

**DEPLOYMENT OF AUTONOMOUS WEAPON SYSTEMS IN THE
WARFARE: ADDRESSING ACCOUNTABILITY GAPS AND
REFORMULATING INTERNATIONAL CRIMINAL LAW**

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Abstract

The importance of autonomous weapon systems (AWS) is particularly apparent in contemporary conflicts, in which all parties are striving to expand the autonomy of these systems, particularly in offensive contexts. The traditional understanding is that the deployment of AWS poses significant threats to civilian life, as well as a range of delicate legal concerns. The narrow understanding is evident in the principal drawbacks of AWS in the absence of human supervision, which results in unpredictable and unreliable outputs, particularly during the targeting and engagement stages, leading to a clear breach of international humanitarian law (IHL). This creates a legal vacuum regarding the attribution of criminal responsibility. This research paper aims to characterise AWS and the implications of their potential deployment, with the primary goal of better identifying and understanding emerging legal concerns. Furthermore, the authors seek to offer a comprehensive understanding of the concept of autonomy, which is internationally accepted. Additionally, they explore the validity of the statement that AWS create an accountability gap relating to the International Criminal Court (ICC) Statute by analysing various types of AWS that are categorised in this study and deployed in modern wars. While the ICC Statute does not explicitly address all issues raised by using AWS, the study presents an interpretation that criminal

responsibility could be assigned to all individuals involved in the use of AWS, especially in thorny situations. This study employs an analytical approach to examine and analyse traditional theories of criminology and the ICC Statute in relation to the ability to attribute individual criminal responsibility when AWS may be used. This study aims to provide a new perspective on criminal legal rules that are compatible with modern technology.

Keywords: *Autonomous weapon systems; international criminal law; responsibility; human control, War crime, ICC Statute.*

1. Introduction

As the utilisation of advanced technology has become increasingly prevalent, it has expanded beyond peaceful applications, and is now being employed in modern warfare. In the past, weapons progressed from gunpowder to nuclear weapons, with the power of the latter still serving as a deterrent to their use in war. However, with the rapid technological advancements, several developed countries have acknowledged that advanced technology-powered weapons will play a crucial role in future wars. These AWS are referred to in the literature (Martellini & Trapp, 2020, p. 143), with informal reports suggesting that the autonomy of weapons has been employed in conflicts such as the Armenia-Azerbaijan War (Atherton, 2021), ongoing conflicts between Russia and Ukraine (Meaker, 2023), and Israel-Hamas (The Economist, 2024) have been increasing.

The ability of AWS to operate independently over long distances to search for and engage in targets is one of the main challenges in ensuring compliance with the law of armed conflict (Khalil & Raj, 2024), including legal, ethical, and security concerns (Sharkey, 2018, p.78).

The discussions commonly classify AWS as a single entity, neglecting the substantial influence that is different in the design and deployment can have on the legal terrain. This undoubtedly elucidates how disparities in design, deployment, and human intervention capabilities alter the accountability landscapes. This article focuses on elucidating individual criminal responsibility issues, especially for the operator and designer within the ambit of the ICC Statute. These elucidations are likely to play a crucial role in reevaluating some prevalent stances, particularly those that draw sweeping conclusions about liability gaps without adequately considering the intricate distinctions between various AWS.

Legal standards pertaining to human rights and IHL have advanced significantly at both regional and international levels. One of the aims of International Criminal Law (ICL) is the criminalisation of actions that violate

the rules governing hostilities that constitute war crimes. The trial process involves activating the rules and controls of international criminal liability, which may be inadmissible if the AWS are used. Furthermore, the primary problem in this study is the lack of clarity in the legal basis for criminal liability when the AWS violates IHL rules, particularly in cases of indiscriminate attacks, which this paper will analyse in detail.

The uncertainty pushed many studies to explore the possibility of attributing liability to the machine itself or whether alternative solutions can be found through the command responsibility. Nevertheless, the paper through contemporary criminal theories that seek to address deficiencies in the current accountability mechanisms considering the growing autonomy of weapons and diminishing human involvement in their operations.

The remainder of this article is organised as follows. Section 2, the definition of AWS and the concept of autonomy are explored to adopt a broad definition which is accepted internationally. Section 3 provides an overview of the most significant and recent AWS used in both current and past wars, with the aim of attaining a clearer grasp of the design challenges and the ways in which humans interact with machines. In Section 4, debates and viewpoints on the reality of accountability gaps in the context of AWS are examined. In Section 5, the individual criminal responsibility under the ICC Statute and the relevant courts is meticulously especially with respect to the element of *mens rea*. In Section 6, the responsibilities of both the publisher and designer of the AWS are assessed by employing practical examples that elucidate the issue; thereafter how responsibility gaps can be closed in the different scenarios. Finally, in Section 7, the status of command responsibility is succinctly explained and responded to, addressing claims regarding its applicability in the context of AWS.

2. The concept of AWS and human absence

One of the key issues that must be addressed when discussing AWS is the definition of autonomy. The categorisation of a weapon system as “autonomous depends on how autonomy is interpreted” (Anthony & Holland, 2014). The term, which originates from the concept of self-rule or self-governance (Krishnan, 2009, p.43), has different meanings in various disciplines such as philosophy, politics, and technology. As a result, there is disagreement about the definition of autonomy in the context of AWS discussions, leading to differing interpretations among stakeholders (Bode, 2024).

The term of autonomy itself is imprecise but conveys a significant and intricate meaning. This intricacy is manifest in the prevalent perception of autonomous systems as “robots or computers capable of independent thought” (Sharkey, 2011). The projection of human autonomy onto machines can lead to

“unrealistic or, at the very least, highly improbable expectations for AWS to attain human-like capabilities” such as intelligence, insight, and possibly even emotions (Noorman & Johnson, 2014).

The philosophical understanding of autonomy “distinguishes humans from other forms of life, and forms the basis of ethics, morality, and moral responsibility” (Mele, 2001, p.8). The notion that autonomy in AWS should be “interpreted as the ability to act without any external constraints is incorrect from another perspective” (Kastan, 2013). Even humans in a military context are subject to legal rules, rules of engagement, and orders, which means that ‘they do not operate with and complete autonomy from a philosophical standpoint’. The likelihood of a machine achieving this level of autonomy, even with the development of 'strong' AI, appears highly improbable.

There exist various viewpoints concerning autonomy in the broader computer science field and in the field of robotics in particularly. For instance, the term “autonomous” is often used to “describe systems that can operate without direct human control or supervision” (Sparrow, 2007, p.65). This aligns with engineering perspectives, where autonomy refers to the capability of a system to operate independently of direct human intervention or to execute specific tasks without human involvement. Nevertheless, it is crucial to acknowledge that an autonomous system operates within certain limitations imposed by its programming and the parameters set by that programming. This viewpoint is consistent with the notion that robotics often conceptualizes machine autonomy within the context of automation. Nevertheless, diplomats and states do not agree to use this as a definitive basis, as such a definition encompasses numerous existing weapons that are currently in use (Bode, 2024).

The key characteristics that are the subject of ongoing debate include decision-making authority, ability to choose actions or thoughts, and capacity to intentionally pursue objectives (Marra & McNeil, 2013)

Another perspective states that “an autonomous system should be self-governing and capable of operating effectively in unpredictable and unstructured environments” (Krupiy, 2015). Political actors often classify technologies used in targeting current weapon systems as semi-automated, automated, or highly automated, rather than autonomous. This is because “the term automation implies a higher level of human control and less technological sophistication”, leading to reduced machine agency (Winfield 2012, p.13). The use of the term automation instead of autonomy may make people more comfortable with these systems as it does not emphasise the controversial implications of retaining human control. On the other hand, weapon manufacturers may utilise the term "AI-enabled" to promote their products, while simultaneously refraining from highlighting the "AI" aspect in situations where it could generate unfavourable attention (Bode, 2024).

Some characterised "autonomy" as the capacity of a system to alter its state without the need for external stimuli (Floridi & Sanders, 2004). In simpler terms, providing a succinct definition of autonomy as "the capability to make decisions free from human control" (Assuring Body of Knowledge, 2020). This definition highlights that autonomy refers to the authority and decision-making ability of technology.

Furthermore, agreeing on a definition might necessitate existing weapon systems to "undergo fresh review processes if they fall within the definition of AWS" (Scharre & Horowitz, 2016; Taddeo & Blanchard, 2022). However, discussions can be directed by scrutinising the elements and features of the systems in operation based on broad definitions.

Stakeholders have diverse opinions on the ideal definition of AWS, especially autonomy. Nevertheless, there is a growing agreement among 'governments and non-governmental organisations' regarding the most suitable conceptualisation of these systems. This consensus generally favours a comprehensive understanding of AWS. Furthermore, the characterises the autonomy of a weapon system been defined as "a capability (or a set of capabilities) that enables a particular action of a system to be automatic or, within programmed boundaries, self-governing" (US DoD Defense Science Board, 2012). The US DoD also states that AWS "can select and engage targets without further intervention by human operators" (US DoD Directive 3000.09, 2012), a characteristic that is echoed by other sources.

AWS 'operate with a high degree of independence from human intervention', particularly in terms of their critical functions. In 2016, the International Committee of the Red Cross (ICRC) adopted a widely accepted definition of AWS: "Any weapon system with autonomy in its critical functions, capable of selecting and attacking targets without human intervention" (ICRC, 2016).

Moreover, the ICRC recently provided an extensive viewpoint in their position paper on AWS They put forth a more expansive interpretation, as the following:

"Autonomous weapon systems select and apply force to targets without human intervention. After initial activation or launch by a person, an autonomous weapon system self-initiates or triggers a strike in response to information from the environment received through sensors and based on a generalized "target profile". This means that the user does not choose, or even know, the specific target(s) and the precise timing and or location of the resulting application(s) of force" (ICRC, 2021).

The fundamental aspect of these concepts is that AWS are characterized as weapon systems that can "identify and attack targets without any additional input." This perspective is comprehensive and does not require a high level of sophistication or agency for a system to be considered autonomous in the

relevant sense. It is important to note that AWS do not necessarily have to be lethal, unlike most critical literature. These comprehensive definitions of AWS provide the most suitable basis for our understanding of AWS which will be adopted in this study. A review will be conducted of the latest and most significant AWS that fall within the scope of these definitions.

3. Types of AWS in use

3.1. Unmanned ground vehicles (UGVs)

Some UGVs can operate autonomously, whereas others are remotely operated. For instance, South Korea deploys Samsung SGR-1 in the demilitarised zone, which is equipped with sensors and pattern-recognition algorithms to detect intruders (Wallach & Allen, 2013). If SGR-1 detects a threat, it alerts its operators, who can then decide to engage in its machine gun. Alternatively, SGR-1 can fire autonomously under specific conditions (Toscano, 2015, p.15). Israel also uses technology like Sentry Tech, which is capable of independent engagement but is currently operated remotely (Docherty, 2012). Another Israeli system, the Guardium, patrols the border with Gaza autonomously, following programmed routes and responding to unforeseen events within predefined guidelines (Crotoft, 2015, p.15). Unlike stationary SGR-1, the Guardium is a mobile system designed for active patrol duties. These advancements in UGV technology show varying levels of autonomy, raising ethical concerns regarding their use in surveillance and combat scenarios (Docherty, 2015, p.16).

3.2. Unmanned aerial vehicles (UAVs)

The US has developed Global Hawk and X-47B, while the United Kingdom has developed Taranis. UAVs are capable of autonomous take off, landing, and navigation by using GPS or electronic maps (Titiriga, 2016). Taranis demonstrates potential for target identification but requires human authorisation for engagement decisions. Moreover, X-47B is particularly noteworthy because it is the first drone capable of autonomous navigation, including launching and landing from aircraft carriers, which marks a significant achievement in aviation complexity (Thurnher, 2012). The US has also developed GT Max, an unmanned helicopter designed for autonomous flight and decision making in response to unforeseen challenges

3.3. Loitering munitions (LMs)

Loitering munitions represent a technologically advanced subset of fire-and-forget weapons and are often cited as prominent examples of potential autonomous weapons. Examples of this kind include ‘the Israeli Harpy missile and the British Brimstone anti-tank missile, as well as the Turkish Kargu-2 and the Iranian Shahed 136’. Unlike conventional fire-and-forget missiles, which typically fly to predetermined coordinates or engage targets designated by operators without the ability to select new targets, loitering munitions possess

enhanced capabilities (Marsh, 2014). These munitions can remain airborne for extended periods and cover larger geographic areas to search for potential crashes into targets (Bode & Watts, 2023). LMs may be viewed as being between UAVs and missiles (Gettinger, 2022). Similarly, the Brimstone missile is designed for anti-armour purposes and employs a database of known target signatures to autonomously reject non-matching objects until it identifies a suitable target.

Modern versions of such LMs include Iran's HESA Shahed 136, Russia's Geran2, and Turkey's STM Kargu-2. LMs are generally equipped with infrared cameras and an array of internal mid- and short-range sensors for autonomous target detection and engagement in hostile environments. Specifically, Geran2 is renowned for its high resistance to electronic jamming owing to its advanced sensor suite and operational design (Lavazza & Farina, 2023).

Various lightweight and portable LMs devices have been developed. One such example is Switchblade-300, which was utilised by Ukraine in the ongoing conflict in Ukraine and manufactured in the US. It weighs only 2.5 kg, making it easily transportable in a backpack. In addition, it can be launched from a canister (Bode & Watts, 2023).

In March 2020, UN experts assessed that the 'Libyan Government of the National Accord' deployed Kargu-2 autonomously, operating 'without human supervision or intervention' (Gurcan, 2021).

Recently, Kargu-2 is characterised as "capable of performing fully autonomous navigation" but that its "[p]recision strike mission is fully performed by the operator, in line with the Man-in-the-Loop principle" (Bode, 2024).

Furthermore, the Harpy missile, for instance, autonomously detects radar signatures that are indicative of radar installation. Upon identifying such a signature, it consults its database to determine the nature of its installation. If the radar is not recognised as friendly, the missile redirects itself towards the target without operator intervention to specify the exact installation to strike (Singh, 2014). The past witnessed Harpy targeting and disabling Hezbollah radars that monitored 'Israel's Defence Force' operations and facilitated missile launches into Israel.

3.4. Cyber weapons

A particular area of significant interest pertains to cyber weapons, primarily due to the nature of cyberwarfare which suggests that the initial deployment of a real AWS may likely occur within this domain, if it has not already been deployed. Ongoing programs are currently being developed to autonomously identify and exploit vulnerabilities within systems (Thurnher, 2016). A prominent example of a cyberweapon employed by a state is the

Stuxnet worm, which is widely recognised for its use in disrupting Iran's nuclear program by causing malfunctions in nuclear centrifuges (Khalil et al, 2024). Some argue that Stuxnet represents an early example of a computational system acting autonomously, potentially qualifying it as the first deployed AWS, as the virus autonomously made decisions to "attack" the centrifuge control computers.

4. Accountability gap

The deployment of AWS, particularly for hostile purposes, in armed conflicts presents legal challenges in determining the responsibility for violations of IHL. It is crucial to elucidate the extent and ramifications of the responsibility gap objections. Sparrow's (2007) seminal formulation posits that deploying sophisticated AI-based autonomous systems in warfare is unethical unless responsibility for their decisions can be assigned. However, he acknowledges that "identifying a suitable locus for such responsibility is problematic with sophisticated AI" (Sparrow, 2007). The UK asserts that AWS can comprehend their environment and make decisions autonomously, thus rendering their actions predictable (Sassoli, 2014).

Furthermore, there is a common belief that if machine intelligence achieves human-like levels, the absence of moral agency in machines cannot be compensated, particularly in the intricate context of armed conflicts. Nevertheless, Boshuijzen-van Burken advocates for a design methodology for autonomous systems that "prioritizes ethical and legal considerations alongside functional, economic, and strategic performance". This approach embeds moral agency within the machine, aligning AWS development with societal concerns, the Martens Clause, and the laws of war. However, this statement explains that the AWS may remain predictable even with very advanced AI.

Boshuijzen-van Burken argues that "technology is not value-neutral, which supports the need for research into value-sensitive design (VSD) for AWS". This aligns with previous proposals for defensive AWS by researchers such as (Verdiesen & Dignum, 2022). In parallel, the US has developed "collateral damage estimation methods" (CDEMs) to assess collateral damage in line with the IHL principle of proportionality (Bitar & Chakka, 2023).

Furthermore, scholars have developed a tool that "can detect issues related to fairness, transparency, privacy, and accountability in machine learning" (Boyd, 2022). Van Burken asserts "that the use of weapons, including autonomous weapons regardless of their specific definitions, is not inherently evil as long as they are employed to promote justice and within the legal boundaries established by a state, which holds the mandate on the use of force" (Van Burken, 2023). Nevertheless, the aforementioned points allude to arguments that refute the notion that machines will be entirely separate from humans by integrating highly advanced AI, although this will remain dependent on the future.

As discussed in Section 3, AWS that have undergone testing or are currently in use. These systems are designed to ensure accountability for errors by maintaining a level of predictability and being closely linked to human action. However, they also possess the necessary capabilities to select and engage targets without further interference, thereby making them autonomous.

The central debate revolves around whether individuals or entities can be held accountable for the behaviour of AWS, particularly in cases where crimes are not intentional. Additionally, addressing the grave breaches of the IHL may be committed by the AWS, referred to as war crimes, thus presenting additional complexities.

ICL serves as a framework for holding individuals responsible for IHL violations. To clarify the provisions of criminal responsibility for individuals, particularly in the context of AWS, it is necessary to analyse the ICC Statute and precedents set by international criminal tribunals. This entails examining the applicability of traditional theories of international criminal responsibility to scenarios involving the use of AWS, focusing on both individual criminal responsibility.

5. Individual criminal responsibility

The modern penal system ascribes criminal liability to individuals based on two essential elements: the *actus reus* and the *mens reas*.

5.1. Actus reus

The physical element of an act is embodied in the commission of a crime, which can result from an action or an omission. Verifying an act is generally not a problem, although it may be more challenging to prove an omission than an action. Theoretically, the physical element of the act is easier to prove than the mental element. While the ICC Statute mentions the physical element of the crime in Article 30, which addresses the mental element, it does not provide any specific details. However, in international debate, the physical element of a crime is not a point of contention. The behaviour of AWS can be considered as the fulfilment of the physical element of a crime, similar to that of a human individual committing an international crime.

5.2. Mens rea in the ICC Statute and case law

Determining the mental state required to hold someone criminally responsible is challenging. Damage alone is insufficient to attribute criminal liability; the perpetrator's mental state must be characterised by the presence of a "guilty mind". This is the foundation of the modern criminal justice system.

It is crucial to understand the concept and degree of mental elements in relation to the ICC Statute, which is considered a common principle in criminal law (Schabas, 2002). This concept has been stated in Article 30 of the Statute, which addresses all the mental elements involved in criminal intent. This

principle has been thoroughly addressed in the context of ICL and has been criticised for its generality and lack of clarity.

According to Article 30, the commission of material elements of a crime must be achieved with “intent and knowledge”. The debate in criminal jurisprudence circles is whether "intent or knowledge" is sufficient, or if both are required. This study focuses on the violation of IHL by AWS, which may result in indiscriminate attacks based on risk-taking, which is a violation of IHL rules according to the API.

Although *dolus eventualis* or recklessness is not explicitly mentioned in the ICC Statute, it has been acknowledged by the ICTY and the Pre-Trial Chamber of the Lubanga confirmation of charges. Critics argue that ICTY rulings do not bind the ICC and point to the Appeals Chamber's rejection of the Pre-Trial Chamber's argument in the Lubanga case. However, the absence of explicit criminalisation of indiscriminate attacks within the ICC remains unjustifiable.

Furthermore, Article 30 of the ICC Statute commences with the phrase "Unless otherwise stated." Some scholars argue that the phrase “unless otherwise provided” in Article 30 refers to the rule in general, rather than discussing the level of intent required for each crime as a concept. Consequently, Article 30 is considered clear in meeting the requirements of criminal intent, apart from any other interpretation that might lead to a controversy.

Nevertheless, we will analyse Article 8 of the ICC Statute, which deals with the mental element of war crimes, to determine whether it encompasses indiscriminate attacks. The attribution of criminal responsibility is complicated by the difficulty of understanding the mental element. Intentionally committing a crime, as required by Articles 8 (2) (b) (i) and Paragraph (1) (e) (i), excludes the risk assumption when attributing criminal responsibility. The concept of intent applies to cases in which the civilian population or those not directly participating in hostility are directly targeted, and “the interpretation of the mental element of the crime is direct intent of the first degree” (Olásolo, 2008). However, it is acknowledged that this intention is specific to crimes stipulated by the ICC Statute, and not customary law (Marchuk, 2014 p.125). Furthermore, Article 30's importance in understanding the concept of criminal intent cannot be overlooked.

Article 8, which addresses war crimes, is relevant under Article 30 stipulation. Paragraph (b): No. (1) Criminalised violations of relevant international norms and laws. Since the text of Article 85 of the API explicitly designates the risk of attacks on civilians as a violation of IHL and a war crime, the term "wilfully" in Article 8 implies the necessary intent. In this regard the ICRC asserts that "wilful" conduct encompasses actions taken with "wrongful intent" or "recklessness." The latter is characterised by "the attitude of an agent

who, without being certain of a particular result, accepts the possibility of it happening" (Crootof, 2016). Considering API as part of the law of armed conflict, it is more appropriate to interpret intent in Article 8 of the ICC Statute based on API, Article 85 (Dörmann et al., 2003).

Those who argue against reopening the door to interpretation claim that Article 8 clearly stipulates the requirements for the mental element of war crimes, which is the "intent" requirement, in a way that does not allow for interpretation. However, a more convincing argument can be made.

The Katanga case in the Pre-Trial Chamber interpreted the *mens rea* as "direct intent of the first degree" (The Prosecutor v. Katanga, 2009). The judgment held that it was based on two elements, "knowledge and intent", in accordance with Article 30 of the ICC Statute (The Prosecutor v. Katanga, 2014). If confirmed, this approach would lead to impunity for every crime based on risk, known as the *dolus eventualis* of *mens rea*. These generally include crimes committed by humans and AWS.

The Trial Chamber in Katanga relied on the interpretation of Article 30 (2) (a) by limiting the mental element to voluntarily committing an unlawful act, which is the opposite of the broader interpretation of the mental element, which is volition. We find, the approach to the Katanga case is unconvincing. In Article 30, para (2) (b), it states that "In relation to a consequence, that person means to cause that consequence or is aware that it will occur in the ordinary course of events". This explanation of the forms of criminal liability allows us to understand that it includes risk-taking behaviour for an unlawful act *dolus eventualis*. The paragraph does not refer to the voluntariness of behaviour but rather the presence of volition. Thus, mental elements were achieved in *dolus eventualis* behaviour. Some believe that the consequence is not limited to the crime leading to murder but rather to any physical effects or any other damage (Eser, 2002). It is unnecessary to associate the "intent" requirement in Articles 30 and 8 because they are identical.

War crimes, as per the ICC Statute, are defined as actions targeting civilians (Bitar & Chakka, 2023). An attack on civilians resulting in death or serious injury is considered a grave violation of IHL (Gaeta, 2013).

Another interpretation focuses on establishing the attribution of responsibility for war crimes based on risk-taking behaviour under Article 30. To this end, it is crucial that the term "intent" is interpreted consistently in Articles 8 (2) (b) and 30 in Paragraph (b), rather than (a). Provided that the phrase 'unless otherwise provided' is considered, this would strengthen the interpretation by incorporating *dolus eventualis* in Article 30 of the ICC Statute.

Furthermore, the interpretation of Art. 30(2)(b), which refers to "eventual intent" or *dolus eventualis* in the first part of the paragraph and "direct intent" or *dolus directus* intent in the second part, enjoys significant backing in

international criminal jurisprudence and the case law of the ICC (Katanga Judgment, 2014).

Regarding the second argument, which the study uses to explain the required intention according to the ICC Statute for incorporating the *dolus eventualis*. Article 21 of the ICC Statute states, according to Paragraph (b), "The Court shall apply: in the second place, where appropriate, applicable treaties and the principles of international law, including the established principles of international law of armed conflict." Additionally, Paragraph (c) asserts, "Failing that, general principles of law...from national laws...including, as appropriate, the national laws of states that would normally exercise jurisdiction over the crime, provided that those principles are not inconsistent with this Statute and with international law and internationally recognised norms and standards."

In modern penal systems, it is presumed that individuals commit crimes because of rational decisions based on notions of right and wrong. It is assumed that individuals possess the freedom to commit crimes, stemming from their awareness. Therefore, a rational foundation is grounded in "knowledge and volition". If the element of volition is present, accidental behaviour is excluded. Additionally, it is important to recognise the varying degrees of intent according to civil law systems, which classify intent based on *dolus directus* in the first and second degrees, and between *dolus eventualis* and negligence (Badar & Marchuk, 2013). In common-law systems, classification is based on direct intent, indirect intent, recklessness, and negligence (Khanna, 1999). Voluntary behaviour serves as the general criterion for *mens rea* and is described as a presumption (Hediger, 1991). However, the interpretation of intent and knowledge elements varies within domestic penal systems (Finnin, 2012).

The classifications of degrees of *mens rea* in contemporary criminal law systems, which encompass *dolus eventualis* and recklessness, it is reasonable to consider *dolus eventualis* as a general principle of law (US DoD, 2016). Given that *dolus eventualis* does not clash with international law and fundamental principles, embracing this expanded interpretation addresses the gap discovered in the ICC Statute by not having a specific criminalisation of indiscriminate attacks or *dolus eventualis* in Articles 30 and 8 (b)(1).

6. AWS and the attribution of individual criminal responsibility

In the current context, if a criminal act is carried out using a weapon system, the person controlling it is typically considered the culprit and can be held responsible for the crime of direct perpetration. This is because the operation of the weapon system represents the act that brings about crime. However, this section aims to examine whether this viewpoint is equally applicable in the context of AWS, as it is with other weapon systems. The discussion will be in accordance with the broad definition of AWS in Section 2.

6.1. *The machine*

Academic discourse has advocated granting robots a legal personality, particularly in civil law, with the European Parliament calling for the Commission to propose rules addressing liability issues arising from robot-induced damage (European Parliament, 2017). The proposal suggests endowing intelligent machines with a real legal personality and recognising their legal capacity upon achieving complete independence. This includes holding robots liable for compensation or reparation, although this conflicts with current liability norms (JHA, 2017), resulting in logical inconsistencies.

It is obvious that the current AWS are outside this discussion, and even if in the future they are developed to emulate human cognition and ethical discernment, the ICC Statute unequivocally states that only natural people—that is, humans—can be criminally accountable. It is logical to not attribute criminal responsibility to machines, necessitating the identification of a human element for accountability. Therefore, we will explore the possibility of holding individuals accountable for using the AWS by examining ICL theories and applying them to various scenarios.

6.2. *The combatant who (deploys or operates AWS)*

There are differing opinions on the level of responsibility of the operators that deploy AWS. Some argue that they are analogous to other weapons platforms, implying that they bear a direct criminal responsibility. However, the determining factor is not just the act itself, but also criminal intent.

Some contend that the intricate nature of AWS requires operators to have a comprehensive understanding of their workings (Alston et al., 2020). This raises questions about whether combatants are required to understand the complexities of these systems. Operators are only required to understand the outcomes of the machine's actions, not the programming intricacies (Schaub & Kristoffersen, 2017). As a result, those using AWS are only obligated to know the machine's outcomes and not the programming complexities (Sassoli, 2014). As long as there is an assumption of unpredictability, it becomes impossible to prove the operator's knowledge and criminal intent, thus making reasoning untenable.

As per the discussion in Sections 2 and 4 of this paper, the current design of AWS is restricted by their programming. Consequently, if they are intentionally deployed to commit a crime, the deployer holds direct criminal responsibility. Criminal liability can only be ascribed to the intention of targeting civilians. However, how can this intention be ascribed to the operator if the AWS are deployed to unintentionally commit a crime? In this situation, the operator can be held responsible if it cannot be proven that they are unaware.

The operator's liability arises if they choose to use the AWS, and a war crime occurs; therefore, they are responsible according to their choice of use, just like any other weapon. This argument relies on the predictability of AWS activities, as evidenced by the UK's view that all AWS activities are predictable. In any case, some believe that when the operator deploys a weapon and is unaware of its nature, consequences, or knowledge of a malfunction, his responsibility cannot be excluded. If they are unaware, they should not use it, and if they use it under these circumstances, responsibility is attributed to them based on recklessness. Nevertheless, if the operator knows that civilian residents are in the target and insists on attacking, this creates a different scenario, which is based on risk-taking behaviour and will be discussed separately.

6.2.1. In case of indiscriminate attacks

If a war crime arises from the use of the AWS, even if predictability is unattainable, its use entails a specific risk, wherein the operator, aware that an attack may result in civilian injury or death, continues. Consequently, the AWS operator's decision is based on recklessness, and responsibility attribution aligns with the interpretation of intent in Article 8, *dolus eventualis*, according to the Anticipation and Voluntary Assumption of Risk doctrine. Through this analysis, the gap in international criminal liability in this context can be addressed.

Moreover, in case utilising reliable AWS programmed to engage specific targets, such as the 'Brimstone missile', which employs shrill radar to locate and attack armoured vehicles, the reliability of the system ensures that it only hits the intended targets. Therefore, any resultant mistakes are the responsibility of the human operators, provided that the system operates as intended. Operators of such AWS must take the precautions outlined in Article 57 of the API, such as ensuring that there are no civilian object posts in the missile's intended path. If a human operator aims and fires a missile in a specific direction, with the knowledge that there is a civilian radar station within the target acquisition range of the missile and subsequently destroys the radar station, the responsibility for this action lies with the operator. Two scenarios arise here: (1) if the operator intentionally directed the missile to hit the civilian object, they would be held directly responsible for the crime, and (2) if the operator did not intentionally target the civilian object, they would remain responsible because of their recklessness under the ICC Statute. However, if an unexpected malfunction occurs in the system, such incidents are outliers due to a general flaw in the system, accidents can occur, and they are considered tragedies rather than crimes (Müller, 2016).

Furthermore, in deploying AWS that could potentially engage civilians, particularly systems capable of directly targeting individuals (rather than vehicles or other assets), the context of deployment is of critical importance. For example, the South Korean SGR-A1 is capable of autonomously engaging

individuals, and is designed for use in confined and defined areas (Parkin, 2015). However, the limitations of such systems make them prone to errors in distinguishing targets, potentially leading to civilian casualties. In certain areas, the demands of distinction may be significantly reduced because of the simplified evaluations of allies' enemies. Specifically, the SGR-A1 is designed to issue 'verbal warnings and demands for surrender before engaging targets and may utilise alarms or non-lethal ammunition instead of deadly force'. Despite the limitations in distinguishing allies from enemies, it is the duty of human operators to guarantee that these systems are utilised only in settings in which the distinction has no practical significance for interaction. Therefore, deploying such AWS in populated areas would render the deployer responsible for recklessness given the complex nature of the environment.

Overall, while some AWS capable of targeting individuals may lead to mistakes, this is not inevitable. The deployment context significantly influences compliance with IHL requirements, and different operational areas will necessitate all precautionary measures.

6.2.2. In case of omissions

Another scenario might be one in which the AWS operator took all the necessary precautions to ensure that the target was exclusively military in nature before activating the weapon, but new information emerged after the operation, indicating the presence of civilians. In such cases, can the operator be held liable for failing to halt the AWS's actions?

To begin with, it is important to note that the situation in question was not the result of an intentional act but rather an instance of negligence or omission. Generally, a human soldier can intervene and stop an attack when new circumstances change the nature of a target. Article 86 of AP1 criminalises those who fail to prevent crimes that lead to wars. In this context, the act is equated with inaction (omission), but only if the omission leads to a serious violation of IHL and the condition of "control" over the weapon is met.

By drawing parallels with the interpretation of Article 30 of the ICC Statute and the phrase "unless otherwise provided" in Article 21 of the same Statute, and considering the principles and standards of international law, including the ICC Statute itself, it is not possible to contravene these standards. Inspired by the IHL and referring to Article 21(c) of the ICC Statute, the violation of international principles and standards was precluded.

As previously discussed, all existing AWS are believed to be programmed to either shut down or self-destroy before reaching their target in the event of a new event that changes the nature of the target. Consequently, if the AWS fail to stop targeting and strike illegal targets, for compelling reasons, the incident is considered a tragedy resulting from poor manufacturing provided that the weapon has been tested before deployment. For instance, the Harpy deployment involved designed to loiter over a wide area, detect radio

emissions, and engage (and subsequently destroy) the source of emissions by targeting the target. If Harpy was deployed after taking all the necessary precautions and in an appropriate environment at an appropriate time and free of civilian vehicles, and a civilian vehicle suddenly appeared, if the deployer could not stop it and for unknown reasons related to poor manufacturing, the civilian vehicle was hit. In this case, the incident is not considered a crime but rather a tragedy owing to the reliability of the weapon used and its restricted design. However, if the deployer has the ability to stop the weapon after learning the presence of a civilian vehicle and fails to do so, it will hold direct responsibility.

However, if we envision the same scenario, but the operator fails to verify the environment or timing in which the AWS was published, and in this timing or environment assumes that there would be a civilian target, then the publisher would be held responsible according to his negligence.

6.3. The programmer or designer

The AWS operates autonomously, guided by sophisticated programming and binding orders, to achieve its intended goals. Nonetheless, the system's actions are intricately linked to the directives that it has been programmed to follow. Therefore, attributing responsibility to the programmer for any resulting criminal act is akin to holding an operator responsible for using the AWS as they would for any other weapons.

Programming AWS to engage in criminal activities or instructing behaviours that may lead to criminal acts establishes a direct connection between the programmer's instructions and the actions taken. Consequently, programmers can be held directly responsible for committing crimes because of their programming decisions.

The programmer's liability under Article 8 of the ICC Statute concerning war crimes hinges on whether their unintentional programming breaches the IHL, falling under the concept of the *dolus eventualis*. If programming is intentionally indiscriminate, direct responsibility applies (HRW & International HR Clinic, 2012).

It could be argued that in situations where AWS have been programmed or directed to commit a crime, the principle of joint perpetration may become relevant. The possibility of attributing joint perpetration as another form of responsibility warrants further discussion.

6.3.1 Joint perpetration

Article 25(3) (a) of the ICC Statute states that “an individual may be held accountable for a crime that they have committed jointly with or through another person, regardless of whether the other person is criminally responsible”. The concept of joint criminal responsibility does not differ in terms of complexity when applied to programmers and designers. In a trial

context, it is essential to prove the causation and interpretation of the accusation, determine the type of responsibility to avoid the penalty imposed on the accused (Powles & Jones, 2003), and determine the degree of punishment.

In accordance with criminal judicial jurisprudence, each crime has a basic perpetrator, and other perpetrators join (Werle, 2007). It is crucial to fulfil the material and objective elements each individual and ensure the criminal intent of everyone who contributes to the crime. However, this cannot be difficult in the case of current AWS, which are restricted by programming or meaningful human intervention (Bode, 2024). Therefore, participants play a significant role in contributing to the crime.

In addition, the Lubanga case established that responsibility applies based on "common control" when the following conditions are met (Prosecutor v. Lubanga, 2008): first, at least two accusers are involved; second, planning and common agreement to carry out a crime, which assumes that there is certainty and acceptance that the crime must occur if matters go naturally; and third, primary contribution to the crime, such as control or taking the mastermind role, must exist.

Although AWS possess autonomous functionality, they are constrained by pre-established programming and can be regarded as any other weapon in relation to the commission of a crime. Consequently, the concept of joint perpetration may be applicable in such instances.

Nevertheless, it is contended that the responsibility for committing a war crime using AWS could be attributed to individual contributors in the programming, even if it was not intentional, under the concept of recklessness or negligence. Therefore, according to the interpretation of *mens rea*, they could be held responsible under Articles 8 and 30 of the ICC Statute.

7. Command responsibility and AWS

Academics have put forth the notion that the command responsibility doctrine could be applicable to individuals who deploy AWS (Schmitt, 2013, p.33). Nevertheless, this study does not concur with the notion that AWS actions can be regulated through command-responsibility principles. It is erroneous to label individuals who deploy AWS as commanders and AWS as agents or combatants (Arkin et al., 2011), whether intentionally or unintentionally. AWS should not be considered or treated as combatants; they must be classified as weapons. Even highly advanced AWS cannot be attributed to the attributes of human combatants, as discussed in Section 3.

The principle of command responsibility cannot be extended to AWS, but it is crucial to acknowledge its relevance in ICL and IHL, where it governs the connection between a human commander and its subordinate. However, characterising a person who deploys AWS as a commander is inaccurate and

misleading. Typically, the term commander refers to an individual who exercises control over troops during military operations. In both IHL and ICL, a commander is understood as a natural person exercising authority over other natural persons in a military context (Smidt, 2000). Article 28 of the Rome Statute employs terms like "forces" and "subordinates", which suggests that the concept was intended to apply to human-to-human interactions. This further underscores the fact that the drafters of the Rome Statute designed the concept to be applicable specifically to human-to-human interactions.

Finally, it is important to highlight that when studies invoke the concept of command responsibility in the context of AWS, they aim to address accountability gaps that individual criminal responsibility has not adequately filled. However, this study asserts that the invocation of command responsibility is unwarranted, as it has clearly interpreted that both the operator and designer are accountable in all cases within the ICC Statute.

8. Conclusion

Even if a highly advanced stage of technology is reached, the connection of AWS to their programming renders them far from exercising free will in decision-making. As a result, AWS can be compared to conventional weapon systems in the sense that they are both subject to programming and instruction. However, it is crucial to view AWS as tools that are controlled by those who program or instruct them to be held directly responsible for any criminal acts committed using them. While AWS may eventually operate beyond human supervision or control, they are still constrained by their programming or instructions and cannot be equated to humans.

This study offered insight into the conventional obligation of demonstrating that responsibility gaps are uncommon in a variety of AWS. The liability for AWS will not be uniform; it will depend on the specific system, deployment methods and conditions, and extent of human control during task performance. It is important to note that the categories or types of AWS can overlap.

However, the notion of direct responsibility may not necessarily be applicable in instances where criminal behaviour is not intentionally programmed or instructed. In such instances, the concepts of omission and recklessness under the ICC Statute, as defined in Articles 30 and 8, in line with ad hoc tribunals, can be employed to address these gaps. Where responsibility gaps may arise can potentially be addressed by expanding the interpretation to include other forms of criminal intent or reformulate the ICC Statute to explicitly include the concept of *dolus eventualis*, as seen in other modern national penal systems.

As a result, there would be no gaps in the responsibilities of the operator and programmer, making the exploration of command responsibility under Article 28 of the ICC Statute unnecessary. In addition, the general application of command responsibility within the ICC is limited because of its complex nature, leading the ICC to prefer the concept of direct responsibility.

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