BOOK REVIEW:

NEW TECHNOLOGIES AND THE LAW IN WAR AND PEACE EDITED BY WILLIAM H. BOOTHBY

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The 21st century has witnessed an inexorable surge in technological advances that have revolutionised every facet of commercial, industrial, professional, academic, and daily life. In *New Technologies and the Law in War and Peace*, William Boothby endeavours to address the legal challenges posed by new technologies that have gradually percolated in wartime and peacetime. Along the discussion, the editor has illuminated the 'dual use' of technological developments, with the impetus for evolution coming from either recognised military need or anticipated commercial gains. The editor does not aim to build upon a specific legal methodology to grapple with emerging scientific developments; instead, his focus is to sketch a preliminary design for legislators, persons involved in treaty negotiations, those developing international policy and guidance, members of think tanks, NGOs and all who have an interest in regulating the products of science. This outline consists of the present international law framework and its inadequacies, the implications of those inadequacies, the likely problems to arise as the technology matures, and above all, the development of law to regulate the simultaneous application of technologies in two distinct spheres of activity: the military on the one hand and the peacetime civilian/consumer on the other.

In the initial chapters, Boothby provides a brief overview of how the acceptability of military uses of new technologies is determined. Before proceeding to the discussion of specific technologies, Boothby probes into a detailed discussion of the comprehensive international law principles as they apply to novel military activities in armed conflict. With reference to the Brussels Declaration of 1874 and the Hague Regulations of 1899 and 1907, the author clarifies that the laws of war do not provide belligerents unconstrained power to adopt means of injuring the enemy which cause unnecessary suffering.

The discussion is not just limited to the law applicable to weapons that States may lawfully employ but also the legal rules that regulate the conduct of hostilities. The author also focuses on targeting

law rules and the subsequent protection of civilians in warfare. Hence, the reader has a clear understanding that any weaponry that cannot be directed at a specific military objective and has the potential to harm civilians is prohibited by international law. The author also elucidates upon the ongoing tensions between human rights obligations and the doctrine of combat immunity which shows that the domestication of international law with specified reservations might still authorise States to misuse new scientific products as the state 'may seem fit'.

After the abridged layout, contributors to the edition separately focus on specific technologies, including cyber capabilities, highly autonomous technologies, military human enhancement, human degradation technologies, nanomaterials, naval technologies, outer space technological developments, artificial intelligence and synthetic brain technologies, and the use and development of biometrics. For each technology, the respective author has followed a coherent structure with an initial discussion of what the technology is and its recent developments, its military and commercial use, current international law and the existing gap between its application and scientific developments, and lastly, comparison, where appropriate, between the use of technologies and subsequent application of law in peacetime and during war.

When discussing the procurement and employment of cyber warfare capabilities, Boothby draws a comparison between the findings of the Tallinn Manual 2.0 and the UN Group of Governmental Experts ('**UN GGE**') reports of 2013 and 2015. The author highlights the detailed rules in the Tallinn Manual that are applicable to the use of cyber force and to the manner in which such force may be lawfully employed in an armed conflict. The manual establishes these rules by applying widely accepted legal principles and rules relating to non-cyber activity in the cyber environment. Whereas the Tallinn Manual is specifically concerned with identifying rules of law and explaining how they may apply in the cyber context, the UN GGE solely focuses on recommended national and international action and approaches, including cooperative measures and best practices, with a view to the fostering of information and communication technology ('**ICT**') security instead of drawing a clear distinction between lawful and unlawful ICT weapons.

Boothby asserts that the UN GGE reports have failed to provide States with a widely accepted set of rules and that they express their propositions in rather general terms, particularly when it is recalled that those propositions only have the status of recommendations. In the author's opinion, the mere fact that certain States do not presently adopt the Tallinn approach does not render that approach wrong. Likewise, the failure of the UN GGE to do more than just 'note' the principle of distinction does not, as such, raise questions on the applicability of the principle or the associated rules. The rules presented in the Tallinn Manual lack an adequate enforcement

mechanism, which raises the question of how these rules will impact a State's domestic legislative regime in relation to cyber capabilities.

The book also enlightens the reader about potential cyber activities in the private sector by including the discussion on intellectual property theft and the *Internet of Things*, a rapidly developing feature associated with a wide range of novel consumer products. The author also makes the reader familiar with the current regulation of these matters at the European level, which can be found in the General Data Protection Regulation ('**GDPR**'). The GDPR deals with the interplay between individual rights and data protection, with notions of physical and psychological integrity and personal autonomy being recognised by the court as part of, or underlying, private life. However, it is clear from the author's discussion that it will likely always be difficult for international law to accomplish consensus between the differing approaches of States.

The book then discusses the employment of autonomous weapon systems where legality hinges upon a person being placed 'on the loop' to regulate the use of the weapon and the autonomous system's limitation on the search for targets in time and space to locations for which assessments of proportionality and other targeting law decisions can be made at the mission planning stage. The author appreciates that artificial intelligence has played an integral role in the evolution of autonomous weapon systems. In the future, the 'learning' aspect might involve the machine developing its own recognition criteria based on observations made in the battle space.

However, it is worth noting that human beings will inevitably be closely involved in acquiring and employing autonomous weapons. States, and the procurement officials they employ, are still entirely responsible for the decision to procure the technology and for the testing and evaluation that must take place before the decision to acquire new weapon systems is made. Interestingly, the book highlights the threat of cyber interference in autonomous weapons. The author explains that as computer navigation links, weapons control and guidance systems, target identification software and other systems become widely used, everything possible will need to be done to ensure that these systems remain robust against cyber interference that would render the use of such weapon systems indiscriminate.

The discussion then proceeds to the commercial use of autonomous weapons in medical surgeries and driverless cars. The author draws an analogy between commercial and military use by stating that if autonomy on the roads is seen as a safer option than driver control, it would be but a short step to apply the same logic to the use of weapon systems. The author emphasises that rather than prohibiting such technology in relation to weapons in ignorance of what it might be capable of

offering, a more rational approach would be to develop and explore the potential for such technologies in weapons platforms.

However, it cannot be ignored that autonomous weapons are dangerously unpredictable in their behaviour. Complex interactions between machine learning-based algorithms and a dynamic operational context make it extremely challenging to predict the behaviour of these weapons in real-world settings. Besides, selecting individuals to target based on sensor data alone, especially through facial recognition or other biometric information, might introduce risks for selective targeting of groups based on their perceived age, gender, race, ethnicity, or religious dress. Hence, with increased proliferation, autonomous weapons could amplify the risk of targeted violence against specific classes of individuals leading to ethnic cleansing and genocide.

In her chapter on military human enhancement, Ioana Puscas recognises that an analogous comparison between human enhancement technologies applied in peacetime and wartime may not be drawn. If used in the workplace and schools, human enhancement technology would raise immediate concerns of misuse, abuse and breach of ethics. However, warfare constitutes a distinctively different environment where 'civilian' ethical considerations are not always transferable, and operational success is the main priority.

Puscas provides the example of the United States and its development and sponsorship of human enhancement technologies via the Defense Advanced Research Projects Agency ('**DARPA**'). Enhancing digestion, improving metabolism, mitigating the effects of sleep deprivation, preventing muscle fatigue, and surviving blood loss are some areas of DARPA's endeavours in military physical enhancement. Puscas incorporates recent developments for better visualisation, including the Restoring Active Memory ('**RAM**') Program, a DARPA project under the umbrella of the BRAIN initiative. It aims to develop a wireless implantable neural interface device enabling military service members to better retrieve memories formed before an injury. While highlighting these developments, Puscas unveils the repercussions of such techniques, which can not only stimulate but can also suppress neural activity. For example, repetitive transcranial magnetic stimulation can severely disturb neurotransmitters, leading to after-effects, including seizures, abnormal endocrine responses and increases in heart rate. Puscas subtly presents her view by suggesting that the mere enhancement of a soldier's operational capabilities without more does not amount to treachery; however, the fact cannot be excluded that enhanced soldiers may commit unlawful behaviour and that the enhancement may have contributed directly to its commission.

Puscas also raises questions about unit morale which might crumble if enhancements are used selectively or only for some units. The introduction of enhancements could lead to acrimonious interpersonal relations and may be detrimental to the socialisation of values of respect and hierarchy within the armed forces. Puscas also casts light on the potential human rights which may be infringed, including the rights to cognitive liberty, mental privacy, mental integrity, and psychological continuity, and highlights the research of Marcello Lenca and Roberto Andorno on this subject.

In a later chapter on human degradation technologies, Harry Aitken and Hitoshi Nasu focus on three different legal regimes that apply to the use of human degradation technology as a non-lethal means of violence: the law of weapons governing specific classes of weapons, the law of targeting applicable both in international and non-international armed conflict, and human rights law applicable to law enforcement operations. Ostensibly, it may seem that any such technique is against human ethics and morality. However, Aitken and Nasu effectively establish that such treatment might not always be prohibited, as exhibited by international law. For example, the Biological Weapons Convention does not prohibit the development, production, stockpiling or acquisition of microbial or other biological agents or toxins where the types and quantities can be justified for prophylactic, protective or other peaceful purposes. Likewise, the Chemical Weapons Convention provides an exception where the use, development, production, acquisition, stockpiling or transfer of toxic chemicals is intended, inter alia, for peaceful, protective and law enforcement purposes and the types and quantities of toxic chemicals are consistent with such purposes.

In his chapter on naval technologies, Wolff Heintschel von Heinegg primarily focuses on unmanned maritime systems ('**UMS**'). Von Heinegg distinctly mentions the criteria for UMS operations in another state's territorial sea. There should be no considerable disagreement about their obligation to comply with the conditions of innocent passage. It should be similarly accepted that underwater UMS must navigate on the surface and show their flag. Von Heinegg, however, mentions that there is no agreement on the consequences of military UMS' failure to comply with those conditions. While addressing discrepancies in international law, von Heinegg clarifies that no provisions exist in the United Nations Convention on the Law of the Sea ('**UNCLOS**') or in any other treaty that explicitly address the installation of undersea systems and devices. Most of the issues concerning modern naval technologies relate to the widely undetermined legal status of UMS and undersea infrastructure. According to the author, it may be that some governments prefer legal ambiguity because they believe that it serves their best interests by providing them with

a considerable margin of discretion and freedom of action. This is a well-justified point, as uncertainty in any law or its interpretation leaves States with the ultimate discretion to apply the law according to their sovereign needs.

Melissa de Zwart then delves deeper into New Space applications of space and considers the public-private partnerships that have evolved both to enable States to continue to engage in expensive space activities and now to realise the potential for commercial space uses, including communication, internet, tourism, and mining opportunities. De Zwart highlights that military and commercial applications now develop concurrently, and governments are increasingly reliant on the cost-effective and more innovative solutions offered by New Space entrepreneurs who cut the time and costs involved in getting to space and making use of space resources.

De Zwart raises legitimate concerns regarding the UN space treaties, which appear to be outdated with their deliberately vague language, hence presenting impediments to the further development of space. New rules need to be adopted that will enable explorers, tourists, settlers and miners to go beyond the Moon to Mars. De Zwart also addresses the issues that may ripen with increased use of space, that is, the potential for conflict will inevitably become more prevalent. As commercial operators establish mines, tourist ventures, and colonies in space, it might be challenging to grapple with how to operate, defend and protect such sites. Above all, it shall also be noted that protecting intellectual property and trade secrets will remain as imperative as protecting the infrastructure and personnel associated with the operation of such facilities.

While interlinking the evolution of various scientific innovations, David P. Fidler expresses his concerns regarding synthetic brain technologies, which may be vulnerable to cyber intrusion, interference, and manipulation. Like other cyber-enabled technologies, artificial brains and brain-machine interfaces would become part of and subject to the cybersecurity problems associated with the *Internet of Things*. These concerns seem relevant to modern-day issues like the spreading of fake news and human susceptibility to misleading information, which raises widespread concerns about terrorist groups, foreign governments, and domestic politicians exploiting social media platforms for malicious ends.

In the final substantive chapter of the book, Boothby provides an insight into the evolving role of biometrics in connection with military activities, including raids, checkpoint operations, border control, maritime interdictions, force protection and what is described as human terrain mapping. Again, Boothby draws vital linkages between biometrics and other technological advancements; there are clear linkages between biometrics and cyber operations, and biometrics will be essential

to the development of autonomous anti-personnel weapon systems while artificial intelligence will be a vital element in the development of future biometric analysis tools.

Throughout their discussions, contributors to the book have followed a realistic approach by developing their narrative around the notion that all technologies advance together, not necessarily at the same rate or at the same time across all fields, and that it is this dynamic of development in different technologies that provides the realistic context against which change in one particular area must be considered. Readers of this book shall have a clear idea that these developments cannot be viewed in isolation and that subsequent developments in international law shall be in compliance with the combined effect of these interactions. The authors have not only successfully established the use of these technologies in wartime and peacetime but have concurrently addressed the fine distinctions in the application of international law regarding these technologies when used in different spheres of commercial and military activities.

In his concluding remarks, Boothby has left many threads for readers to join to create their own map of understanding. Boothby has not rendered any decision of international law as wrong or right, nor has he been supportive of either interpretation of international law as consisting of a 'whole' or as comprising a 'mixture' of regimes. Undoubtedly, international law is an amalgamation of fragmented, self-contained, isolated; and single, unified systems. However, how its application must be embarked upon is left to every reader's analysis of international law and its unified fragments.