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Gender Bias in Military AI: Implications for Women's Security in Conflict Zones

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Introduction

The rapid adoption of artificial intelligence (AI) in military operations is transforming the nature of conflict, from automated targeting to AI-driven humanitarian aid. Yet, beneath the promise of technological neutrality lies a critical blind spot: the persistent gender bias embedded in both the development and deployment of military AI systems. As recent research highlights, the lack of gender expertise and the dominance of male perspectives in defense technology risk perpetuating-and even amplifying-existing inequalities, with serious consequences for women's safety and rights in conflict zones [2].

Source : Evolution of AI in Modern Military Warfare (Aranca, 2023)

The significance of this topic lies in the recognition that military AI constitutes not merely a technical advancement, but a transformative force that fundamentally influences patterns of

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[2] Katherine Chandler, 'Does Military AI Have Gender? Understanding Bias and Promoting Ethical Approaches in Military Applications of AI', 12 July 2021, https://unidir.org/publication/does-military-ai-have-gender-understanding-bias-and-promoting-ethical-approaches-in-military-applications-of-ai/.

protection, targeting, and marginalization during armed conflict. When gender bias remains unexamined and unaddressed within these systems, women and other marginalized groups are disproportionately exposed to risks. Critically engaging with these biases is imperative to ensure that technological progress in military domains does not undermine human rights or perpetuate gender inequities. This commentary seeks to elucidate the nature and implications of gender bias in military AI, and to advance concrete recommendations for fostering more equitable and inclusive approaches in the development and governance of these technologies.

Unpacking the Roots of Gender Bias: Theoretical Foundations for Analyzing Military AI

Before addressing the operational and humanitarian consequences of gender bias in military AI, it is essential to revisit the theoretical frameworks that underpin this analysis. These frameworks not only illuminate the roots of gendered inequalities in military technology but also provide critical tools for understanding how such biases are reproduced and sustained in contemporary conflict settings.

Feminist security theory, as articulated by scholars such as Cynthia Enloe, provides a foundational lens for understanding these dynamics by highlighting how defense institutions and technological design processes have historically privileged masculinized norms and perspectives[3]. This privileging is evident not only in the predominance of male developers and decision-makers in the field, but also in the tendency to frame security through binary and adversarial concepts-such as "protector" versus "protected" – which can marginalize the lived experiences and security needs of women in conflict zone[4]. The absence of gender analysis in the development and deployment of military AI creates a "gender vacuum" in both policy and practice, where systems are designed and implemented without sufficient consideration of how gender norms and inequalities shape both risks and outcomes[5].

[3] Reem Abbas, 'Cynthia Enloe: Militarised Empires Around the World', *WILPF* (blog), 6 March 2024, https://www.wilpf.org/cynthia-enloe-militarised-empires-around-the-world/.

[4] 'Critical Feminist Insights on Security, Militarism, and the Inclusion of Women in the Military - War Prevention Initiative', 9 October 2018, https://warpreventioninitiative.org/peace-science-digest/critical-feminist-insights-on-security-militarism-and-the-inclusion-of-women-in-the-military-2/.

[5] Shimona Mohan, 'Filling the Blanks: Putting Gender into Military A.I.', *Observer Research Foundation*, 2023, https://www.orfonline.org/research/filling-the-blanks-putting-gender-into-military-a-i.

Source : Female soldiers are changing how armed forces work

The field of critical algorithm studies demonstrates that the assumption of technological neutrality in military AI is misleading. Instead, AI systems often encode and amplify societal biases present in their training data and design processes6. These algorithmic shortcomings are not only technical failures but also reflect and reinforce broader patterns of gendered exclusion and misrecognition, with real-world consequences for the identification and protection of individuals in conflict settings7.

Finally, intersectional humanitarian law emphasizes that military AI can exacerbate compound vulnerabilities by intersecting gender with other identity markers such as displacement, ethnicity, and disability. As highlighted by SIPRI, the use of AI in military targeting and humanitarian applications risks perpetuating and even amplifying existing forms of bias, leading to misidentification and the denial of critical protections under international law[8].

These dynamics expose a self-reinforcing feedback loop rooted in the interplay of institutional norms and technical design. Without deliberate intervention, military AI risks institutionalizing gender hierarchies under the guise of progress, where "neutral" algorithms legitimize exclusion. This cyclical erasure-where biased systems generate biased outcomes that further marginalize

[6] Laurie Kaiser, 'UB Computer Science Professor Weighs in on Bias in Facial Recognition Software', *University at Buffalo*, 2024, https://www.buffalo.edu/news/tipsheets/2024/ub-ai-expert-facial-recognition-expert-ifeoma-nwogu.html.

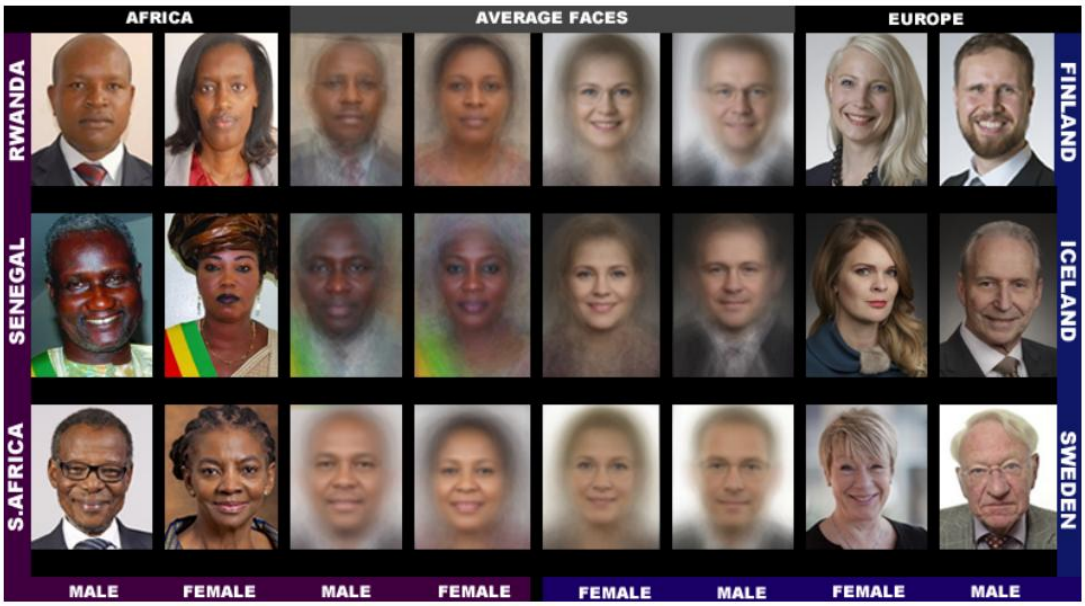
[7] Chandler, 'Does Military AI Have Gender?'

[8] Nivedita Raju and Laura Bruun, 'Integrating Gender Perspectives into International Humanitarian Law' (Stockholm International Peace Research Institute, August 2023), https://doi.org/10.55163/QILU7567.

women-demands dismantling the theoretical and practical divides between gender justice and technological governance.

Operational Expressions of Gender Bias in Military AI

Military AI systems operationalize gender bias across several domains, with particularly pronounced effects in targeting technologies. In the case of civilian applications of AI, Buolamwini and Gebru showed that the error rate for commercial gender classification was less than 1% for lighter-skinned males, but rose to 34.7% for darker-skinned females[9]. This discrepancy is directly linked to the composition of training datasets, which are often overwhelmingly comprised of images of lighter-skinned men, while women – especially women of color-are significantly underrepresented. As noted by the authors, the lack of diversity among AI developers and the absence of representative data perpetuates and amplify these biases.



Source : Buolamwini and Gebru, 'Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification

However, this issue is not confined to civilian applications. As highlighted by UNIDIR, military AI systems often draw directly on the same datasets, methods, and design practices as their

[9] Joy Buolamwini and Timnit Gebru, 'Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification', 2018, https://www.semanticscholar.org/paper/Gender-Shades%3A-Intersectional-Accuracy-Disparities-Buolamwini-Gebru/18858cc936947fc96b5c06bbe3c6c2faa5614540.

civilian counterparts, inheriting and reproducing these entrenched biases[10]. The consequences in military contexts are profound: biased training data can lead to the misclassification of civilians as combatants or the overlooking of certain individuals altogether, with serious legal and ethical ramifications. For example, in the occupied Palestinian territories, facial recognition algorithms exhibit a high misidentification rate for veiled women, often categorizing them as "non-human" objects or failing to distinguish civilians from combatants [11] . These misidentifications are not simply technical errors; they have direct consequences, potentially exposing women to wrongful targeting or exclusion from protection under the laws of armed conflict.

Beyond targeting, gender bias is also embedded in military intelligence analysis. Pattern-of-life algorithms, which are used to predict behaviors and assess threats, often encode gendered assumptions. Natural language processing tools used to analyze conflict narratives have also been shown to misclassify or deprioritize reports associated with women's experiences, entrenching gendered blind spots in military decision-making. For instance, caregiving activities performed by women may be interpreted as "non-threatening", while similar patterns of movement by men are coded as "suspicious", leading to differential treatment and risk exposure[12]. These technical shortcomings are not simply errors; they reflect and reinforce broader patterns of exclusion and misrecognition that have real-world consequences for the identification and protection of individuals in conflict settings.

The impact of gender bias extends into humanitarian applications of AI as well. SIPRI notes that bias in military AI can have humanitarian consequences "depending on context and use", including in targeting, surveillance, and humanitarian services[13]. It specifically warns that AI systems used to support humanitarian services during armed conflict can reinforce stigmatization and discrimination, leading to the exclusion of vulnerable populations from relief actions if their needs are not accurately identified by the system. Indeed, AI systems-such as

[10] Chandler, 'Does Military AI Have Gender?'

[11] 'Artificial Intelligence in Military Conflict: Critical Reflections - Next Century Foundation', 19 November 2024, https://www.nextcenturyfoundation.org/artificial-intelligence-in-military-conflict-critical-reflections/.

[12] Katherine Chandler, 'AI Is Often Biased. Will UN Member States Acknowledge This in Discussions of Autonomous Weapon Systems?', *IPI Global Observatory*, 20 September 2021, https://theglobalobservatory.org/2021/09/ai-is-often-biased-will-un-member-states-acknowledge-this-in-discussions-of-autonomous-weapon-systems/.

[13] Alexander Blanchard and Laura Bruun, 'BIAS IN MILITARY ARTIFICIAL INTELLIGENCE', *SIPRI*, 2024.

biometric identification, digital aid targeting, and data-driven resource allocation often lack gender-disaggregated data, resulting in the exclusion or underestimation of women's needs.

Source : Refugees Protest Inhumane Conditions in Kakuma - USCRI

For example, in Kakuma refugee camp, the implementation of biometric identity management systems for food aid distribution has resulted in the exclusion of marginalized groups, particularly Somali Bantu women, who often face difficulties with fingerprint recognition due to manual labor and lack of proper documentation[14]. This technological barrier, combined with existing social inequalities, has made it harder for these women to access essential humanitarian assistance, highlighting how AI-driven systems can inadvertently reinforce patterns of exclusion in crisis contexts.

These operational biases are the result of "lifecycle bias", where gender gaps compound at every stage of AI development and deployment, ultimately perpetuating and amplifying inequalities rather than mitigating them[15].

Addressing and Reducing Gender Bias: Strategies for Military AI

Effectively addressing gender bias in military AI requires a holistic strategy that integrates technical, policy, and institutional reforms, each grounded in empirical research and human rights principles. One of the most critical steps is ensuring that training datasets are gender-balanced. As highlighted by UNIDIR, the predominance of men in AI development-where

[14] Iazzolino, Gianluca. "Infrastructure of compassionate repression: making sense of biometrics in Kakuma refugee camp." *Information Technology for Development* 27.1 (2021): 111-128.
[15] Chandler, 'Does Military AI Have Gender?'

women are significantly underrepresented-has led to male-skewed data that fails to capture the full spectrum of women's experiences and needs in conflict settings. Studies confirm that when AI models are trained on mixed-gender datasets, the resulting systems exhibit less gender disparity and more equitable outcomes compared to those trained on gender-specific or unbalanced data sets[16]. This underscores the importance of inclusive data collection and algorithmic auditing as foundational technical interventions.

Beyond technical fixes, policy measures play a vital role in institutionalizing gender accountability within military AI. UNIDIR advocates for mandatory gender impact assessments at every stage of AI system development and deployment, ensuring that potential harms are identified and mitigated before systems are operationalized[17]. It also emphasize the need for states to adopt clear guidelines and risk mitigation measures to address unintended gender biases in AI-enabled military applications[18]. Additionnally, integrating the Women, Peace, and Security (WPS) agenda into AI governance frameworks is also essential, as it brings gender expertise directly into oversight and decision-making processes[19].

Institutional reforms are equally necessary to rewire defense cultures that have historically marginalized women and other underrepresented groups.

Source : UNIDIR Launches Women in AI Fellowship

[16] Latif, Ehsan, Xiaoming Zhai, and Lei Liu. "Ai gender bias, disparities, and fairness: Does training data matter?." *arXiv preprint arXiv:2312.10833* (2023).

[17] Chandler, 'Does Military AI Have Gender?'

[18] Lansana Gberie, Ingvild Bode, Shimona Mohan. Fixing Gender Glitches in Military AI: Mitigating Unintended Biases and Tackling Risks. *United Nations Institute for Disarmament Research (UNIDIR), 6 Mar. 2024*

[19] Bringas, B. (2024). The Role of AI in Supporting Women, Peace and Security Agenda. EPIS Magazine, 4(6).

Increasing gender diversity within defense technology teams and establishing cross-disciplinary review boards-including ethicists, gender experts, and civil society representatives-are recommended as effective ways to surface and address bias. UNIDIR's Women.AI Fellowship and similar initiatives aim to foster such diversity and expertise, ensuring that a wider range of perspectives informs the development and governance of military AI.

The combined effect of these strategies is not merely theoretical. Efforts to mainstream gender analysis and diversify technical teams have led to measurable improvements in the fairness and reliability of military AI systems. However, experts caution that technical solutions alone are insufficient; meaningful progress requires a cultural reckoning within military institutions to challenge entrenched gender norms and power dynamics. By implementing these reforms, states can move toward military AI systems that not only minimize harm but also actively promote gender equity in line with international commitments such as the Women, Peace, and Security agenda and the Sustainable Development Goals.

Conclusion

The integration of artificial intelligence into military systems has unveiled systemic gender biases that exacerbate risks for women in conflict zones, undermining both security and equity. This analysis demonstrates that military AI technologies-from automated targeting to humanitarian aid algorithms-replicate and amplify societal inequalities through male-dominated development teams, unrepresentative training datasets, and institutional norms privileging masculinized conceptions of warfare. These biases manifest in operational failures: facial recognition systems misclassify veiled women as non-human objects, pattern-of-life algorithms dismiss caregiving activities as non-threatening, and biometric aid systems exclude female-headed households due to technical and social barriers.

Addressing these challenges necessitates a paradigm shift in military AI governance. Technical interventions, such as gender-balanced datasets and algorithmic audits, must be paired with policy reforms that institutionalize gender impact assessments and align AI systems with the Women, Peace, and Security agenda's equity mandates. While technological fixes can mitigate immediate harms, lasting progress demands dismantling the militarized masculinities that shape AI development. By centering gender equity in design and governance, stakeholders can ensure military AI advances human security rather than eroding it, aligning technological progress with the Sustainable Development Goals' vision of inclusive peace.