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Emergent Normativity: Communities of Practice, Technology, and Lethal Autonomous Weapon Systems

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Lethal autonomous weapon systems (LAWS) are the subject of considerable international debate turning around the extent to which humans remain in control over using force. But what is precisely at stake is less clear as stakeholders have different perspectives on the technologies that animate LAWS. Such differences matter because they shape the substance of the debate, which regulatory options are put on the table, and also *normativity* on LAWS in the sense of understandings of appropriateness. To understand this process, I draw on practice theories, science and technology studies (STS), and critical norm research. I argue that a constellation of communities of practice (CoPs) shapes the public debate about LAWS and focus on three of these CoPs: diplomats, weapon manufacturers, and journalists. Actors in these CoPs discursively perform practices of boundary-work, in the STS sense, to shape understandings of technologies at the heart of LAWS: automation, autonomy, and AI. I analyze these dynamics empirically in two steps: first, by offering a general-level analysis of practices of boundary-work performed by diplomats at the Group of Governmental Experts on LAWS from 2017 to 2022; and second, through examining such practices performed by weapon manufacturers and journalists in relation to the use of loitering munitions, a particular type of LAWS, in the Second Libyan Civil War (2014–2020).

Les systèmes d'armes létales autonomes (SALA) font l'objet de nombre de débats internationaux au sujet du contrôle de l'usage de la force par les êtres humains. Néanmoins, un certain flou entoure les véritables enjeux, à cause du désaccord des parties prenantes quant aux technologies des SALA. Ces divergences sont importantes, car elles façonnent la teneur du débat, les choix de réglementations offerts, mais aussi la normativité des SALA quant à leur adéquation. Pour comprendre ce processus, je me fonde sur les théories de la pratique, les études des sciences et des techniques (STS) et la recherche critique sur les normes. J'affirme qu'une constellation de communautés de pratique (CCP) façonne le débat public sur les SALA. Je me concentre sur trois CCP : les diplomates, les fabricants d'armes et les journalistes. Dans ces CCP, le discours des acteurs traduit un travail des frontières, au sens des STS, pour orienter la compréhension des technologies au cœur des SALA : l'automatisation, l'autonomie et l'IA. Je procède à une analyse empirique de cette dynamique en deux étapes. D'abord, je propose une analyse générale des pratiques de travail des frontières des diplomates dans le cadre des groupes d'experts gouvernementaux sur les SALA entre 2017 et 2022. Ensuite, j'analyse les pratiques des fabricants d'armes et des journalistes relatives à l'utilisation des munitions rôdeuses, un type spécifique de SALA, au cours de la deuxième guerre civile libyenne (2014–2020).

Los sistemas de armas autónomos letales (SAAL) son objeto de un considerable debate internacional en torno al nivel de control que los seres humanos son capaces de mantener en relación con el uso de la fuerza. Sin embargo, no resulta tan claro discernir, de manera precisa, lo que está en juego ya que las partes involucradas difieren respecto a las tecnologías que ponen en funcionamiento a los SAAL. Estas diferencias resultan importantes porque conforman la sustancia del debate, qué opciones regulatorias se ponen sobre la mesa, y también dan forma a la normatividad sobre los SAAL en el sentido de que permiten comprender su adecuación. Con el fin de entender este proceso, utilizamos teorías prácticas, estudios de ciencia y tecnología (CTS) e investigación de normas de relevancia crítica. Sostenemos que existe una constelación de comunidades de práctica (CoP, por sus siglas en inglés), la cual determina el debate público sobre los SAAL y la cual se centra en tres de estas CoP: diplomáticos, fabricantes de armas y periodistas. Los agentes que forman parte de estas CoP realizan de forma prolija prácticas de trabajo de delimitación relacionado con los CTS, con el fin de poder desarrollar la comprensión de las tecnologías que forman la base de los SAAL: automatización, autonomía e IA. Analizamos estas dinámicas, de manera empírica, a través de dos pasos: en primer lugar, ofreciendo un análisis a nivel general de las prácticas de trabajo de delimitación realizadas por diplomáticos en el GGE (siglas en inglés correspondientes a Grupo de expertos gubernamentales) relativo a los SAAL durante los años 2017–2022; y en segundo lugar, mediante el examen de aquellas prácticas llevadas a cabo por fabricantes de armas y periodistas en relación con el uso de municiones merodeadoras, un tipo particular de SAAL, durante la Segunda Guerra Civil Libia (2014–2020).

Militaries around the world are developing, using, and considering various automated, autonomous, and artificial intelligence (AI) technologies. The consequences of *integrating* such technologies into targeting are the subject of heated debate featuring many stakeholders, such as programmers, weapon manufacturers, military personnel, diplomats and other national representatives, civil society actors, journalists, and academics across disciplines. Conceptually, this debate turns around lethal autonomous weapon systems (LAWS)[1] that apply force automatically based on "machine analysis of information acquired from

[1]I use the term LAWS because I study the debate at the GGE, which remains focused on *lethal* AWS. The focus on lethality carries normative weight in delimiting the GGE's scope. Lethality may be a potential outcome of using AWS, but what is problematic about integrating autonomy in targeting applies to "acting with the intent to cause physical harm, i.e., violence" (Asaro 2019, 541; see also Crootof 2015, 1837; Rosert and Sauer 2021, 14). Distinguishing between lethal and non-lethal autonomous systems therefore creates unhelpful regulatory gray zones.

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sensors" without human assessment (Connolly 2022, 3).[2] Integrating machine analysis into targeting decision-making is controversial because it challenges the extent to which humans can remain in control over the use of force. Some of the risks associated with this development are a loss of moral agency in warfare, greater unpredictability in how force is used, and detrimental effects on core provisions of international law (Renic 2019a; Boulanin et al. 2020; Holland Michel 2020). Scholars also argue for the military benefits associated with improving the effectiveness of the targeting process through the ability to make sensor-acquired data actionable via machine analysis, through increasing the speed at which weapon systems can respond, including in situations of defense, as well as potential humanitarian benefits (Richemond-Barak and Feinberg 2016; Galliott and Scholz 2018; Payne 2021).

At the international level, the meetings of the Group of Governmental Experts (GGE) on LAWS, created in 2017 under the auspices of the UN Convention on Certain Conventional Weapons (CCW), are the institutional focal point of this debate that also receives attention and international media coverage beyond it. Over the past 6 years, three main positions have emerged: First, those who favor a clear-cut legal prohibition of LAWS centered on enshrining human control as a novel positive obligation in international humanitarian law (IHL); second, those who seek the negotiation of new legally binding rules on some aspects of the technology that is part of LAWS; and third, those who argue that LAWS do not trigger demand for new regulation and believe existing IHL to be sufficient.

However, stakeholders disagree about how to understand the basic technologies that animate LAWS. Automation, autonomy, and AI are all frequently used, but they trigger diverging connotations and may change over time. These definitional differences matter in two ways: First, they incrementally form the substance of what the international debate understands LAWS to be; and second, they shape what are considered to be "appropriate" policy responses to their development, for example, their governance in the form of regulation or prohibition. In other words, such disagreements shape normativity, which I define as understandings of appropriateness encompassing both ideas of oughtness and of normality (Huelss 2020; Bode 2023). The paper therefore asks: *How does the international public debate shape normativity on LAWS?*

I address this question by drawing on the community of practice (CoP) literature, an influential strand of international practice theories (e.g., Adler 2005; Bicchi and Bremberg 2016; Græger 2016; Hofius 2016; Adler and Faubert 2022). Understanding CoPs as "domains of knowledge that constitute communities of engaging practitioners bound by a shared interest in learning and performing shared practices" (Adler, Bremberg, and Sondarjee 2022, 1), I argue that there is a constellation of CoPs (Adler 2019, 172) shaping the debate about LAWS via discursively performed practices.

The paper makes two analytical and empirical contributions to the CoP literature. First, analytically, I return to a conversation between CoP and Science and Technology Studies (STS). How humans interact with technology in practices was instrumental to Lave and Wenger's original conceptualization of a CoP (Lave and Wenger 1991). Yet, this aspect has, with some notable exceptions (Pouliot 2010; Adler-Nissen and Drieschova 2019), not received much attention in international practice theories. But as critical security studies increasingly consider the politics of technology (Amoore and Raley 2017; Hoijtink and Leese 2019; Bellanova, Lindskov Jakobsen, and Monsees 2020; Suchman 2020; Bellanova et al. 2021; Hoijtink and Planqué-Van Hardeveld 2022), investigating how the distribution of knowledge and learning takes place in relationships of human–machine interaction regains relevance. The paper draws on the concept of boundary-work[3] as it originally appeared in STS: a communally approved form of drawing the lines between science and non-science, including politics (Gieryn 1983; Suchman 2012). Here, lines are not drawn between who is/is not part of a CoP (Hofius 2016; Sondarjee 2021), but between automation, autonomy, and AI—and therefore between what counts as an LAWS. I use boundary-work to draw out how such dynamics shed light on how normativity emerges and is shaped in practices. This relationship between norms and practices speaks to an active research field in between international practice theories and IR norm research (Bode and Karlsrud 2019; Bernstein and Laurence 2022; Bode and Huelss 2022; Gadinger 2022; Lesch and Loh 2022). Incrementally, how actors perform practices by engaging in boundary-work shapes normativity. I use the term normativity to draw on relational understandings rather than attempting to fix an ideal-typical bounded "norm" (Hofferberth and Weber 2015; Pratt 2022). The constellation of CoPs becomes a locale for such emergent normativity from the bottom up. For the present study, I have chosen to focus on discursively performed practices[4] in order to investigate how these implicitly or explicitly draw on ideas of oughtness and justice that require the performance of some form of public, discursive expression, and validation.[5] Second, empirically, by examining a constellation of CoPs as a locale for emergent normativity on LAWS, the paper makes empirical contributions to the literature on the political and ethical significance of such weapon systems (Sharkey 2016; Garcia 2017, 2023; Bode and Huelss 2018; Asaro 2019; Renic 2019b; Schwarz 2019; Rosert and Sauer 2021; Nadibaidze 2022; Qiao-Franco and Bode 2023).

The boundary-work I identified is public and discursive in nature—it can be tracked via studying how actors across CoPs perform such practices discursively. I concentrate on only three CoPs within this constellation—diplomats, weapon manufacturers, and journalists—for two reasons: First, I focus on diplomats because this group includes the state representatives making the international regulatory decisions on LAWS. How they understand LAWS therefore offers a base layer for the international debate. Second, how weapon manufacturers and journalists contribute to the debate is understudied but crucial for capturing how LAWS are understood in the international public sphere. Interested members of the public are un-

[2]This paper is concerned with the normative and potential regulatory consequences of referring to technologies using machine analysis in targeting in different ways. Let me therefore offer a baseline for understanding that builds on an academic consensus (Crootof 2019a; ICRC 2019; Sauer 2020; Garcia 2023). Autonomous weapons can integrate automated, autonomous, as well as AI technologies. This means some autonomous weapons already integrate AI technologies in targeting (e.g., some loitering munitions reportedly use machine learning), but that autonomous weapons do not necessarily integrate AI technologies. Likewise, AI technologies may not only be used in weapon systems, but also in military decision support systems.

[3]I want to thank Ruha Benjamin for drawing my attention to this concept as a source of inspiration for the debate about LAWS.

[4]Boundary-work also encompasses practices of designing, developing, and testing technologies performed at sites that are not open to the public eye but are likewise sources of normativity (Bode 2023).

[5]I want to thank Charlotte Epstein for drawing this to my attention.

likely to follow debates at the GGE directly but will rather build their knowledge on information filtered by media outlets.

Methodologically, my interpretive study uses four qualitative methods, featuring the collection of primary and the analysis of secondary data. First, I engaged in participant observation of six GGE meetings from 2017 until 2022. Second, from 2017 to 2022, I conducted sixteen interviews with diplomats and journalists.[6] Third, I studied discursively performed practices by, chiefly, weapon manufacturers and journalists, in relation to the use of the Turkish-manufactured Kargu-2 loitering munition (LM) in the Second Libyan Civil War (2014–2020) as a focus case. Here, I analyzed a mixture of open-source material authored by or featuring members of the CoPs. I also draw on a policy report on LMs that is the result of a research collaboration with Tom Watts (Bode and Watts 2023). I focus on LMs as one type of weapon system integrating machine analysis in targeting because such platforms, for example, the Israeli-manufactured Harpy, have often been taken to represent the exception to the rule that "fully" autonomous weapon systems (AWS) that can function completely without human control once activated are not yet in use (e.g., Guizzo 2016; Anzarouth 2021).

The remainder of the paper is organized as follows: First, I develop my argument about how a constellation of CoPs becomes a locale for emergent normativity on LAWS via the STS concept of boundary-work. Second, I use these arguments to examine evolving normativity in the constellation of CoPs in two steps: (1) I focus on how practices in relation to defining automation, autonomy, and AI performed by diplomats at the GGE shape normativity at a general level. (2) I study how this "terminology à la carte"[7] plays out in practices performed in relation to the UN-reported use of Kargu-2 LMs in Libya. I close with a critical conclusion.

CoPs, STS, and Normativity

CoPs scholarship shares a focus on how practices—patterned action in social context (Leander 2008, 18)—are performed in collective, group, or community structures. Scholars consider learning as a form of transmitting knowledge and acquiring increasing competence over time as central to practice (Nicolini 2013, 77; Bueger and Gadinger 2018, 52). In this, knowing and learning are fundamentally social phenomena that necessarily require engaging and participating in specific communities. CoPs are "well-identifiable social 'things'" (Nicolini 2013, 19) because they share a certain repertoire of practices as well as shared assessments as to what a competent performance of this repertoire of practices looks like.

The practitioners who perform practices related to LAWS are spread across different professional backgrounds and sites. They include programmers, weapon manufacturers, military personnel, diplomats, civil society actors, journalists, and academics across disciplines. This suggests that there is a constellation of CoPs shaping the substance of the debate about LAWS and emergent normativity therein. For this paper, I focus on practitioners located in three CoPs within this constellation: diplomats, weapon manufacturers, and journalists. CoP scholarship has long been interested in forms of interaction between such different communities, focusing on individuals who participate in multiple communities and may therefore act as brokers or on the constitution of boundary objects that trigger exchange and engagement (Hofius 2016; Sondarjee 2021). This thinking offers connections to STS and provides the springboard for my arguments.

I argue that practitioners associated with different CoPs engage in boundary-work not along the borders of the communities but to demarcate the basic technological concepts at stake in the debate about LAWS: automation, autonomy, and AI. I understand boundary-work as knowledge-brokering practices performed by diverse practitioners "involved in decision-making on technical issues" (Orsini, Louafi, and Morin 2017, 734). As an STS concept, boundary-work highlights that demarcations between science and politics needed to be established in the first place, remain unstable, and need to be maintained (Gieryn 1983). In the STS sense, boundary-work as a set of practices does not shape relations between the different CoPs that perform it, but rather between what counts as automated, what counts as autonomous, and what counts as AI. The boundaries between these terms are not clear-cut but tenuous and overlapping. This means that boundary-work is normative. It draws attention to the knowledge-making and knowledge-carrying work (Adler and Faubert 2022) that concepts such as automation, autonomy, and AI contain. By unpacking how different CoPs use these three core terms, we can investigate how they shape normativity.

For example, political actors may describe the technologies integrated into the targeting of an existing weapon system as semi-automated, automated, or highly automated rather than as autonomous because automation implies a higher degree of human control, less technological "sophistication," and, consequently, less significant machine "agency" (Winfield 2012, 13). Using automation rather than autonomy may therefore raise the level of comfort for such systems because it does not draw attention to the controversial consequences such technologies trigger for retaining human control. Conversely, weapon manufacturers may strategically speak about a technology as "AI-enabled": They may highlight that their products use "AI" to sell them but may not connect their products to "AI" in contexts where it is opportune not to draw attention to the hype that comes with talking about "AI."

Through performing practices of boundary-work, a constellation of CoPs becomes a locale for emergent normativity from the bottom up. By focusing on how such practices are performed by actors within the CoPs, I set out to highlight their agency. Often, policy discourse in this field portrays developing LAWS as inevitable, following a supposed "natural," instrumental trajectory of technological progress. An STS approach, however, recognizes that technological processes do not develop by themselves but that their trajectories are deeply intertwined with human decision-making. It matters how stakeholders position themselves vis-à-vis the question of understanding LAWS or whether they even consider the development of LAWS as a "game-changer." Performing these practices means taking normative stands and thereby shaping normativity on LAWS. Capturing their performers as part of a constellation of CoPs can allow us to better understand the dynamics of this process and how it is shaped by boundary-work.

[6] I conducted interviews with nine states parties and seven journalists. These sixteen interviews were conducted with different forms of participant consent: Eight research participants allowed me to associate verbatim quotes with their professional background (referenced as diplomat interviewee DI #1 or journalist interviewee JI #1), two interviews were conducted under the Chatham House Rule (referenced as expert interviewee EI #1), and six as background. Interviews conducted as background inform the general analytical narrative.

[7] I want to thank Neil Renic for this apt expression.

Automation, Autonomy, and AI at the GGE: Boundary-Work at the Diplomatic CoP

Stakeholders in the debate on LAWS do not actually only or even all that frequently talk of AI, but chiefly use two other terms to address seemingly similar technologies: automation and autonomy. In consulting which stakeholders define these terms, how, and in what context, it quickly becomes apparent that they draw not only definitional but also political boundaries in characterizing technologies as automated rather than autonomous. This section unpacks patterns of talking about LAWS that unfold within the diplomatic CoP. I focus on the debate at the CCW starting informally in 2014, but chiefly in the form of the GGE since 2017.

In simple terms, AI is the attempt "to create machines or things that can do more than what's programmed into them" (Gebru 2023). AI is an umbrella term for an entire field of research, including streams such as natural language processing and computer vision, as well as particular techniques such as machine learning. Autonomy and automation overlap as both terms denote systems that, once activated, can perform some functions without human input (Boulanin and Verbruggen 2017, 5). In robotics, automation implies less "sophistication" vis-à-vis autonomy because automated systems follow a pre-programmed sequence of actions rather than being guided by sensors (Winfield 2012, 12). An autonomous system is still "controlled by a program but now receives information from its sensor that enables it to adjust its speed and direction of its motors (and actuators) as specified by the program" (Sharkey 2012, 141).

However, diplomatic practitioners use these terms in significantly different ways and to serve different apparent purposes. I will now examine these discursively performed practices, starting with the boundary-work between automation and autonomy and then moving on to AI. What we can observe here is the constitution of knowledge on the supposed "technical" issue of LAWS. The complexity of the subject enables diplomats across the CoPs to engage in all kinds of substantive claims and counterclaims about what LAWS can and cannot do and which technologies they are supposedly based on.

Automated or Autonomous Weapon Systems?

Diplomats appear to display a preference toward using automation rather than autonomy. In fact, autonomy appears to be almost avoided as a term. Instead, diplomats use qualifications such as "semi-autonomous" or "fully autonomous" or speak of a "gradual transition of systems toward full autonomy."[8] Many diplomats appear to push the problem of such "fully autonomous" systems to the future: They emphasize that "fully autonomous systems *do not exist yet*" (Permanent Mission of the European Union 2017, author's emphasis), that LAWS are "*future* weapon systems" (Permanent Mission of New Zealand 2017, author's emphasis), a "*possibly emerging* new technology of warfare" (Permanent Mission of Austria 2017, author's emphasis), or by simply referring to the "*potential* emergence of LAWS."[9] Some states parties have explicitly highlighted that "we want to deal with the questions raised by the development and use of future autonomous weapons" (Permanent Mission of Germany 2017, emphasis in original). In interviews, I conducted with diplomats, many talked about LAWS as "things that do not exist."[10] Many states parties have performed such discursive practices consistently throughout the GGE's deliberations from 2017 to 2022. Automation then appears to be favored because of the future framing many diplomats tend to attach to autonomy: "you cannot define something that we don't know, we don't know what it looks like."[11]

How diplomats distinguish between automation and autonomy departs from academic definitions of the terms found in robotics literature. Diplomats play with common connotations of automation as a term without reflecting on this explicitly. This works with the seemingly greater level of social "acceptance" or familiarity that speaking of a system as automated rather than as autonomous triggers. As summarized by defense analyst Hagström: "a well-known and familiar technology is more often referred to as 'automatic,' while new automated technology is labelled 'autonomous.' [. . .] The piloting of an aircraft today is considered *simple* automation" (Hagström 2016, 23, author's emphasis). Using automation also suggests that such systems come with a higher degree of predictability, or the possibility to "reasonably foresee how a weapon will function in any given circumstances of use and the effect that will result" (Boulanin et al. 2020, 7).

It should be noted, however, that neither the behavior of automated nor autonomous systems will be predictable to 100 percent. The inherent complexity of the technologies makes it impossible to test all possible encounters such systems may have in the real world. And the more significant that complexity becomes on the path from automated, to autonomous, to AI technologies, the less complete testing of it will be able to be (Holland Michel 2020). Further, when it comes to challenges inherent to human–machine interaction, integrating either automated or autonomous technologies into the targeting functions of weapon systems triggers similar problematic consequences because they increase system complexity (Bode and Watts 2021).

By using terms such as "automated," "semi-automated," and "semi-autonomous" in the LAWS debate, many diplomats both implicitly and explicitly adopt a wait-and-see approach with regard to what kind of "semi-autonomous" systems develop over time and what kind of use will still count as acceptable. As Crootof argues, such a wait-and-see approach is "a common response to new weaponry" in situations of uncertainty "when the social and political impact of that technology are not yet well-understood" (2019a, 19). In temporally pushing a drawing of the line toward what is admissible, this clearly expands the room of maneuvre for states. It also means that states parties can miss the opportunity to shape the development and use of a new technology in a responsible direction, resulting in significant and potentially irreversible harm that a regulatory approach centered on the precautionary principle could have addressed through a legal ban (Crootof 2019a, 19–20).

The wait-and-see approach also enables practices of using new types of weapon systems integrating machine-based analysis in targeting to become productive of normativity. We can already see this in action through tracking how the development and use trajectories of existing weapon systems integrating such technologies, such as air defense systems, have shaped understandings of what counts as an "appropriate" quality of human control (Bode 2023). In systems such as the HARPY, an LM that can autonomously identify and attack radars, human control has already been relinquished for specific tasks.[12] Interestingly, such existing weapon systems are only infrequently addressed in discursively per-

[8] DI #1, April 24, 2017.
[9] Joint remarks by Germany and France, August 3, 2021, author's emphasis.
[10] DI #2, April 25, 2017 and DI #3, April 26, 2017.
[11] DI #1, April 24, 2017.
[12] DI #2, April 25, 2017.

formed practices by diplomats at the GGE. In the few instances that such systems are mentioned, they are characterized as "automated" systems that states do not only operate under meaningful forms of human control because there is a human-in-the-loop, but also serve as a source of "good practices" on human control (Australia et al. 2022). Referring to these systems as automated rather than autonomous excludes them from any potential regulation and even from regulatory debate. The global proliferation of weapon systems integrating autonomous technologies in targeting may go some way toward explaining such practices among the diplomatic CoP: At least eighty-nine states have, for example, at least one, but often several types of air defense systems with autonomous features (Boulanin and Verbruggen 2017).

Practices performed by states in relating to existing weapon systems integrating machine-based targeting are therefore not scrutinized—and that is precisely the point: "If autonomy is too widely defined, many types of weapon systems in existence would fall under this rubric. Yet, automated systems are most often used defensively against individualised, specific, and previously defined targets."[13] There is another consequence of diplomats using "automation" as the preferred term and connecting it, if only rarely, to the trajectory of existing weapon systems: Such systems become just "another tool in the cupboard" that do not constitute "a dramatic change."[14] In referring to existing systems as automated and pushing what is problematic about autonomy exclusively to fully autonomous systems, the debate on LAWS almost becomes a non-issue: When automated features are mentioned, diplomats focus on their potential achievements in terms of increasing precision.

AI

There is a stark divide between the willingness of different CoPs to even use the term "AI." As I will demonstrate in the subsequent section on LMs, both weapon manufacturers and journalists are much keener to use AI, in combination with autonomy or instead of autonomy, while diplomats only rarely speak of AI at the GGE. If diplomats speak to AI, it is frequently in relation to "fully autonomous" systems, which, as discussed above, are portrayed very much as a future, almost imaginary concern. Such fully autonomous systems are defined in "futuristic" ways (Article 36 2018): The United Kingdom, for example, speaks of systems that are "capable of understanding higher-level intent and direction" (UK Ministry of Defence 2017, 13). Chinese diplomats have likewise put forward a demanding understanding of LAWS that refers to self-learning without including the term "AI": "[. . .] through interaction with the environment the device can learn autonomously, expand its functions and capabilities in a way exceeding human expectations" (Permanent Mission of China 2018, 1). Such definitions have "very little immediate relevance for systems in development today."[15] However, in defining "away" the problem of LAWS, these definitions have significant normative consequences. If they were to become the basis for regulating or prohibiting LAWS, such legal provisions would be almost meaningless. But this kind of extreme boundary-work is not widely accepted among members of the diplomatic CoP either: Such definitions have failed to draw support among diplomatic delegations in Geneva. More so, in my interviews with diplomats, they have drawn attention to these definitional exercises as unhelpful and potentially isolating.

Despite this critique, there are undisclosed parallels between such demanding definitions of LAWS and how many diplomats question the potential development of "fully autonomous" weapon systems. In interviews and informal conversations, diplomats have characterized even the assumption that states may develop such LAWS as "bold." Self-learning systems or systems with a high level of complexity are perceived as non-desirable for the military because of the issue of control: "the military interest in this is zero."[16] One diplomat went as far as arguing that "the only market for fully autonomous weapon systems would be sci-fi or James Bond-like villains."[17] The historical trajectory of military strategy, diplomats argued, has gone toward assigning targeting decisions to central command and to increasing communication throughout: "Tactically, the development of LAWS would not make sense due to the lack of control and they would run contrary to previous developments in military strategy."[18]

Other diplomats followed this general line of argument in unpacking "the military" as a homogeneous actor, noting that actors in development tend to push for the greater integration of autonomy, while operational actors are more cautious. Indeed, conversations I had with military personnel at the margins of the GGE showed that this could go either way: On the one hand, the military can be an actor to highlight the risks associated with new technologies. The protocol regulating blinding laser weapons under the auspices of the CCW in the 1980s illustrates this: here, a US policy shift in favor of preventively banning blinding lasers occurred, which was based on the argument that their soldiers could come home blinded (Bode and Huelss 2022, chap. 2). On the other hand, the perceived military advantage connected to the development of technologies such as LAWS seems to trump everything else, and it is hard to persuade military actors in another direction. This focus on military advantage has been growing more pronounced in the tense international climate following the Russian invasion of Ukraine.

To conclude, there is a three-fold dynamic at play in the boundary-work performed in the diplomatic CoP that shapes normativity on LAWS: First, in using automation rather than autonomy in relation to existing weapon systems, such systems are excluded from the purview of the GGE debate. This has the add-on effect of legitimizing existing systems that fall short of autonomy: Such systems are then legitimate precisely because they are *not* LAWS. Second, if autonomy is used, it is qualified via constructions such as semi-autonomous or fully autonomous. The former describes systems that have humans in-the-loop or on-the-loop and should therefore, again, not be part of the GGE's potential regulatory purview. The latter describes systems that are operated completely outside of human control, a development that comes with sci-fi associations as it is portrayed not to correspond to prevalent military doctrine. Third, consequently, the regulatory space of the GGE on LAWS becomes severely restricted. The development of fully autonomous weapon systems is deemed unlikely and therefore not in need of urgent regulation. At the same time, the operation of existing *automated* weapon systems is not deemed to pose challenges to either IHL or human control. So, what then are the significant characteristics that make the regulation and potential prohibition of LAWS neces-

[13] DI #3, April 26, 2017.
[14] DI #2, April 25, 2017.
[15] EI #8, July 25, 2022.
[16] DI #2, April 25, 2017.
[17] DI #2, April 25, 2017.
[18] DI #1, April 24, 2017 and DI #7, April 27, 2017.

sary? Regulatory incentive therefore runs the risk of being lost in this CoP's boundary-work. In the words of one diplomat: "No additional law is needed for the purpose of governing LAWS. IHL has served us well so far, there is no need to change IHL at this stage."[19] If the debate continues along this trajectory, "LAWS could become a fait accompli."[20] In a best-case scenario, the GGE's work could culminate in a ban at the fine end of the autonomy spectrum—a ban on "fully autonomous" systems. Ultimately, though, the practices of boundary-drawing between automation, autonomy, and AI as performed in the diplomatic CoP adopt a particular framing of LAWS that severely limits what we should be concerned about.

This finding about the connection between understanding the technologies animating LAWS in a limiting way and regulatory incentive is surprising, given that there is a consistent group of states parties (chiefly associated with the Global South) favoring a precautionary approach to regulation in the form of a legal ban. Brazil, Chile, Costa Rica, and Mexico, for example, have all expressed their strong preference for proceeding to negotiate new legally binding rules on LAWS (Bode 2019). However, they do not yet connect this regulatory position to a critical discussion of how existing weapon systems that already integrate automated and autonomous technologies in targeting set problematic precedents as well as demonstrating that autonomous weapons are not a future concern. That said, a communique drafted by Latin American and the Caribbean states parties in February 2023 may point to a change in terminology that could be expressed at further GGE meetings later in 2023. The text still speaks of "*emerging* technologies," but it also mentions "autonomy in weapons systems and its impact on meaningful human control" rather than autonomous weapons systems ("Communiqué of the Latin American and the Caribbean Conference of Social and Humanitarian Impact of Autonomous Weapons" 2023). This suggests a broadening of what is understood as concerning toward systems that integrate machine analysis in targeting and how this affects the quality of control human operators can exercise.

Loitering Munitions in Libya: Autonomous or Not?

Colloquially referred to as "killer" drones, LMs are expendable uncrewed aircraft integrating sensor-based targeting to hover over, detect, and crash into targets (Bode and Watts 2023). Such munitions are therefore not fired at a specified target but are designed to loiter over the battlefield, within a potentially broad geographical area, to search for pre-programmed targeting profiles. At this point, the munition destroys the target object by crashing itself into it. LMs can best be thought of as something in between a drone and a missile (Gettinger 2022). In contrast to missiles, LMs typically have a human-in-the-loop. This means that a human operator can decide to abort an attack once the LM is in flight and must confirm a target before the munition launches itself onto it. Like drones, LMs can be remotely piloted by a human operator, but many are also capable of autonomous flight: They can, for example, track a target autonomously without a human directing them (Krieg and Rickli 2019, 105–6; Wyatt 2020, 2). In contrast to drone models such as US-manufactured Reaper or Predator, many LMs are small and portable. For example, the US-manufactured Switchblade-300, which has been used by Ukraine in the ongoing war in Ukraine weighs 2.5 kg, can be carried in a backpack, and is canister-launched (Watts and Bode 2023). LMs have proliferated throughout the late 2010s: In 2017, there were only ten states producing these weapons, doubling to twenty-four in 2022 (Gettinger 2022, see Table 1 for examples).

Table 1. Examples of LMs in use (Watts and Bode 2023)

Name	*Developers and users*	*Operational since*
Chien Hsiang	Taiwan	2019
CH-901 Rainbow	China	2016
Devil Killer	Republic of Korea	2014
Drone 40	United Kingdom, Ukraine	2016
Harop	Israel (D); other users: Azerbaijan, India, Morocco, Turkey	2009
Kargu-2	Turkey (D); other users: Azerbaijan	2019
Lancet-3	Russia	2019
Switchblade-300	United States; other users: United Kingdom, Ukraine	2016
Warmate	Poland (D); other users: Turkey, Ukraine, India	2018

Despite this, LMs have not been a major part of the GGE debate, which has, as argued above, remained chiefly preoccupied with future concerns. The proliferation and growing use of LMs as evidenced by the war in Ukraine underline the urgency of the LAWS debate and its potential for "normalizing" the use of such systems in the absence of any specific legally binding rules (Bajak and Arhirova 2023; Meaker 2023). LMs have been used in Syria, Libya, and Nagorno-Karabakh, but the numbers of systems used and the extent of their usage in Ukraine set new precedents: Russia and Ukraine have, for example, used at least six different types of LMs since mid-2022.[21]

Describing a Kargu-2 LM as an LAWS in May 2021, a report by a UN Panel of Experts covering the course of the Libyan Civil War between October 2019 and January 2021 attracted major media attention (UN Security Council 2021). The Turkish military has used the Kargu-2 quadcopter, produced by STM Defense Technologies Engineering, since 2018 (STM 2021b)—for instance at the Turkish-Syrian border (Katoch 2020). In March 2020, according to the assessment of UN experts, the Libyan Government of National Accord used the Kargu-2 autonomously, that is, without human supervision or intervention, to attack militants linked to Khalifa Haftar:

> Logistics convoys and retreating HAF [Heliborne Assault Force, author] were subsequently hunted down and remotely engaged by the unmanned combat aerial vehicles or the lethal autonomous weapons systems such as the STM *Kargu-2* […] and other loitering munitions. The lethal autonomous weapons systems were programmed to attack targets without requiring data connectivity between the operator and the munition: in effect, a true "fire, forget and find" capability. The unmanned combat aerial vehicles and the small drone intelligence, surveillance and recon-

[19] DI #6, April 26, 2017.
[20] DI #5, April 25, 2017.
[21] Russia has used the domestically manufactured KUB-BLA and Lancet-3, while Ukraine has used the US-supplied Switchblade-300 and Phoenix Ghost, as well as the Polish-manufactured Warmate and the Australian-manufactured Drone 40.

> naissance capability of HAF were neutralized by electronic jamming from the *Koral* electronic warfare system. (UN Security Council 2021, para. 63)

Media coverage was quick to characterize this incident as the first time an LM was used to kill combatants on the battlefield "based on AI" and without the assistance of a human operator (Hernandez 2021; Stanley 2021). Journalists and weapon manufacturers across their respective CoPs engaged in boundary-work in defining the extent to which the Kargu-2 is autonomous and which types of tasks the system is capable of performing autonomously, e.g., navigation, target identification, target tracking, or attack. The incident illustrates unresolved definitional debates about what does and does not qualify as an LAWS—and the normativity therein. As one tech reporter aptly summarized: "no one can agree on what a killer robot *is,* and if we wait for this to happen, their presence in war will have long been normalized" (Vincent 2021). As I demonstrate, the boundary-work within and between the two CoPs, I focus on concentrated chiefly on the notion of autonomy and AI, while the term automation almost disappears in these practices.

Unpacking the Technological Functionality of the Kargu-2

The content of discursively performed practices by the manufacturer of the Kargu-2, STM, in relation to how the system integrates autonomous and AI technologies in targeting has changed over time. These changes appear to be directly linked to how the UN report discussed the Kargu-2. Before the report was published, STM spoke of the Kargu-2 having "both autonomous and manual modes" (STM 2018b) and using "real-time image processing capabilities and *deep learning* algorithms" (Susar 2020, author's emphasis). A manufacturer video released on YouTube in April 2018 argued that the Kargu-2 gives human operators the "[a]bility to autonomously fire-and-forget through entry of the target coordinates" (STM 2018b). In 2020, STM officials reported that facial recognition technologies would be integrated into the Kargu-2, although no technological details were disclosed (Yerepouni 2020). Before May 2021, we therefore see a preponderance of autonomy and AI-related terms such as deep learning algorithms and facial recognition in practices of boundary-work performed by the manufacturer.

Manufacturer material about the Kargu-2 published after May 2021 describes the system's technological functionalities in very different terms. Now, the Kargu-2 is described 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" (STM 2021a, author's emphasis). Further, while the 2018 YouTube video referred to the system as an "autonomous rotary wing attack drone" (STM 2018b), later material calls it a "rotary wing attack drone LM system" (STM 2021a), having notably dropped the reference to autonomy.

According to a July 2021 press release: "Each mission (both ISR and Precision Strike) is performed under the complete control of the human operators, limiting the platform's autonomy to navigational purposes only" (STM 2021b). After the publication of the UN Report, the company's CEO Hakan Güleryüz also argued that "[a]t STM, we always think ethically a human should be involved in the loop" (quoted in Tavsan 2021). STM continues to claim that the Kargu-2 uses an "*Automatic* Target Recognition System" (STM 2021a, author's emphasis). It is notable that the Kargu-2's targeting system is now referred to as "automatic," thereby clearly connecting to practices of boundary-work performed in the diplomatic CoP and drawing on the greater familiarity, the supposedly less complex and therefore less problematic character of automated technologies.

Notwithstanding these changes performed by the manufacturer, many journalists continued to include explicit references to "AI" when they describe the Kargu-2, describing it as "powered by AI" (Cramer 2021), referring to the Kargu-2's "AI-driven image recognition" (Allen and Okpali 2022), and its "machine learning-based object classification" (Nasu 2021) to find and select targets.

In examining these practices of boundary-work, we should recall that members of the journalist CoP are likely not privy to any exclusive information on the actual technological capabilities of weapon systems integrating autonomous technologies. In fact, actors across the constellation of CoPs without privileged insights into their countries' military capabilities rely on their practices of boundary-work about the Kargu-2's technological functionality on information that is available in the public domain.[22] These are data either published by the weapon manufacturers or collated by defense analysts associated with subscription services such as Jane's Defence or Shephard Media, who also rely heavily on manufacturer information (Bode and Watts 2023, sec. 4). As such, any detail that is circulated about the Kargu-2's technological capabilities originates in a very limited number of data sources. These sources are typically vague in providing information about specific functionality and can be hyped or downplayed in periods of scrutiny. As Verbruggen puts its "fancy buzzwords + no actual information" (2021).

Contesting Ways of Operating: How Was the Kargu-2 Used in Libya?

There are important details about the Kargu-2's mode of operation in Libya that the UN report does not include or does not make a clear statement about: first, whether there were casualties in the attack; and second, whether the Kargu-2 was used in autonomous mode. Written in typically ambiguous UN report language, what the report says about the Kargu-2 leaves much room for actors across CoPs to perform diverging practices of boundary-work.

First, it is not stated outright whether the attacks conducted by the Kargu-2 led to human harm or death (UN Security Council 2021, 17). The report implies this by noting that retreating Haftar-affiliated forces were subject to "continual harassment from the unmanned combat aerial vehicles and lethal autonomous weapons systems, which were proving to be a *highly effective* combination in defeating the United Arab Emirates-delivered Pantsir S-1 surface-to-air missile systems" and later on speaking of "significant casualties" in the battle (UN Security Council 2021, 17). Second, the report does say if the Kargu-2 was purposefully operated autonomously or in manual mode in the incident described. The report only notes that "the lethal autonomous weapons systems were programmed to attack targets without requiring data connectivity between the operator and the munition" (UN Security Council 2021, 17).

The extent to which this point of uncertainty was addressed by actors across different CoPs differs significantly. Most media comments, with notable exceptions (Hambling 2021; Vincent 2021), appear to gloss it over, concentrating instead on the more opportune "killer robot used in conflict" line (Hernandez 2021; Stanley 2021).[23] As more and more media reports came out, this discursive boundary-work performed in the journalist CoP got stronger and

[22] JI #2, May 3, 2022.
[23] JI #2, June 29, 2021.

stronger. But STM representatives denied that the Kargu-2 platform attacked targets autonomously in Libya on several occasions. In June 2021, STM's then CEO Güleryüz, posited that "[o]ur homegrown autonomous AI drone technology is mostly used for navigation purposes as well as designating and differentiating humans, animals, vehicles, etc. Therefore, it is not capable of launching fully autonomous attacks on targets" (Özberk 2021). Interestingly, Güleryüz speaks of AI, but qualifies the integration of AI technologies in targeting by arguing that human control remains essential: "[u]nless an operator pushes the button, it is not possible for the drone to select a target and attack" (Tavsan 2021). STM therefore maintains that autonomous, and AI technologies are integrated into the system's navigation rather than its targeting. Of course, this stands in explicit contrast to how STM talked about the Kargu-2 in marketing material prior to the Libya incident (STM 2018a).

The First Known Case of a "Killer Robot"?

The incident has been widely reported as being the first use of an LAWS in combat (Stanley 2021; Walsh 2021). This claim has triggered debate about the actual *novelty* of integrating autonomous and AI technologies into the Kargu-2 (and other LMs). This is most probably not the first time that LMs, and other weapons systems integrating automated, autonomous, or AI technologies in targeting, have been used on the battlefield. According to various reports, Azerbaijan already used the Israeli-manufactured LM Harop in 2016 to target a bus with Armenian military volunteers in 2016 in the disputed area of Nagorno-Karabakh (Gibbons-Neff 2016). Members of the academic CoP were therefore surprised by the significant attention the Libya incident triggered (Sauer 2021). "Does this instance in Libya appear to be a groundbreaking, novel moment in this discussion [on autonomy in weapon systems, author]? Not really. What is not new is the presence of loitering munitions. What is also not new is the observation that these systems are quite autonomous" (Franke quoted in Cramer 2021). In other words, "[t]he problem is that even if it did happen, for many experts, it's just not news" (Vincent 2021). The intense discussion surrounding the Kargu-2 in Libya therefore begs the question why it was this particular incident that drew the attention of the journalist CoP, when previous incidents have passed unnoticed. An explanation for this could be a (perceived) ripening of public interest in the topic, combined with the growing attention this topic has received since the creation of the GGE. While the use of the Harop in 2016 occurred just 2 years after states parties at the CCW started their informal discussions about LAWS, in 2021, these public discussions had already been more frequent and regular for 4 years, leading to more international media coverage of the topic.

In sum, we see three dynamics at play in how journalists and the weapon manufacturer performed practices of boundary-work in relation to the Kargu-2 in Libya: First, both the weapon manufacturer and the journalists used AI and autonomy much more frequently and easily than members of the diplomatic CoP. In both cases, it appears that actors across the two CoPs perform such practices of boundary-work to draw attention to their respective products. These practices connect to the significant buzz around AI technologies in the public sphere and its polarizing, and therefore attention-generating, portrayal in between utopian and dystopian visions. On the part of the manufacturer, designating their product as including "AI" intends to increase their selling potential.

Second, we can see in these practices how limiting and limited any public understanding of the factual technological capabilities of weapon systems integrating automated, autonomous, and AI technologies actually is. Any public knowledge builds on the information made available via the journalist CoP that is largely reliant on the information provided by manufacturers, includes many practices of boundary-work that make a public understanding of the distinction between automation, autonomy, and AI—and the consequences that the weaponization of these technologies can be associated with—tenuous.

This situation, third, enables a "terminology à la carte" that shapes normativity. It does so by creating spaces of possibility and *normality*, structuring what is politically thinkable. The effect of practices performed among journalists serves to constitute a societal hype around AI and puts out the message that weapons integrating AI technologies are here and have seemingly become part of what is "normal" in warfare. On the one hand, this hype, while (at least partly) tactically and commercially driven, could become the foundation for regulatory incentive. If such technologies are already used in weapon systems, LAWS cease being a future concern and become a current one in dire need of regulation. This conclusion is supported by the portrayal of a rather simple reality of weaponized "AI" in the media. But this simplification contrasts with the fact that knowledge of the object under discussion is actually more complex—and subject to significant uncertainty. A lack of nuance puts the critical and regulation-generating potential of journalistic practices on LAWS in peril. Weapon manufacturers adapt the performance of their knowledge-brokering practices according to context: An LM can therefore be simultaneously autonomous and not autonomous, although the actual technological functionalities of the systems do not change. This can, however, pull the rug from under practices portraying the existence and use of weapon systems integrating AI technologies as clear-cut. The dependence of public discourse on LAWS on information provided by weapon manufacturers therefore creates severe limits to knowing that can ultimately limit regulatory incentive.

Conclusion

Taking the debate about LAWS as a starting point, I analyzed how practices of boundary-work performed by actors in different communities of practice within a constellation shape normativity. Building on STS, I argued that these practices broker knowledge by seeking to establish seemingly objective, technical understandings of what counts as automated, as autonomous, and as AI. Such practices shape normativity in defining what should or should not be included in the debate on LAWS and what, if anything, should become the object of regulation.

My analysis of practices performed by actors across three CoPs within the constellation—diplomats, journalists, and weapon manufacturers—reached two findings: First, in the diplomatic CoP, actors refer to existing weapon systems integrating autonomous technologies as automated, thereby excluding such systems from the debate about LAWS. Further, by associating potential problems with such technologies chiefly with fully autonomous weapon systems, such practices shrink the regulatory space on LAWS to exclude practically all existing systems and systems in current development. Second, the case study of practices of boundary-work performed by journalists and the weapon manufacturer in

relation to the use of the Kargu-2 in Libya demonstrates the normative consequences of the instrumental boundary-work in between automation, autonomy, and AI: A new normality of integrating AI technologies in targeting alongside a deep and potentially unresolvable public uncertainty about the factual technological functionality of LAWS. The "terminology à la carte" performed by actors across the CoPs results in tenuous social understanding of the problem, thereby making it almost impossible to constitute a critical public understanding in this field that would be the basis for more regulatory incentive on the part of the diplomatic (and military) CoPs. There are at least three sets of political dynamics that underpin the practices of boundary-work performed by diplomats, journalists, and weapon manufacturers.[24] Boundary-work can originate in (1) differences in knowledge; in (2) different attitudes to regulation such as the wait-and-see approach but also in regulatory obstructionism by defining LAWS in overly narrow ways; and in (3) commercial motivations.

These observations lead me to at least two avenues of further research: First, there is much left to be explored in boundary-work performed across and within different CoPs both in terms of breadth, i.e., taking into account a wider selection of CoPs such as the military or civil society, as well as depth, i.e., studying the practices associated with a wider selection of weapon manufacturers. Practices performed by civil society actors have, for example, evolved in interesting ways since 2017. This includes significant changes in the terminology used, moving away from the notion of fully autonomous weapon systems to talking about sensor-guided weapons and autonomy in weapon systems (Article 36 2021; ICRC 2021; Connolly 2022).

Second, what is and what can be the role of the academic CoP in shaping critical public understanding in the debate on LAWS? Academic actors across both the technical and social sciences engage in discussions at the GGE and, via media interviews, are also asked to contribute to practices of boundary-work performed by journalists (Crootof 2019b). As reflexive, interpretive scholars, it therefore becomes crucial to consider how the academic CoP also performs boundary-work with potential effects on normativity and normality in shaping what we come to "know" about LAWS—and how to regulate them.

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