). *Defense Primer: U.S. Precision-Guided Munitions*. Congressional Research Service. <https://crsreports.congress.gov/product/pdf/IF/IF11353>

Crawford, E. (2016). *The Principle of Distinction and Remote Warfare*. Sydney Law School Legal Studies Research Paper, No 16. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2785454

Dinstein, Y. (2004). *The Conduct of Hostilities under the Law of International Armed Conflict* (4th ed). Cambridge University Press

Fox, A. (2018, April 16). *Precision fires hindered by urban jungle*. Association of the United States Army. <https://www.ausa.org/articles/precision-fires-hindered-urban-jungle>

Fox, A. (2020, February). *The Mosul Study Group and the lessons of the battle of Mosul*. Association of the United States Army. <https://www.ausa.org/sites/default/files/publications/LWP-130-The-Mosul-Study-Group-and-the-Lessons-of-the-Battle-of-Mosul.pdf>

Garland, C. (2017, March 25). *Islamic State-held human shields in Mosul complicate coalition strikes*. Stars and Stripes. <https://www.stripes.com/news/islamic-state-held-human-shields-in-mosul-complicate-coalition-strikes-1.460575>

George, S., Abdul-Zahra, Q., Michael, M. & Hinnant, L. (2017, December 21). *Mosul is a graveyard: final IS battle kills 9,000 civilians*. Associated Press. <https://apnews.com/article/middle-east-only-on-ap-islamic-state-group-bbea7094fb954838a2fdc11278d65460>

Gisel, L., Sarciada, G.P., Hume, K., & Zeith, A (2021, June 27). *Urban Warfare: an age-old problem in need of new solutions*. ICRC. <https://blogs.icrc.org/law-and-policy/2021/04/27/urban-warfare/>

Gorden, M. (2017, July 2). *U.S.- Backed Forces Close to Trapping ISIS Holdouts in Raqqa*. The New York Times. <https://www.nytimes.com/2017/07/02/world/middleeast/us-backed-forces-close-to-trapping-isis-holdouts-in-raqqa.html>

Hoehn, J. (2021, June 11). *Precision-Guided Munitions: Background and Issues for Congress*. Congressional Research Service. <https://sgp.fas.org/crs/weapons/R45996.pdf>

ICJ. (1996, July 8). *Legality of the Threat or Use of Nuclear Weapons Opinion*, Advisory Opinion.

ICRC. (2004, July). *What is International Humanitarian Law?* ICRC Advisory Service on International Humanitarian Law.

https://www.icrc.org/en/doc/assets/files/other/what_is_ihl.pdf

ICRC. (n.d.). *Principle of distinction*. ICRC Casebook.

<https://casebook.icrc.org/law/principle-distinction>

Ignatieff, M. (2000). *Virtual War: Kosovo and Beyond*. Chatto & Windus

Kaag, J., & Kaufman, W. (2009). Military frameworks: technological know-how and the legitimization of warfare. *Cambridge Review of International Affairs*, 22(4), 585-606.

Kaag, J., & Kreps, S. (2012). The Use of Unmanned Aerial Vehicles in Contemporary Conflict: A Legal and Ethical Analysis. *Polity*, 44(2), 260-285.

Kahn, L. & Horowitz, M. (2023). Who Gets Smart? Explaining How Precision Bombs Proliferate. *Journal of Conflict Resolution*, 67(1), 3-37.

Markham, C., & Schmitt, M. (2013). Precision Air Warfare and the Law of Armed Conflict. *International Law Studies*, 89, 669-695.

McInnes, C. (2002) *Spectator-Sport War: The West and Contemporary Conflict*. Lynne Rienner Publishers.

McNerney, M., Tarini, G., Rosenblatt, N., Sudkamp, K., Moore, p., Grisé, M., Sacks, B. & Lewis, L. (2022). *Understanding Civilian Harm in Raqqa and Its Implications for Future Conflicts*. Rand Corporation. https://www.rand.org/pubs/research_reports/RRA753-1.html

Melzer, N. (2014). The Principle of Distinction Between Civilians and Combatants. In A. Clapham & P. Gaeta (Eds.), *The Oxford Handbook of International Law in Armed Conflict*. (296 – 331). Oxford University Press.

Mosul Study Group. (2017, September). *What the Battle for Mosul Teaches the Forces*. US Army Mosul Study Group. <https://www.armyupress.army.mil/Portals/7/Primer-on-Urban-Operation/Documents/Mosul-Public-Release1.pdf>

MSF. (2015a). *Public Release on initial MSF Internal Review*. Médecins Sans Frontières. https://www.msf.org/sites/default/files/msf_kunduz_review_041115_for_public_release.pdf

MSF. (2015b). *MSF Initial Reaction to US Military Investigation into Kunduz Attack*. Médecins Sans Frontières. <https://www.doctorswithoutborders.org/latest/msf-initial-reaction-us-military-investigation-kunduz-attack>

Operation Inherent Resolve. (n.d.). *Who We Are*. Combined Joint Task Force Operation Inherent Resolve. <https://www.inherentresolve.mil/WHO-WE-ARE/>

Owens, P. (2003). Accidents Don't Just Happen: The Liberal Politics of High-Technology 'Humanitarian' War. *Journal of International Studies*, 32(3), 596-616.

Ramdharie, S. (2023, October 12). *Precisiebommen op Gaza en toch elke dag meer burgerdoden, hoe kan dat?* De Volkskrant. <https://www.volkskrant.nl/nieuws-achtergrond/precisiebommen-op-gaza-en-toch-elke-dag-meer-burgerdoden-hoe-kan-dat-baealba7/?referrer=https://www.google.com/>

Schmitt, M. (2005). Precision attack and international humanitarian law. *International Review of the Red Cross*, 87(859), 445-466.

Sehrawat, V. (2017). Legal States of Drones Under LOAC and International Law. *Penn State Journal of Law and International Affairs*, 5(1), 165-206.

Serle, J. (2015, November 2). *At least 80 US airstrikes hit Afghanistan in October: The White House's covert drone and air war – Monthly update*. The Bureau of Investigative Journalism. <https://www.thebureauinvestigates.com/stories/2015-11-02/at-least-80-us-airstrikes-hit-afghanistan-in-october-the-white-houses-covert-drone-and-air-war-monthly-update>

Spencer, J., Geroux, J. (2021, September 15). *Case Study #2 – Mosul*. Modern War Institute. <https://mwi.westpoint.edu/urban-warfare-project-case-study-2-battle-of-mosul/>

Stone, J. (2007) Technology and the problem of civilian casualties in war. In Rappert, B. (Ed.), *Technology and Security: Governing Threats in the New Millennium*. Palgrave, 133–151.

Terpstra, N. (2022). Opportunity Structures, Rebel Governance, and Disputed Leadership: The Taliban's Upsurge in Kunduz Province, Afghanistan, 2011–2015. *Studies in Conflict and Terrorism*, 45(4), 258-284.

Thomas, W. (2001). *The Ethics of Destruction: Norms and Force in International Relations*. Cornell University Press.

Townsend, S. (2017, September 15). *Reports of Civilian Casualties in the War Against ISIS Are Vastly Inflated*. Foreign Policy. <https://foreignpolicy.com/2017/09/15/reports-of-civilian-casualties-from-coalition-strikes-on-isis-are-vastly-inflated-lt-gen-townsend-cjtf-oir/>

UNAMA. (2015, December). *Afghanistan Human Rights and Protection of Civilians in Armed Conflict – Special Report on Kunduz Province*. United Nations Assistance Mission in Afghanistan. https://unama.unmissions.org/sites/default/files/special_report_on_kunduz_province_12_december_2015-english.pdf

UNAMA. (2016, February). *Afghanistan Annual Report 2015 Protection of Civilians in Armed Conflict*. United Nations Assistance Mission in Afghanistan. <https://unama.unmissions.org/protection-of-civilians-reports>

United Nations. (2017, October 12). *One year on from the start of the battle for Mosul, hundreds of thousands of civilians need assistance*. Office for the Coordination of Humanitarian Affairs. <https://reliefweb.int/report/iraq/one-year-start-battle-mosul-hundreds-thousands-civilians-need-assistance-enarku>

UNHCR. (2017, June 16). *Civilians living in 'penury and panic' as Mosul battle rages*. UNHCR staff. <https://www.unhcr.org/news/stories/civilians-living-penury-and-panic-mosul-battle-rages-unhcr>

US Air Force. (n.d.). *AC-130W Stinger II*. Official United States Air Force Website. <https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104485/ac-130w-stinger-ii/#:~:text=Modifications%20to%20the%20AC%2D130W,trainable%2030mm%20and%20105mm%20weapons>.

US Department of Defense. (2015, November 25). *Department of Defense Press Briefing by General Campbell via teleconference from Afghanistan*. US Department of Defense. <https://www.defense.gov/News/Transcripts/Transcript/Article/631359/department-of-defense-press-briefing-by-general-campbell-via-teleconference-fro/>

US Department of Defense. (2017, August 22). *Secretary Mattis Media Availability with General Townsend and Special Envoy McGurk*. US Department of Defense. <https://www.defense.gov/News/Transcripts/Transcript/Article/1286209/secretary-mattis-media-availability-with-general-townsend-and-special-envoy-mcg/>

US Department of Defense. (n.d.). *Summary of the Airstrike on the MSF Trauma Center in Kunduz, Afghanistan on October 3, 2015; Investigation and Follow-on Actions*. US Department of Defense. <https://info.publicintelligence.net/CENTCOM-KunduzHospitalAttack.pdf>

Vogel, R. (2010). Drone Warfare and the Law of Armed Conflict. *Denver Journal of International Law and Policy*, 39(1), 101-138.

Wasser, B., Pettyjohn, S., Martini, J., Evans, A., Mueller, K., Edenfield, N., Tarini, G., Haberman, R. & Zeman, J. (2021). *The Air War Against the Islamic State – The Role of Airpower in Operation Inherent Resolve*. Rand Corporation. https://www.rand.org/pubs/research_reports/RRA388-1.html

Wheeler, N. (2002) Dying for enduring freedom: Accepting responsibility for civilian casualties in the war against terrorism. *International Relations* 16(2), 205–225.

Zajac, M. (2022). Preventing another Mosul - Unmanned Weapon Platforms as the Solution to the Tragedy of a Hostage Siege. In Stanar, D. & Tonn, K. (Eds.), *The Ethics of Urban Warfare* (p. 153-171). Brill Nijhoff.

Zehfuss, M. (2010). Targeting: Precision and the production of ethics. *European Journal of International Relations*, XX(X), 1-24.