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RESEARCH ARTICLE

The drone revolution: Towards a synthesis in the drone debate

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Abstract
To what extent can drones be the primary determinants of victory in warfare? This question is at the heart of the drone revolution debate in security studies. Proponents of a drone revolution argue that drones provide 'game-changing characteristics', act as 'magic bullets' against adversaries, and even provide the key defence to decide the 'fate of nations'. Sceptics disagree, arguing that no matter the nuances or contexts of war, drones can never be considered the primary determinant of victory. In this article, we argue that the two sides of the debate rest upon a false dichotomy – that technologies must either be revolutionary or evolutionary. We reappraise country-specific case studies used by both sides of the debate: the Ethiopia–Tigray War, the Houthi–Saudi War, and the Russia–Ukraine War. Our analysis reveals a welcome synthesis; the impact of drone employment depends on the types of war waged, the drone capabilities deployed, and the political objectives sought in each conflict. In this sense, drones can have an impact on war that is sometimes ordinary and sometimes revolutionary. It is only by clarifying the analytical scope of the debate that the impact of drones on the practice of war can be fully understood.

Keywords: drone warfare; drones; Ethiopia; Houthis; military revolution; Ukraine

The drone revolution?

Can drones ever be considered the primary determinant of victory on the battlefield? New platforms of warfare routinely acquire staunch advocates of their utility.[1] Proponents of the drone revolution have argued that drones present a new technology of war that provides game-changing characteristics with the potential to act as a magic bullet against an adversary and a key defence in the fate of a nation.[2] The sceptics of such claims are currently dominating the conversation around

[1]See, for example, J. F. C. Fuller's advocacy for the battle tank and its potential to 'revolutionize the art of tactics' or Alexander de Seversky's 1942 claim that aviation was the new 'decisive factor in war making'. J. F. C. Fuller, *On Future Warfare* (London: Sifton-Praed & Co., 1928), pp. 89–90; Alexander de Seversky, *Victory through Airpower* (New York: Simon & Schuster, 1942), p. 3.

[2]Declan Walsh, 'Foreign drones tip the balance in Ethiopia's civil war', *The New York Times* (20 December 2021), available at: {https://www.nytimes.com/2021/12/20/world/africa/drones-ethiopia-war-turkey-emirates.html}; David Hambling, 'The "magic bullet" drones behind Azerbaijan's victory over Armenia', *Forbes* (10 November 2020), available at: {https://www.forbes.com/sites/davidhambling/2020/11/10/the-magic-bullet-drones-behind--azerbaijans-victory-over-armenia/}; Agnes Callamard and James Patton Rogers, 'We need a new international accord to control drone proliferation', *Bulletin of Atomic Scientists* (2020), available at: {https://thebulletin.org/2020/12/we-need-a-new-international-accord-to-control-drone-proliferation/}.

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the drone revolution debate.[3] In this paper, we argue that, while the debate over the drone revolution is entertaining in its contentiousness, it misses the point that the impact of drones largely depends on the socio-political contexts in which the technology is introduced and used.

The claim that the role of technology depends on the politics of a given war is likely of no surprise to even the casual reader. 'War is a continuation of politics by other means', and as a result, the effectiveness of any drone campaign is contingent on the political context surrounding their use. But politics is a broad signifier, and most studies regarding the effectiveness of drone technology in military campaigns centre on US wars of intervention – a set of very narrow case studies that lack broadly applicable lessons. As drones proliferate, better theories with more political specificity and higher international relatability are needed.

To this end, we begin at the foundations of the drone revolution debate, one that pits technological fantasy against operational realities.[4] These two camps are specifically segmented as proponents or sceptics of the drone revolution, with little flexibility for integrating across the two. We adopt this framework from Antonio Calcara and his co-authors, who portray analysts as either technological fanatics, certain that drones have revolutionised 21st-century war, or as sceptics, unwilling to concede to the radical claims of the proponents.[5] While Calcara et al. explore these categories in detail, the debate has continued since their article's publication, and so we think a brief recapitulation of the discussion is worthwhile here. In addition, we simplify their framework. Proponents and sceptics have opposing responses to the question we posed at the outset: can drones ever be considered the primary determinant of victory on the battlefield?

The proponents and the sceptics

Proponents of the drone revolution suggest that drones can (at least) sometimes be considered the primary determinant of victory in contemporary warfare.[6] Analysts and scholars alike have referred to drones in various settings as 'game-changers', 'magic bullets', or the deciders of the 'fates of nations'.[7] Each term identifies a distinct characterisation of revolutionary change in the character of war. While most proponents do not use such provocative terminology, these descriptors present three useful categories under which the more nuanced argument of both sides of the debate can, and will, be explored.

Sceptics of the drone revolution suggest that drones can never be considered the primary determinant of victory on contemporary battlefields. Scepticism of the game-changer depiction of drones is often rooted in an operational argument developed by Stephen Biddle.[8] The problem of – and solution to – trench warfare in the First World War, Biddle argues, was one of operational

[3]See, for example, Antonio Calcara, Andrea Gilli, Mauro Gilli, Raffaele Marchetti, and Ivan Zaccagnini, 'Why drones have not revolutionized war: The enduring hider–finder competition in air warfare', *International Security*, 46:4 (2022), pp. 130–71; Antonio Calcara, Andrea Gilli, Mauro Gilli, and Ivan Zaccagnini, 'Will the drone always get through? Offensive myths and defensive realities', *Security Studies*, 31:5 (2022), pp. 791–825.

[4]Debates about the legality, ethics, and morality of drone use all are continuing alongside conversations about the drone revolution and strategic effectiveness. Unfortunately for these conversations, the ideals of remote warfare – precise, surgical, with fewer civilian casualties and a light military footprint – have fallen to the wayside, and the normative commitments of such ideals have taken a backseat to conversations about strategic effectiveness. We do not endorse the twilight of ethical, moral, and legal debates, but we do suggest that international norms of drone use are set and seem unlikely to change in the near future.

[5]Calcara, Gilli, Gilli, Marchetti, and Zaccagnini, 'Why drones have not revolutionized war'.

[6]In contrast to the studies examined here, other scholars identify the revolutionary impact of drones in war with the underlying implication that 'The real RMA is the move away from human-centric warfare to post-human warfare'. This is an important consideration when looking towards the distant future, but of course, beyond the scope of our argument. Stephanie Carvin and Michael John Williams, *Law, Science, Liberalism and the American Way of Warfare* (New York: Cambridge University Press, 2014), p. 202.

[7]Walsh, 'Foreign drones tip the balance of Ethiopia's civil war'; Hambling, 'The "magic bullet" drones behind Azerbaijan's victory over Armenia'; Callamard and Patton Rogers, 'We need a new international accord to drone proliferation'.

[8]Stephen Biddle, *Military Power* (Princeton, NJ: Princeton University Press, 2004).

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and tactical doctrine. Manoeuvre was eventually gained by discovering what Biddle calls 'the modern system', a combined field manoeuvre that involved small independent units moving across the battlefield by way of dispersing, taking cover, concealing themselves, and suppressing enemy fire through combined arms integration. In its operational scope, the modern system subsumes each subsequent technological or doctrinal development; every emerging technology can be integrated into the modern system, or is an extension of the modern system, to create piecemeal military innovations.[9] In other words, technologies cannot be determinants of victory, only force multipliers under modern system employment. In short, sceptics of the drone revolution argue that drones have not changed the game, do not provide a magic bullet, and do not decide the fate of nations. We now take a closer look at the proponents and sceptics in each of these categories.

Drones as game-changers?

A revolutionary 'game change' occurs when a technology provides such an innovative disruption as to invert or significantly change the character of battlefields. Many conversations regarding the disruptive impact of drones on the contemporary battlefield focus on non-state actors and their acquisition of the technology.[10] It was the Islamic State's successful adoption and use of drones in its operations in Syria and Iraq, especially those on display during the coalition forces' siege of Mosul in late 2016 and early 2017, that best characterised this 'second drone age'.[11] Pablo Chovil, a member of the US 82nd Airborne Division and participant in the Battle of Mosul, notes the advantage drones provided IS militants to observe coalition troop movement into and around the city.[12]

There is consensus among scholars that drones in the hands of non-state militants will be technologies of destruction and disruption rather than primary determinants of battlefield victory. As such, scholarship considering non-state drone proliferation often focuses on the prevention and mitigation of drone attacks.[13] As these technologies become more affordable, however, drones may create new potential for successful outcomes over state governments or their intervening allies. Amy Zegart,[14] for example, argues that drones may serve as an effective coercive technology by conveying to an adversary that attacks can be affordably sustained over considerable periods of time. While Zegart's evidence relied heavily on the US use of drones, her argument applies equally as well to non-state actors. As we show below, the Houthi rebels have already proved to be an early case of coercion success against an intervening state actor. In cases such as these, drones may achieve strategic effectiveness when there exist asymmetric political interests in the conflict.

[9]See, for example, Calcara, Gilli, Gilli, Marchetti, and Zaccagnini, 'Why drones have not revolutionized war'; Calcara, Gilli, Gilli, and Zaccagnini, 'Will the drone always get through?'.

[10]See, for example, Ash Rossiter, 'Drone usage by militant groups: Exploring variation in adoption', *Defense & Security Analysis*, 34:2 (2018), pp.113–26; James Patton Rogers, 'Future threats: Military UAS, terrorist drones, and the dangers of the Second Drone Age', in *A Comprehensive Approach to Countering Unmanned Aircraft Systems,* Matthew Willis, André Haider, Daniel C. Teletin, and Daniel Wagner (eds.) (Kalkar: The Joint Air Power Competence Centre, 2021), pp. 481–508, available at: {https://www.japcc.org/wp-content/uploads/A-Comprehensive-Approach-to-Countering-Unmanned-Aircraft-Systems.pdf}.

[11]For the ISIS use of drones, see James Rogers, 'The darkside of our drone future', *The Bulletin of the Atomic Scientist* (2019), available at: {https://thebulletin.org/2019/10/the-dark-side-of-our-drone-future/}. For the US use of drones during this same period as part of Operation Inherent Resolve, see Andrew Mumford, *The West's War against Islamic State: Operation Inherent Resolve in Syria and Iraq* (London: IB Tauris, 2021), pp. 63–4.

[12]Pablo Chovil, 'Air superiority, under 2000 feet: Lessons from waging drone warfare Against Isil', *War on the Rocks* (2018), available at: {https://warontherocks.com/2018/05/air-superiority-under-2000-feet-lessons-from-waging-drone-warfare-against-isil/}.

[13]T. X. Hammes, 'The democratization of airpower: The insurgent and the drone', *War on the Rocks* (2016), available at: {https://warontherocks.com/2016/10/the-democratization-of-airpower-the-insurgent-and-the-drone/}; Rossiter, 'Drone usage by militant groups'; Alyssa Sims, 'The rising drone threat from terrorists', *Georgetown Journal of International Affairs*, 19 (2018), pp. 97–107.

[14]Amy Zegart, 'Cheap flights, credible threats: The future of armed drones and coercion', *Journal of Strategic Studies*, 43:1 (2020), pp. 6–46.

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Increasingly, however, some scholars focusing on state acquisition and more conventional conflicts, suggest changes to the character of the battlefield can open a window of opportunity for that technology to serve as a primary determinant of victory. It is, for Maximilian Bremer and Kelly Grieco, the coordination between ground infantry and assets like drones in the 'air littoral' that make or break a state's chances on the modern battlefield.[15] The authors argue the fight for control over the first 10,000 feet of elevation above the ground and under more traditional air assets is significant to victory in any conflict or war. According to Grieco and Bremer, 'the employment of large numbers of small and cheap but lethal systems in the air littoral' will likely determine the victor in future 'high-end fights'.[16] Contrastingly, in an early assessment of the war in the Nagorno Karabakh, Joël Postma dampens claims that the Azeri drone use was a watershed for the future character of warfare, declaring that armed drones were 'not the single decisive factor'.[17] Ultimately, for Postma, drones' inability to hold territory determines their secondary importance to infantry. As such, the question of whether the game-changing character of drones will lend the technology to determining the outcomes of conflicts remains unresolved.

Drones as magic bullets?

Describing drones as a 'magic bullet' suggests that the technology itself introduces an advantage to its user that can determine the outcome of the belligerent interaction. The magic bullet theory tends to find its test in an unsettled debate over the effectiveness of the United States' use of armed drones in targeted killing campaigns against members of terrorist organisations in Afghanistan, Pakistan, Yemen, and Somalia. On the one hand, scholarship suggests drone strikes constitute credible threats and can effectively influence the capacity and behaviour of terrorist groups, particularly targeted killings to disrupt and degrade these organisations. Amy Zegart, for example, casts her assessment of drones in the light of coercion theory. In short, the cost-effectiveness of drones provides the credibility to shoot the enemy 'forever', and in doing so gives significant coercive leverage to their user.[18] Other scholars have noted the impact of drones in degrading and dismantling terrorist organisations.[19]

The evidence magic bullet proponents present has not proven indisputable. Competing studies find drone strikes are ineffective at best and counterproductive at worst.[20] Rather than positively influencing the behaviour of terrorist groups, critics claim, drone strikes tend to embolden and even strengthen these groups, who are quick to learn and adapt their organisational practices to reduce their vulnerability to strikes.[21] More recently, Anouk Rigterink has shown that terrorist

[15]Maximilian K. Bremer and Kelly A. Grieco, 'The air littoral: Another look', *The US Army War College Quarterly: Parameters*, 51:4 (2021), pp. 67–80.

[16]Kelly A. Grieco and Maximilian K. Bremer, 'Contesting the air littoral', *Æther: A Journal of Strategic Airpower & Spacepower*, 3:3 (2024), pp. 10–24 (p. 14).

[17]Joël Postma, 'Drones over Nagorno-Karabakh', *Atlantisch Perspectief*, 45:2 (2021), pp.15–20 (p. 15).

[18]Zegart, 'Cheap flights, credible threats'; see also Marcel Plichta and Ash Rossiter, 'A one-way attack drone revolution? Affordable mass precision in modern conflict', *Journal of Strategic Studies*, 47:6–7 (2024), pp. 1001–31.

[19]See, for example, Daniel Byman, 'Why drones work: The case for Washington's weapon of choice', *Foreign Affairs*, 92:4 (2013), pp. 32–43; Patrick B. Johnston, 'Does decapitation work? Assessing the effectiveness of leadership targeting in counterinsurgency campaigns', *International Security*, 36:4 (2012), pp. 47–79; B. C. Price, 'Targeting top terrorists: How leadership decapitation contributes to counterterrorism', *International Security*, 36:4 (2012), pp. 9–48; Patrick B. Johnston and Anoop K. Sarbahi, 'The impact of US drone strikes on terrorism in Pakistan', *International Studies Quarterly*, 60:2 (2016), pp. 203–19; Asfandyar Mir, 'What explains counterterrorism effectiveness? Evidence from the US drone war in Pakistan', *International Security*, 43:2 (2018), pp. 45–83; Kelly A. Grieco and James Wesley Hutto, 'Can drones coerce? The effects of remote aerial coercion in counterterrorism', *International Politics*, 60:4 (2023), pp. 919–43.

[20]Audrey Kurth Cronin, 'Why drones fail: When tactics drive strategy', *Foreign Affairs*, 92:4 (2013), pp. 44–54; Jenna Jordan, 'When heads roll: Assessing the effectiveness of leadership decapitation', *Security Studies*, 18:4 (2009), pp. 719–55; Jenna Jordan, 'Attacking the leader, missing the mark: Why terrorist groups survive decapitation strikes', *International Security*, 38:4 (2014), pp. 7–38; Jesse Paul Lehkre and Rahel Schomaker, 'Kill, capture, or defend? The effectiveness of specific and general counterterrorism tactics against the global threats of the post-9/11 era', *Security Studies*, 25:4 (2016); pp. 729–62.

[21]Jordan, 'When heads roll'; Jordan, 'Attacking the leader'.

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attacks increased in Pakistan in the six months after a US drone strike hit relative to those months after a miss.[22] This suggests that drones not only fail to provide the primary determinant of victory in conflict, but their use actually increases the chances of failure – drone employment inadvertently encourages terrorism and insurgency.[23]

Certainly, the US- and counterterrorism-centric character of these discussions poses a problem of generalisation. Recently, however, Antonio Calcara, Andrea Gilli, Mauro Gilli, and Ivan Zaccagnini garnered significant attention arguing against the magic bullet narrative, particularly in conventional conflicts.[24] Because drones are unable to offer significant advantage over air defences, the authors argue, they cannot be claimed to provide an offensive advantage for their users and likewise offer no revolutionary effects on battlefields. In other words, it is the integrated air defence systems capable of targeting and shooting down drones that provides the true keys to national security and defence, not drone technologies.[25] In their turn, these authors have gained significant criticism,[26] but much like the game-changer question, the question of whether the drones provide a magic bullet that can determine the outcomes of conflicts also remains unresolved.

Drones deciding the fate of nations?

If drones 'decide the fate of nations', we should expect that their acquisition creates distinct military and political advantages for the acquiring state.[27] In other words, a technology that performs this role alters 'the capacity of states to create and project military power'.[28] Michael Boyle suggests that armed drone proliferation outside of the Western world will function like the aircraft before it and reset 'the terms of competition' by 'introducing a degree of uncertainty into regional balances of power'.[29] While for Boyle the impact of drones is most heavily felt in their political nature – the technology increases uncertainty between states, their low cost makes aggression easier to risk and accidental military incidents more likely – it signals the significance of drone acquisition for developing nations. Other scholars have pointed to both the defensive capabilities of drones when integrated into an overall air defence system, as well as suggesting that drone surveillance capability could have a significant impact on the nuclear stability between small nuclear states.[30] None of this quite answers the question of whether drones can decide the fate of a nation or be the primary determinant in a state's survival. Though it is clear that sceptics of a game change as well as the

[22] Anouk S. Rigterink, 'The wane of command: Evidence on drone strikes and control in terrorist organizations', *American Political Science Review*, 115:1 (2021), pp. 31–50.

[23] The US and counterterrorism-centric character of these discussions pose a problem of generalisation for two important reasons. First, the US experience in the global war on terror (GWOT) remains a unique international event in which a great power declares war on 'a method'. In this sense, the GWOT does not meet the legal classifications of war, impacting the transmutability of its lessons onto more conventional styles of conflict. The ephemerality of declaring war on the method of terrorism drives the second problem with generalising findings from the GWOT: the political objective is so broad it is nearly impossible to measure victory. Scholars typically agree that terrorism is not a practice that can be eradicated but instead one that must be managed. This consensus does not inspire much hope for any recognisable political victory over terrorism, which makes assessing the impacts of drones in quelling terrorist practices difficult over the long term. Nevertheless, it is possible to assess the performance of US drone campaigns against *specific organisations* that practise terrorism. In this sense, it is possible some idea of their use and utility can be translated to more general types of conflicts – primarily those involving asymmetry between the participants.

[24] Calcara, Gilli, Gilli, Marchetti, and Zaccagnini, 'Why drones have not revolutionized war'.

[25] The sceptics are not without their critics. In a recent special section in the journal *Security Studies*, Jacquelyn Schneider, Paul Lushenko, and Sarah Kreps all take aim at Calcara et al.'s arguments.

[26] Jacquelyn Schneider, 'Unscorable at 12: Technically correct, but misses the mark', *Security Studies*, 32:3 (2023), pp. 568–74; Paul Lushenko and Sarah Kreps, 'Tactical myths and perceptions of reality', *Security Studies*, 32:3 (2023), pp. 574–81.

[27] Callamard and Patton Rogers, 'We need a new international accord to drone proliferation'.

[28] Williamson Murray and MacGregor Knox, 'Thinking about revolutions in warfare', in MacGregor Knox and Williamson Murray (eds), *The Dynamics of Military Revolution, 1300–2050* (New York: Cambridge University Press, 2001), pp. 1–14 (p. 7).

[29] Michael J. Boyle. 'The race for drones', *Orbis*, 59:1 (2015), pp. 76–94 (p. 78).

[30] J. Wesley Hutto, 'Drone proliferation and IR theory: Visions for the future', in James Patton Rogers (ed.), *De Gruyter Handbook of Drone Warfare* (Boston, MA: Walter de Gruyter, 2024), pp. 453–74; Steven J. Childs, 'Developing nations, drones and deterrence: Unmanned aerial vehicles and small nuclear powers', *Comparative Strategy*, 40:1 (2021), pp. 1–17.

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magic bullet theory would take issue with such a claim, this area of the drone revolution remains largely unresearched.

Towards a synthesis?

While the dichotomy provides us with a useful starting point, we aim to move towards a synthesis. Indeed, when theories and evidence conflict to this degree each with some validity, synthesis is necessary. We take our cue from Allan Dafoe, who points out that questions regarding the impact of technology research 'should not be … dichotomous … but a set of questions of degree, scope, and context: to what extent, in what ways, and under what scope conditions are particular kinds of technology more autonomous and powerful in shaping society?'.[31] It is much the same when considering technological advancements and military victory. The questions raised here are simple and straightforward: Which wars? What are the objectives? Which drone technologies and who has them?

Whether drones can be considered the primary determinant of victory on a contemporary battlefield depends on the type of war conducted, the political objectives involved, and the tactical capabilities deployed. These contextual factors are not causal but constitutive. Rather than functioning as independent variables that distinctly influence the battlefield impact of drones, they are interconnected and collectively shape a contextual battlefield on which drones are employed. The way these ideal types interact and ultimately influence drone deployment is a key focus of this paper.

A note on method and case selection

Whether drones can be considered the primary determinant of victory on a contemporary battlefield depends on the type of war conducted, the political objectives involved, and the tactical capabilities deployed. We identify three conflict ideal-types (conventional wars, civil wars, and wars of intervention) and three broad types of political objective (territorial dispute, policy change, regime change) and adopt NATO's three-fold categorisation of drone technologies (category I, II, and III), roughly equating with high-altitude long-endurance drones (HALE), medium-altitude long-endurance drones (MALE), and small drone systems. Taken together, these variables shape the battlefield potential for drone effect. For example, in conventional wars, battlefield technology saturation may dull the impact of drones on its outcome. As we will argue, this is less likely to be the case in civil wars and wars of intervention with weaker actors or less intense political objectives.

Contextual variable 1: Conflict type

We identify three conflict ideal-types – conventional wars, civil wars, and wars of intervention – in which drone warfare occurs. Conventional war involves two organised, regular, militaries and is carried out under the banners of adversarial sovereign state governments, having the characteristics of symmetric warfare. In short, conventional war is organised violence subordinate to a state's political objective. The political objectives in conventional war vary from simple policy change demands to demands for territorial cessions or regime change.[32] Conventional wars can sometimes be wars of existence fought for survival, but this is not always the case. In this sense, conventional wars range from limited to unlimited forms of violence. Yet there is a natural progression towards extremes in conventional wars.[33] In other words, political objectives can change as wars proceed.

[31] Allan Dafoe, 'On technological determinism: A typology, scope conditions, and a mechanism', *Science, Technology, & Human Values*, 40:6 (2015), pp. 1047–76 (p. 1050).

[32] Daniel M. Jones, Stuart A. Bremer, and J. David Singer, 'Militarized interstate disputes, 1816–1992: Rationale, coding rules, and empirical patterns', *Conflict Management and Peace Science*, 15:2 (1996), pp. 163–213.

[33] Even Clausewitz recognised this fact: 'the strength of [the enemy's] will is much less easy to determine and can only be gauged approximately by the strength of the motive animating it. Assuming you arrive in this way at a reasonably accurate

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Conventional wars feature violent force-on-force combat, as adversaries search for decisive points in operational lines, looking to deliver a knockout blow to the other's capabilities, leadership, or materiel. In this violence, adversaries in conventional wars tend to harden their positions, and expand their political objectives. It is conventional wars that do not feature this tendency toward the extreme that are often brought up as novel contrary occurrences: the Falklands War between Great Britain and Argentina and the First Gulf War between the United States (US) and Iraq are the two most cited instances of short conflicts with decisive characteristics, in which the political objectives were set and once met the fighting ceased.

In contrast to conventional wars, civil wars are organised violence carried out by substate actors with a political purpose.[34] Because these conflicts pit the state against a substate actor, they tend to feature asymmetric warfare. The political objectives of civil war vary as much as those in conventional war, perhaps more.[35] Whether they be casting off the yoke of an oppressive government, forcing a policy change by the regime in power, or establishing sovereignty over a piece of territory,[36] the insurgents in a civil war target a combination of state government forces as they compete for the hearts and minds of their 'nation'.[37] In this sense, civil wars are prone to unconventional combat, though this varies from state to state, depending on the relative power of and technologies available to the militaries involved.[38] The military representing the interest of the state is often equipped with better training and more powerful weapons, and the army may even have the benefit of supporting services, like a navy or air force, prompting the substate actor to fight asymmetrically.[39]

Typically, a civil war has succeeded if the insurgents can deny the government effective control over its territory, defeat state fighters, or force their withdrawal from separatist territory.[40] While it is likely that the success of insurgency depends on the relative power of the state government, it is also the case that strong state governments do not typically encounter serious civil insurgencies – and even when they do, success is difficult.[41] Thus, any state government experiencing a threatening civil war is in a weakened state and is at least somewhat vulnerable to the demands of the insurgency.

estimate of the enemy's power of resistance, you can adjust your own efforts accordingly; that is, you can either increase them until they surpass the enemy's or, if this is beyond your means, you can make your efforts as great as possible. But the enemy will do the same; competition will again result and, in pure theory, it must again force you both to extremes.' Carl Von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), p. 77.

[34]Stathis Kalyvas, *The Logic of Violence in Civil War* (New York: Cambridge University Press, 2006).

[35]Steven R. David, 'Internal war: Causes and cures', *World Politics*, 49:4 (1997), pp. 552–76.

[36]Paul Collier and Anke Hoeffler, 'On economic causes of civil war', *Oxford Economic Papers*, 50:4 (1998), pp. 563–73; Michael L. Ross, 'What do we know about natural resources and civil war?', *Journal of Peace Research*, 41:3 (2004), pp. 337–56; Halvard Buhaug, 'Relative capability and rebel objective in civil war', *Journal of Peace Research*, 43:6 (2006), pp. 691–708; David Sobek and Caroline L. Payne, 'A tale of two types: Rebel goals and the onset of civil wars', *International Studies Quarterly*, 54:1 (2010), pp. 213–40.

[37]Many civil wars have an ethnic or ideological dimension; see Marta Reynal-Querol, 'Ethnicity, political systems, and civil wars', *Journal of Conflict Resolution*, 46:1 (2002), pp. 29–54; Nicholas Sambanis, 'Do ethnic and nonethnic civil wars have the same causes? A theoretical and empirical inquiry (Part 1)', *Journal of Conflict Resolution*, 45:3 (2001), pp. 259–83. Especially in these cases, the hearts and minds of the surrounding populations tend to be just as important for the success of the insurgent as it is for the success of the counterinsurgent: see Kalyvas, *The Logic of Violence in Civil War*; Christoph Mikulaschek, Saurabh Pant, and Beza Tesfaye, 'Winning hearts and minds in civil wars: Governance, leadership change, and support for violent groups in Iraq', *American Journal of Political Science*, 64:4 (2020), pp. 773–90.

[38]Stathis Kalyvas and Laia Balcells, 'International system and technologies of rebellion: How the end of the Cold War shaped internal conflict', *American Political Science Review*, 104:3 (2010), pp. 415–29; Laia Balcells and Stathis N. Kalyvas, 'Does warfare matter? Severity, duration, and outcomes of civil wars', *Journal of Conflict Resolution*, 58:8 (2014), pp. 1390–418.

[39]Ivan Arreguin-Toft, *How the Weak Win Wars: A Theory of Asymmetric Conflict* (New York: Cambridge University Press, 2005).

[40]David T. Mason, Joseph Weingarten, Jr, and Patrick Fett, 'Win, lose, or draw: Predicting the outcomes of civil wars', *Political Research Quarterly*, 52:2 (1999), pp. 239–68; Karl R. DeRouen, Jr and David Sobek, 'The dynamics of civil war duration and outcome', *Journal of Peace Research*, 41:3 (2004), pp. 303–20.

[41]Arreguin-Toft, *How the Weak Win Wars*.

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Wars of intervention often begin as civil wars but are distinct in that the introduction of a third actor complicates the strategic situation with a new set of political objectives. Patrick Regan suggests that outside 'states intervene [in civil wars] to stop the fighting between groups in conflict', and he operationalises the policy success of such an intervention by looking for ceasefire agreements or other halts in military activity.[42] Much like civil wars, these conflicts feature asymmetric warfare between the parties. Regan's study suggests that intervening states have somewhat-limited political objectives.[43] Essentially, they intend to coerce the parties to a ceasefire and the negotiating table.

This impacts the character of a war in two ways. First, an intervenor's limited political objectives create an environment of asymmetric interests between the intervenor and the local parties to the conflict. For local parties, these conflicts are existential security threats. For the intervenor, on the other hand, the conflict may be a security threat – contagion is a real risk for small wars, especially those with separatist elements[44] – but it is often a war of choice, not a war of necessity.[45] This, of course, does not mean that the war will be short as a result of the intervention. In fact, some suggest that foreign military interventions extend the intensity and longevity of a conflict.[46]

The length of a conflict and the intervenor's commitment to escalating the conflict are not always correlated.[47] As such, because the intervenor is motivated by limited political objectives, their military commitment to the conflict is likely to be small. This limited commitment might be in troops, equipment, or time, but the commonality across these indicators is that the intervening state's war has a half-life not experienced by the other parties in the conflict. For the side on which the intervention is occurring, this presents the political problem of keeping the ally in the fight. The adversarial government or insurgent on the other hand faces the problem of waiting out the intervenor, speeding their exit, or coercing their behaviour in some way.

Contextual variable 2: Political objectives

Political objectives are often ambiguous, but quantitative scholars have found broad ways to interpret and classify them in any given conflict. Specifically, we adopt the Correlates of War typology of political objectives, identifying three: regime change, territorial change, and policy change. Regime

[42]Patrick M. Regan, 'Third-party interventions and the duration of intrastate conflicts', *Journal of Conflict Resolution*, 46:1 (2002), pp. 55–73; Patrick M. Regan, 'Interventions into civil wars: A retrospective survey with prospective ideas', *Civil Wars*, 12:4 (2010), pp. 456–76.

[43]We know, of course, that this is not always the case. As noted in fn. 23, the GWOT had expansive political objectives that nominally encompassed the entire world. Yet the GWOT resembles less and less a war and more and more a constant policing action – this is likely because its political objectives, rather than being limited, were instead loose and ill defined.

[44]Halvard Buhaug and Kristian Skrede Gleditsch, 'Contagion or confusion? Why conflicts cluster in space', *International Studies Quarterly*, 52:2 (2008), pp. 215–33.

[45]The US War in Vietnam is the most famous example of such a war of choice with asymmetric political objectives. While the US fought to maintain the status quo political division of Vietnam, the North fought for nationalist unity, and the National Liberation Front fought a war of existence.

[46]Ann Hironaka, *Neverending Wars: The International Community, Weak States, and the Perpetuation of Civil War* (Cambridge, MA: Harvard University Press, 2009); Bethany Lacina, 'Explaining the severity of civil wars', *Journal of Conflict Resolution*, 50:2 (2006), pp. 276–89; Marie Olsen Lounsbery, 'Foreign military intervention, power dynamics, and rebel group cohesion', *Journal of Global Security Studies*, 1:2 (2016), pp. 127–41; Arthur Stein and Marc-Oliver Cantin, 'Crowding out the field: External support to insurgents and the intensity of inter-rebel fighting in civil wars', *International Interactions*, 47:4 (2021), pp. 662–91; Ibrahim Elbadawi and Nicholas Sambanis, 'How much war will we see? Explaining the prevalence of Civil War', *Journal of Conflict Resolution*, 46:3 (2002), pp. 307–34; Jeffrey Dixon, 'Emerging consensus: Results from the second wave of statistical studies on civil war termination', *Civil Wars*, 11:2 (2009), pp. 121–36; Regan, 'Interventions into civil wars'; Christopher Linebarger and Andrew Enterline, 'Third party intervention and the duration and outcomes of civil wars', in Sarah McLaughlin Mitchell and T. David Mason (eds), *What Do We Know about Civil Wars?* (London: Rowman & Littlefield, 2023), pp. 93–108.

[47]The US, for example, maintained limited objectives and a fear of inciting nuclear conflict that prevented it on several occasions from escalating the Vietnam War.

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change identifies the desire to change or replace the governing structures of another state; territorial change refers to the attempt by an actor to change the control over a piece of land; and policy change denotes an interest in overturning an actor's standing foreign or internal policy.[48] We suggest that different political objectives will be attached to an actor's interests in ways that vary the actor's commitment to the conflict. Wars over regimes and territory are consistently shown to be tied to conflict severity and escalation – with territorial disputes found most likely to lead to conflict escalation.[49] The same is not true for disputes over policy.[50] As the intensity of the objective increases, we might expect the intensity of the war to increase as well. Intense wars feature myriad capabilities and technologies, flooding the battlefield to gain advantage. The more technologies brought to bear, the less individual impact drones will have on the battlefield. Of course, the inverse may also be the case. The fewer technologies brought to bear, the larger individual battlefield impact drones stand to have.

Contextual variable 3: Technology employed

Drone technologies are many and varied. As such, it makes little sense to speak the phrase 'drones are revolutionary'. Which drones? What are their capabilities? How are they employed? To provide answers to these questions, we adopt NATO's UAS classification system that categorises drone capabilities based on their weight, payload, and flying altitude (Table 1).[51] These capabilities are grouped into three classes, referred to Class III, II, and I, in descending order of strategic capability. Class III and II systems are more popularly referred to as HALE and MALE (high- and medium-altitude long-endurance) drone, whereas class I systems include a wide array of commercial technologies, including the increasingly popular first-person viewer (FPV) drones. NATO's classification system captures what many other drone typologies miss – the cheap, small, short-range, tactical, commercial drones that are easily acquired and easily augmented for military purposes. Nevertheless, it is still difficult to capture the incredible variability of capabilities across drone systems. The variability across drone capabilities is matched by variability in their method of employment, or their mission sets. HALE and MALE drones have a wide range of mission sets, including intelligence, surveillance, and reconnaissance (ISR), close air support (CAS), air interdiction, long-range strike, and non-traditional mission sets like armed overwatch. Small uninhabited air systems (sUAS), on the other hand, while performing surveillance and reconnaissance and armed overwatch, lack the capabilities to perform more traditional airpower missions such as CAS, interdiction, and long-range strike. This is not to suggest that actors acquire specific drones to perform specific functions. Indeed, as the case of the Russia–Ukraine War suggests, the utility of drones is wide and ever-evolving based on innovations at the tactical level scaled upwards and across the armed forces.[52] These practices are nearly always in response to the war's context rather than the technology itself. It is to this contextual employment that we now turn.

In the remaining sections of the paper, this contextual typology for drone employment will be applied to three distinct contemporary cases of drone use – the Russia–Ukraine War, the Ethiopian Civil War, and the Saudi–Houthi conflict – assessing the technology's battlefield impact in each case. Questions of the impact of drones of modern battlefields are obviously contemporary, and

[48] Jones, Bremer, and Singer, 'Militarized interstate disputes', p. 178.

[49] Douglas M. Gibler, 'What they fight for: Specific territorial issues in militarized interstate disputes, 1816–2001', *Conflict Management and Peace Science*, 34:2 (2016), pp. 194–211; Karen A. Rasler and William R. Thompson, 'Contested territory, strategic rivalries, and conflict escalation', *International Studies Quarterly*, 50:1 (2006), pp. 145–67; Alex Braithwaite and Douglas Lemke, 'Unpacking escalation', *Conflict Management and Peace Science*, 28:2 (2011), pp. 111–23.

[50] Gibler, 'What they fight for'.

[51] Matthew Willis, André Haider, Daniel C. Teletin, and Daniel Wagner (eds.), Joint Air Power Competence Centre, 'Strategic concept of employment for unmanned aircraft systems in NATO', available at: {http://www.japcc.org/wp-content/uploads/UAS_CONEMP.pdf}.

[52] Ukraine acquired drones initially for battlefield reconnaissance, and only after iterations of conflict did their current use as artillery replicants and precision strike munitions emerge. These missions in Ukraine were driven by manpower and artillery limitations. In other words, the use of drones is always contingent.

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Table 1. NATO's drone classification.

Class	Category	Normal employment	Normal operating altitude	Normal mission radius	Primary supported commander	Example platform
Class III (< 600 kg)	Strike/Combat	Strategic/national	Up to 65,000 ft MSL	Unlimited (BLOS)	Theatre	Reaper
	HALE	Strategic/national	Up to 65,000 ft MSL	Unlimited (BLOS)	Theatre	Global Hawk
	MALE	Operational/theatre	Up to 45,000 ft MSL	Unlimited (BLOS)	JTF	Heron
Class II (150–600 kg)	Tactical	Tactical formation	Up to 18,000 ft AGL	200 km (LOS)	Division, brigade	Watchkeeper
Class I (< 150 kg)	Small (>15 kg)	Tactical unit	Up to 5,000 ft AGL	50 km (LOS)	Battalion, regiment	Scan Eagle
	Mini (<15 kg)	Tactical sub-unit (manual or hand launch)	Up to 3,000 ft AGL	Up to 25 km (LOS)	Company, platoon, squad	Skylark
	Micro (<66 J)	Tactical sub-unit (manual or hand launch)	Up to 200 ft AGL	Up to 5 km (LOS)	Platoon, Squad	Black Widow

so finding enough information to make any useful assessment on the matter can be difficult. Such high-profile cases, utilised widely by proponents and sceptics, motivate the generation of knowledge around the event both in popular culture and scholarly literature. Their common use in the drone debate also makes them ideal, relevant choices to help highlight the synthesis we propose. As such, the cases were selected to conduct a structured, focused comparison of wars in which drones have played a significant role.[53] The object is to uncover under what conditions drones may have a determining impact on the outcome of a conflict – are they game-changers, magic bullets, or deciders of the fates of nations? The cases reveal that variations in political objectives and conflict type allow drones to have an impact on war that is sometimes ordinary and sometimes revolutionary. In short, by analysing the nuances of the debating scholars' own cases, our findings partly confirm the sceptics' point of view; drones seem ordinary in conventional state-to-state conflicts. Yet when deployed in non-Western and non-conventional conflicts, drones support the proponents' views – drones can be the primary determinants of victory in certain conflicts. Whether the drone revolution really is a revolution, then, depends on where one looks.

A game-changer in Ukraine?

The war in Ukraine is the very definition of a conventional war, where both state parties deploy regular armies to defeat the other. The Russo-Ukraine War is often likened to the First World War, such is its conventional status. Around 1 million Russian and Ukrainian troops are deployed across a vast front line that stretches over 1,000 kilometres. The long front line is reinforced in depth. Certainly, the conventional character of the war offers an answer to whether drones have 'changed the game' in Ukraine, yet the significance of drones to the character of the conflict is undeniable. Has the new game created a window for drones to provide a determining effect on the conflict's outcome?

On 24 February 2022, the Russian Federation launched a four-pronged invasion of Ukraine under the auspices of 'liberating' the Ukrainian people from their 'Nazi' government.[54] Russian missiles prepped the battlefields and air strikes were intended to provide cover for the Russian battalion tactical groups (BTGs) as they proceeded into Ukraine along major routes and highways from Belarus, Crimea, and the Russian-controlled territories in Donbas. The Russian invasion faltered under serious Ukrainian resistance. The northern front's logistics and its move towards Ukraine's capital Kyiv depended on a successful taking of Hostomel Airport. When the initial attempt failed, Russian troops were forced to retreat.[55] The southern and south-eastern fronts fared better, but the fighting was more entrenched than expected, and both sides suffered severe casualties as Russian forces finally overwhelmed Kherson and Mariupol in May 2022.[56]

In the autumn of 2022, Ukraine launched successful counteroffensives in the south and east.[57] Ukraine tried to repeat this success in 2023, but by this time the Russian forces had further entrenched themselves and reconstituted.[58] By December 2023, 664 days since Russia's invasion, the war had degraded to an attritional stalemate. It was here that Ukraine, falling short in its production

[53] Alexander L. George and Andrew Bennett, *Case Studies and Theory Development in the Social Sciences* (Cambridge, MA: MIT Press, 1995).

[54] David K. Li, Jonathan Allen, and Corky Siemaszko, 'Putin using false "Nazi" narrative to justify Russia's attack on Ukraine, experts say', *NBC News* (24 February 2022), available at: {https://www.nbcnews.com/news/world/putin-claims-denazification-justify-russias-attack-ukraine-experts-say-rcna17537}.

[55] Liam Collins, Michael Kofman, and John Spencer, 'The battle of Hostomel Airport: A key moment in Russia's defeat in Kyiv', *War on the Rocks* (2023), available at: {https://warontherocks.com/2023/08/the-battle-of-hostomel-airport-a-key-moment-in-russias-defeat-in-kyiv/}.

[56] Mariano Zafra and Jon McClure, 'Mapping Ukraine's counteroffensive', *Reuters* (21 December 2023), available at: {https://www.reuters.com/graphics/UKRAINE-CRISIS/MAPS/klvygwawavg/}.

[57] Ibid.

[58] Ibid.

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and supply of artillery shells and struggling to equip front-line fighters, sought novel 'revolutionary' solutions.[59] In his December address, Zelenskyy announced the remedy to Ukraine's artillery problem would be an increased investment in military drones. Zelenskyy exclaimed how domestic drone manufacturing, drone training, and even a special drone section of the military would become a core focus of the Ukrainian war-making industry and capacity, helping to secure victory. As Zelensky announced to great fanfare, Ukraine would 'produce a million drones' in 2024.[60]

Zelenskyy's speech elevated the many proclamations defence intellectuals and journalists (some of them technological fanatics) that drones have, and would continue to have, a revolutionary impact on the war.[61] In fact, it is safe to say that the idea of a drone revolution in Ukraine became entrenched as a core part of the common parlance about how to win the war against Russia. Yet has this proven true? Do drones hold the key to victory in Ukraine? It is to the politics of the warring parties and the capabilities deployed in the Russo-Ukraine War that we turn to find an answer.

Russo-Ukrainian political objectives

The initial war aim of the Russian Federation was regime change, and effectively the complete restitution of Ukraine as a Russian territory. This was both clear in the declarations of Russian president Vladimir Putin, as well as in the character of the invasion itself. It is also clear that Putin expected these objectives to be easily achieved. Russian forces were not expecting the Ukrainian resistance with which they were met, and a failure to secure air superiority led to a collapse of the Russian Army's logistical support system. Putin's narrative leading into the war was that there existed no Ukrainian national identity. Whether or not this was the case before the Russian invasion, it certainly seems that one exists now. It is this nationalism that provokes the Ukrainian political objective of national survival.

Less abstractly, Ukraine's response to Russia's extreme political objectives has been its insistence on the complete removal of Russia from all claimed Ukrainian territory: Donetsk, Luhansk, and Crimea. The current character of the battlefield suggests that these demands are unlikely to be met. Simultaneously, however, it may be understandably difficult for President Zelenskyy to back away from these demands given the open hostility of the Russian invasion. President Putin as well, for his part, has cultivated an all-or-nothing perspective on victory at home. The intransigence of the Russo-Ukrainian political objectives helped cultivate battlefields that look very much like those of the early 20th century.

Capabilities deployed in Ukraine

Drones of all shapes and sizes have been deployed in the tens of thousands over Ukraine. Critically, it is not the drones themselves that have stalemated this conflict, but the stalemated conflict that has driven the ubiquitous use of drones as efforts to assist Ukrainian and Russian forces on the ground to manoeuvre, and to penetrate – however slightly – the formidable integrated air defences.

The war has progressed in largely two technological phases. During the initial phase of the war, 'when Russia's air defense and electronic-warfare capabilities were less pronounced,' Ukraine held

[59] Antti Ruokonen, 'Ukraine's artillery shell shortfall', *The Lawfare Institute* (3 August 2024), available at: {https://www.lawfaremedia.org/article/ukraine-s-artillery-shell-shortfall}.

[60] Reuters, 'Ukraine to produce one million drones next year, Zelenskiy says' (19 December 2023), available at: {https://www.reuters.com/world/europe/ukraine-produce-one-million-drones-next-year-zelenskiy-says-2023-12-19/}.

[61] Stephen Witt, 'The Turkish drone that changed the nature of warfare', *The New Yorker* (16 May 2022), available at: {https://www.newyorker.com/magazine/2022/05/16/the-turkish-drone-that-changed-the-nature-of-warfare}; Thomas Harding and Robert Hollast, 'The drone revolution: How Ukraine conflict is being fought to the new rules of war', *The National News* (6 October 2023), available at: {https://www.thenationalnews.com/world/2023/10/06/russia-ukraine-war-drone-revolution/}; Steve Cannane and Shaun Kingma, 'How Ukraine's innovative use of drones has revolutionised modern warfare', *Australian Broadcasting Corporation News* (5 December 2023), available at: {https://www.abc.net.au/news/2023-12-05/drones-used-by-ukraine-and-russia-are-revolutionising-warfare/103186820}.

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some operational advantages in the air with the use of Turkish-supplied TB2s.[62] The loitering capability and size of the munitions carried by the TB2s helped Ukrainian forces penetrate Russian air defences and strike large targets, the footage of which was then released to international media services. These drones also became a 'public relations victory' for the Ukrainian government at a time when morale was low.[63] Russian air defence and electronic-warfare capabilities able to detect, target, and destroy incoming HALE and MALE drones prompted a shift in Ukrainian drone use.

The second technological phase of the war has more heavily featured the use of FPVs. While the survival rate of drones in this war is mere minutes, part of this has to do with the FPV drone's purpose of delivering munitions in high-precision single strikes. Western sanctions on Russia have also limited its ability to employ high-tech drones in the war, leading it to rely on Iranian Shahed-136 drones – capable of carrying a significant payload for one-way use.[64]

Both Ukraine and Russia have utilised drones for tactical and strategic purposes, signalling game-changing aspects on the battlefield, and attempts to deliver magic bullet knock-out blows at the strategic level. While Ukraine's smaller quadcopters provide a degree of ISR yet unseen in conventional conflicts, their FPV drones have provided significant substitutes for artillery – attacking Russian personnel and assets on the battlefield. Additionally, Ukraine has used Class II and III systems, increasingly attacking Russia both in the air and at sea, as well as attacking with drones strategic targets inside Russia.[65] Russian use has largely mirrored Ukraine's; its particular use of Iranian Shaheds draws media attention for the civilians and infrastructure it targets.[66] Additionally, by December 2023 Russia had used 3,700 Shahed drones against tactical and strategic Ukrainian targets.[67]

Emerging drone technologies have seamlessly integrated into a war increasingly compared to those of the early 20th century. Before the conflict, Ukraine had only seven drone manufactures. Today it has more than 80.[68] This fact is a testament to the importance of drones on the battlefields of Ukraine. As the US distances itself from Ukrainian support both politically and materially, the importance of drones to Ukrainian survival will only intensify. Technology only reaches so far against the backdrop of political and economic interests which in this case threaten to 'trump' the manufacture and deployment of even a million drones by Ukraine.[69]

Assessment of drone impact on the war

Reactions to Zelenskyy's 'one million drones' speech followed the proponents–sceptics dichotomy. Those who addressed the context and content of the speech noted how the drones were part of an attempt to fill a critical munitions gap while the president organised industry and pressed allies for

[62]Kristen D. Thompson, 'How the drone war in Ukraine is transforming conflict', *Council on Foreign Relations* (16 January 2024), available at: {https://www.cfr.org/article/how-drone-war-ukraine-transforming-conflict}.

[63]Jomana Karadsheh and Isil Sariyuce, 'Turkish drones have become a symbol of the Ukrainian resistance', *CNN* (11 April 2022), available at: {https://www.cnn.com/2022/04/11/middleeast/mideast-summary-04-11-2022-intl/index.html}.

[64]Thompson, 'How the drone war in Ukraine is transforming conflict'.

[65]Ellen Nakashima and Isabelle Khurshudyan, 'US concerned about Ukraine strikes on Russian nuclear radar stations', *The Washington Post* (29 May 2024), available at: {https://www.washingtonpost.com/national-security/2024/05/29/us-ukraine-nuclear-warning-strikes/}; Cara Anna, 'Ethiopia armed group says it has alliance with Tigray forces', *The Associated Press* (11 August 2021), available at: {https://apnews.com/article/africa-only-on-ap-ethiopia-b280e6622d66b7e7f9b12cd1d0041ae8}; Cassandra Vinograd, 'Ukraine launches "massive" drone attacks inside Russia, officials say', *New York Times* (14 January 2025), available at: {https://www.nytimes.com/2025/01/14/world/europe/ukraine-russia-massive-drone-strikes.html}.

[66]BBC, 'How are "kamikaze" drones being used by Russia and Ukraine' (29 December 2023), available at: {https://www.bbc.com/news/world-62225830}.

[67]Reuters, 'Russia has fired 7,400 missiles, 3,700 Shahed drones in war so far, Kyiv says' (21 December 2023), available at: {https://www.reuters.com/world/europe/russia-has-fired-7400-missiles-3700-shahed-drones-war-so-far-kyiv-says-2023-12-21/}.

[68]Thompson, 'How the drone war in Ukraine is transforming conflict'.

[69]We thank an anonymous reviewer for this point.

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delayed supplies of conventional weapons.[70] Others swayed towards hyperbole, claiming that Class I drones were 'transforming' and 'changing the future of warfare'.[71]

Our findings suggest that there is room for both perspectives. The integration of drones into the battlefields of Ukraine have changed the game – the contemporary battlefield in Ukraine is unimaginable without them – but despite this, drones will not provide an independent determining effect on the outcome of the conflict. The political objectives are too extreme, the troop and ground capability commitments too intense, and as a result the capabilities fielded on either side are amassed. There can be little doubt that drones offer a much-needed extra layer of offensive capacity, in some cases filling deficits of conventional capabilities like artillery; and in other cases drones may be vital to individual mission success. Nevertheless, in conventional wars fought by two modern industrialised militaries, drones alone will not offer victory; no single military technology can.[72] None of this is to say, however, that drones may not have this impact on other types of conflict.

A magic bullet for the Houthis?

Saudi Arabia's war of intervention against the Houthis to protect its interests in Yemen have proven ill fated. Between 2015 and 2022, the Houthis conducted approximately 1,000 rocket or missile attacks and over 350 distinct drone strikes, many of them concentrated against strategic targets deep in Saudi territory. Eventually, Saudi Arabia ended its campaign against the Houthis and sought rapprochement with Houthi state sponsor Iran. The Houthi development of its own indigenous drone capability seems to have provided the Houthis with a magic bullet against the Kingdom of Saudi Arabia, the provision of an air force with which to coerce a nation-state.

Having been forced into a resignation during the 2011 Arab Spring, Yemeni president Ali Abdullah Saleh, an historic partner in the United States' global war on terror and enemy of the Houthi Shiite movement to the north, infamously switched sides and joined forces with the Houthis to wrest power back from his former vice president. When civil war broke out in early 2014, forces loyal to Saleh assisted Houthi forces in making substantial gains across the country. After Saleh and Houthi forces made substantial territorial gains in 2014, including the Yemeni capital Sanaa in September, threatening the strategic port of Aden, Saudi Arabia intervened to assist (or rescue) the Hadi government.[73]

Operation Decisive Storm, predominantly led by Saudi Arabia with some assistance from the United Arab Emirates (UAE) and other Gulf Cooperation Council (GCC) states, began with airstrikes against Houthi military targets, weapons stores, and encampments of Saleh forces.[74] Concurrently, the UAE landed infantry on Yemen's southern coast to prevent the fall of Aden to

[70]Ian Lovett, 'Low on ammo, Ukraine tries to build a million explosive drones', *Wall Street Journal* (3 February 2024), available at: {https://www.wsj.com/world/low-on-ammo-ukraine-tries-to-build-a-million-explosive-drones-57f8fb52}.

[71]Shashank Joshi, 'How cheap drones are transforming warfare in Ukraine', *The Economist* (5 February 2024), available at: {https://www.economist.com/interactive/science-and-technology/2024/02/05/cheap-racing-drones-offer-precision-warfare-at-scale}; Quentin Sommerville, 'How drones and the battle for Ukraine are changing the future of warfare', *BBC* (25 July 2024), available at: {https://www.bbc.com/news/videos/cw4y2mrp4jwo}.

[72]Stephen Biddle, 'Back in the trenches: Why new technology hasn't revolutionized warfare in Ukraine', *Foreign Affairs* (10 August 2023), available at: {https://www.foreignaffairs.com/ukraine/back-trenches-technology-warfare}.

[73]Mohammed Alyahya, 'Why did Saudi Arabia intervene in Yemen?' *Al-Monitor* (2015), available at: {https://www.al-monitor.com/originals/2015/06/yemen-saudi-arabia-iran-houthis-support-military.html}; Luca Nevola and Baraa Shiban, 'The role of coup forces, Saleh, and the Houthis', in Stephen W. Day and Noel Brehony (eds), *Global, Regional, and Local Dynamics in the Yemen Crisis* (Cham: Palgrave Macmillan, 2020), pp. 233–53.

[74]Farea Al-Muslimi, 'Saudi airstrikes against Yemen first', *Al-Monitor* (2015), available at: {https://carnegieendowment.org/posts/2015/04/saudi-airstrikes-against-yemen-a-first?lang=en&center=middle-east}.

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the Houthis.[75] Elsewhere, coalition-aligned Islamic militias checked the Houthi advance.[76] While these efforts drew the primary lines of operation that would stagnate throughout the war[77] – Houthi territory in the north-west, a UAE-backed Southern Movement controlling Aden and the south-central and south-west parts of the country, and the Republic of Yemen to the north-east – much of the action of the war occurred in the air in Houthi–Saudi exchanges. It was strategic Houthi drone (and missile) strikes deep into Saudi territory that finally pressured a negotiated 2022 truce between the Houthis and Saudi Arabia and, perhaps more importantly, Saudi Arabia's rapprochement with Iran.[78] The political objectives and capabilities held by each side drove the character of this conflict.

Saudi–Houthi political objectives

The threat of state failure and the possibility of an Iranian ally in power in Yemen led the Kingdom of Saudi Arabia to intervene. Saudi Arabia had backed former president Saleh for several years before his political isolation in the wake of the Arab Spring. During this time, however, he was a sworn enemy of the Iranian-aligned Houthi movement. It was not Saleh's interest in taking power back, but instead his willingness to empower the Iranian-backed Houthi movement, that irked the Saudis and their GCC partners. Once Saleh switched sides, it seemed natural for Saudi Arabia to do the same.

The initial political objectives of Saudia Arabia and the UAE 'were to recapture the entirety of Yemen and destroy the Houthi movement, thus denying Iran a presence on the Arabian Peninsula'.[79] Yet an operational stalemate led to a quiet reformulation of those objectives: the Saudi-led coalition 'sought to defend Aden, roll back the Houthi expansion in southern and central areas … and neutralize' Houthi and Saleh forces capabilities.[80] The operation was particularly surprising to international observers and experts, who doubted the capability and willingness of the coalition to sustain such a mission.[81] This scepticism proved largely correct.

The Houthis are an Islamic Shia religious movement, motivated by an antipathy for the West, Saudi Arabia, and other forms of Islam.[82] The Houthi movement's political object is the reformation of Yemen in accordance with their spiritual beliefs. The character of this object is significant in that it demonstrates an interest in territorial control over Yemen. Wars of intervention have many competing political objectives, however, and perhaps more important than the Houthis' objectives are those of their Iranian backers.

[75]Michael Knights and Alex Almeida, 'The Saudi–UAE war effort in Yemen (part 1)', *Washington Institute for Near East Policy*, Policy Watch No. 2464 (10 August 2015), available at: {https://www.washingtoninstitute.org/policy-analysis/saudi-uae-war-effort-yemen-part-1-operation-golden-arrow-aden}.

[76]Fred H. Lawson, 'Why foreign military interventions prolong civil wars: Lessons from Yemen', *International Politics*, 59:6 (2022), pp. 1167–86.

[77]Troop commitments by Saudi Arabia and the UAE were strikingly low, so each was forced to rely on militant clients for their ground campaigns. As these relationships fractured, security vacuums were filled by radicals affiliated with al Qaeda on the Arabian Peninsula and ISIS. A rising need to stabilise territorial control meant that belligerent territorial advances stalled. Emile Hokoyem and David B. Roberts, 'The war in Yemen', *Survival*, 58:6 (2016), pp. 157–86.

[78]Peter Baker, 'Chinese-brokered deal upends Mideast diplomacy and challenges US', *The New York Times* (11 March 2023), available at: {https://www.nytimes.com/2023/03/11/us/politics/saudi-arabia-iran-china-biden.html}; John Hudson, Yasmeen Abutaleb, and Dan Lamothe, 'China brokers Iran–Saudi Arabia détente, raising eyebrows in Washington', *The Washington Post* (10 March 2023), available at: {https://www.washingtonpost.com/national-security/2023/03/10/china-saudi-iran-deal/}.

[79]Hokoyem and Roberts, 'The war in Yemen', p. 165.

[80]Ibid., p. 166.

[81]Ibid., p. 157.

[82]International Crisis Group, 'Yemen: Is peace possible?' *Middle East Report* No. 167 (9 February 2016), available at: {https://www.crisisgroup.org/middle-east-north-africa/gulf-and-arabian-peninsula/yemen/yemen-peace-possible}.

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As early as 2014, Iran was providing weapons, training, and money to the Houthi movement.[83] This practice is common in Iranian regional politics, which generally seeks to disrupt the US-dominated regional political order, expand the regional influence of Shia Islam, and accumulate soft power among marginalised and oppressed groups.[84] More concretely, Iran is interested in 'safeguarding its access to transit points it uses to deliver material support to partners' and maintaining a footprint across the region to ensure future strategic flexibility. To have a strategic ally occupying territory along the southern Saudi border affords Iran a means of pressuring Saudi decision-making and policy. It was to this end that Iranians provided significant air capabilities to its Houthi clients.[85]

Capabilities deployed against Saudi Arabia

It is important to note at the outset that the Houthis have no air force of their own, and Saleh's forces brought minimal air power into their arsenal.[86] Yet Iranian assistance, especially in terms of their drone/missile hardware and know-how, over the course of the conflict has provided the Houthis with a formidable air-power component. As such, the capabilities employed in the conflict proceeded in three phases from 2014 to 2022.[87] While the Houthis' first recorded use of drones was the employment of a commercially available DJI Phantom quadcopter in December 2015, the first phase of the war (between 2014 and 2016) featured heavy Houthi reliance on a pre-war stockpile of munitions.[88] They used this stockpile to directly engage Saudi Arabia across the border into its southernmost cities (Middle East Eye, 2015).[89] By January 2016, however, they were using drones for intelligence, surveillance, and reconnaissance (ISR) operations.[90]

The gradual development of a Houthi indigenous missile capability characterised the second phase of the conflict (2016–18). The Houthis constructed a hybrid drone, the more sophisticated parts of which are were smuggled in from Iran and matched with larger parts (such as the airframe) manufactured domestically (UN, 2024).[91] One Houthi favorite, the Qasef-1 (a derivative of the Iranian Ababil-T) possesses a greater range, warhead capacity, and accuracy than the acquisitions of many non-state actors, including ISIS. Perhaps even more significant are the acquisition of Iranian Samad-3s, which were used in the long-range Saudi Aramco strike. With these new capabilities, the Houthis expanded their military targets to attack Saudi Arabia in depth. The employment of drones in strategic strikes against Saudi Arabia would increase during this period and peak in 2019. Between May and August 2019, the Houthis reportedly conducted over 50 drone attacks into Saudi Arabia. The frequency, number, and character of this statistic summarises the third technological phase of the war. This phase includes the now-infamous attack on the Saudi Aramco gas facility, causing massive fires and significantly disrupting international oil supplies.[92]

[83]Yara Bayoumy and Mohammed Ghobari, 'Iranian support seen crucial for Yemen's Houthis', *Reuters* (15 December 2014), available at: {https://www.reuters.com/article/idUSKBN0JT17A/}; Thomas Juneau, 'Iran's policy towards the Houthis in Yemen: A limited return on a modest investment', *International Affairs*, 92:3 (2016), pp. 647–63.

[84]Juneau, 'Iran's policy towards the Houthis in Yemen'; Afshon Ostovar, 'The grand strategy of militant clients: Iran's way of war', *Security Studies*, 28:1 (2019) pp. 159–88.

[85]Juneau, 'Iran's policy towards the Houthis in Yemen'.

[86]Tom Porter, 'The Houthi Air Force has a single fighter jet – an ancient F-5. The US is very much not afraid of it', *Business Insider* (17 January 2024), available at: {https://sg.news.yahoo.com/houthi-air-force-single-fighter-161059149.html}.

[87]Luca Nevola, 'Beyond Riyadh: Houthi cross-border aerial warfare (2015–2022)', *ACLED* (17 January 2023), available at: {http://acleddata.com/2023/01/17/beyond-riyadh-houthi-cross-border-aerial-warfare-2015-2022/#s6}.

[88]Ibid.

[89]Middle East Eye, 'Houthis shell Saudi Arabia border town, prompting retaliation threat,' Middle East Eye, May 7, 2015 (1 July 2025), available at: {https://www.middleeasteye.net/news/houthis-shell-saudi-arabia-border-town-prompting-retaliation-threat}.

[90]Ibid.

[91]Karen Allen, 'Houthis in Somalia: Friends with technological benefits?' Institute for Security Studies (10 June 2025), available at: {https://issafrica.org/iss-today/houthis-in-somalia-friends-with-technological-benefits}.

[92]Al Jazeera, 'Houthis drone attacks on 2 Saudi Aramco oil facilities spark fires' (14 September 2019), available at: {https://www.aljazeera.com/economy/2019/9/14/houthi-drone-attacks-on-2-saudi-aramco-oil-facilities-spark-fires}.

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Over the course of the war, the Houthis conducted approximately 1,000 rocket or missile attacks and over 350 distinct drone strikes, many of them concentrated against strategic targets deep in Saudi territory. Only 15 per cent of these strikes in 2015 were drone-launched munitions. With Iranian capability, however, the Houthis developed extended-range drones. After 2019, drone attacks would outnumber rocket and missile attacks. By 2022, nearly 90 per cent of strikes were conducted using drones.[93]

Assessment of drone impact on the conflict

While the Houthis have not achieved their objectives to reform the entire state of Yemen, they have achieved a remarkable victory over Saudi Arabia, denying the intervention its objectives and compelling the Saudis to seek rapprochement with Iran. It is an incredible accomplishment for a militia with no conventional air force or navy.

For Iran, it is an impressive strategic gain in a region where they had been nearly isolated. Before the 2023 agreement, Saudi Arabia and Israel pursued closer relations with one another, a move that would have effectively created 'a regional security alliance against Iran'.[94] In other words, the agreement is a strategic loss for Saudi Arabia, so why did the Kingdom sign it?

Reported Saudi–US conversations identified the cessation of Houthi drone strikes as the underlying motivation for the deal. The *New York Times* reported that the decisive factor to the agreement 'was a commitment by Iran to stop further attacks on Saudi Arabia and curtail support for militant groups that have targeted the kingdom'.[95] Essentially, Saudi officials were looking for guarantees from Iran that 'they would curtail military support to the Houthis'.[96] Jonathan Lord at the Center for a New American Security described the Saudis as 'attempting to buy down the risk of Iran'.[97] In other words, Saudi Arabia is absorbing a strategic cost in signing the agreement to lower the potential of future Houthi drone and missile strikes.

At time of this writing, the Saudi–Houthi relationship remains precarious, but the truce is unbroken. Houthi aggression toward the US and its allies operating in the Red Sea, of course, has not stopped. Since the politics of the dispute remain unresolved, it is likely the truce has a half-life. Saudi Arabia cannot feel comfortable with an Iranian militant client on its southern border, and the Yemen Civil War remains unsettled. While the politics of this conflict remain unresolved, we cannot ignore the Houthi's magic bullet – the use of drones in strategic strikes against Saudi Arabia in depth coerced a Saudi–Iran rapprochement.

Because the Houthis do not possess an air force and do not maintain an aerospace industry, they were reliant on their Iranian patron for the hardware to build their drones. They were also reliant on the commercial market to obtain the technologies necessary to retrofit the Iranian drone casts with flying and targeting technology. In this sense, it is difficult to assess whether a non-state actor that does not maintain a patron–client relationship with a state actor would be able to build and use drones to the same extent. Indeed, there are some drone capabilities the Houthis and other non-state actors simply do not have the infrastructure or technical proficiency to employ. But these technologies are becoming more readily available over time, not less. As the commercial market offers more advanced drone technologies, non-state militants will more easily acquire these technologies and militarise them. For great powers used to intervening in disputes and conflicts abroad in order to influence their political outcomes, the Saudi experience serves as a warning – non-state actors now have the potential to obtain a magic bullet that can effectively 'shoot forever'.[98]

[93] Nevola, 'Beyond Riyadh'.

[94] Patrick Kingsley, 'Saudi deal with Iran surprises Israel and jolts Netanyahu', *The New York Times* (10 March 2023), available at: {https://www.nytimes.com/2023/03/10/world/middleeast/israel-saudi-iran.html}.

[95] Baker, 'Chinese-brokered deal upends Mideast diplomacy and challenges US'.

[96] Hudson, Abutaleb, and Lamothe, 'China brokers Iran–Saudi Arabia détente, raising eyebrows in Washington'.

[97] Ibid.

[98] Zegart, 'Cheap flights, credible threats'.

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Deciding the fate of Ethiopia?

The government of Ethiopia nearly fell in 2021 to a group of insurgents known as the Tigrays. This insurgency had pushed to nearly 80 miles outside of Ethiopian capital Addis Ababa when the Ethiopian government finally acquired and employed MALE and HALE drone technology. These technologies quickly destroyed Tigray Defense Force (TDF) forces and supply lines to drive them back to their northern territories. In short, drones offered the government the means to survive. In this sense, armed drones proved decisive in deciding the fate of a nation, altering 'the capacity of [Ethiopia] to create and project military power'.[99]

For almost 30 years, Ethiopia was politically controlled by the ethnic Tigray People's Liberation Front (TPLF), a resistance militia turned political party in the wake of the Cold War. In 2014, mass protests swept across the country, and the TPLF lost power. Under Ethiopia's new multinational federal system, the Prosperity Party and new prime minister Abiy Ahmed promised liberal reforms depending upon the countrywide adoption of a federal system based on 'Ethiopianness', as opposed to historical ethnic cleavages. As the Prosperity Party solidified its political power, TPLF representatives slowly left Addis Ababa to build regional power at home. In 2020, Abiy used the coronavirus pandemic as an excuse to postpone federal elections. In defiance, the Tigray regional state held its own elections. This action ultimately resulted in a military conflict between the TDF and the Ethiopian National Defense Forces (ENDF).[100]

Abiy responded to the Tigray regional elections by initiating a 'law enforcement operation' to bring the state back under federal control.[101] While the law enforcement operation seemed an initial success, the ENDF proved unprepared for the counteroffensive launched by the TDF. By the following January, the ENDF were pushed out of Tigray. Additionally, the TDF had captured heavy artillery, allowing for a conventional offensive against Ethiopian forces carried out towards the capital city. The Tigray offensive caused a scramble to mobilise new volunteers and regional militias to serve on the front lines of the conflict. In seven months, the TDF controlled the regional capital of Mekele and the strategic cities of Dessie and Kombolcha. By late 2021, the TDF was approaching the city of Debre Birhan, 85 miles north of Addis Ababa.[102]

In August 2021, new fronts in the war opened, in which the Tigrays faced intensifying strikes from Eritrea to the north and smaller government-aligned militias from the west.[103] Additionally, the ENDF launched a counteroffensive in October that attrited the Tigray forces in the south. Yet the Tigray advance persisted along five fronts throughout November. The situation was dire; France and the United Kingdom both issued official statements instructing their citizens and diplomats to leave Addis Ababa.[104] The Ethiopian government would defy expectations, however, as the ENDF acquired and deployed Class II and III drone capability from the UAE, Turkey, and Iran.

Initially, the Ethiopian government used drones to strike advancing TDF convoys and supply lines along the highway to Addis Ababa. This reconnaissance-strike capability mapped nicely onto the geographical realities of the Tigray advance. As Prime Minister Abiy noted, 'there is a single tarmac road from Tigray south all the way to Shewa, and during December there were about a dozen drones at any one time patrolling that road and shooting at any trucks moving along the road, making it extremely difficult and hazardous for the TDF to supply its front lines'.[105] Matched with ground offensives northwards by the Ethiopian government and its allies, these strikes sparked

[99] Murray and Knox, 'Thinking about revolutions in warfare', p. 7.

[100] Martin Plaut and Sarah Vaughn, *Understanding Ethiopia's Tigray War* (New York: Hurst, 2023).

[101] The ENDF also had the assistance of Eritrean military forces intent on pursuing past grievances against the Tigray regional state. Plaut and Vaughn, *Understanding Ethiopia's Tigray War*; Kjetil Tronvoll, 'The anatomy of Ethiopia's civil war', *Current History*, 121:835 (2022), pp. 163–169 (p. 166).

[102] Walsh, 'Foreign drones tip the balance in Ethiopia's civil war'.

[103] Plaut and Vaughn, *Understanding Ethiopia's Tigray*.

[104] Alex De Waal, 'Ethiopia on the brink of collapse as the Tigray conflict reaches a boiling point', *Responsible Statecraft* (30 June 2021), available at: {https://responsiblestatecraft.org/2021/06/30/ethiopia-on-the-brink-of-collapse-as-the-tigray-conflict-reaches-a-boiling-point/}.

[105] Plaut and Vaughn, *Understanding Ethiopia's Tigray War*, p. 163.

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a near complete TDF retreat (approximately 270 miles to the north). As their gains rapidly slipped through their hands, Tigray's leader requested a ceasefire and further negotiations.[106]

Tigray–Ethiopian political objectives

Like many civil wars, the Tigray–Ethiopian civil war is one over governance. As Kjetil Tronvoll cogently states,[107] the primary conflict between the Tigrays and the Ethiopian government stems from 'their opposing visions of what the Ethiopian polity is and how it should be configured'. Disputes over how the country should be governed have been a significant problem over the history of Ethiopia, with cleavages forming between the '[regional] self-rule (*woyane*) or state control (*Ethiopiawinet*)'.[108] Revolutionaries among the Tigray population identify the problem of Ethiopian politics as one of suppressing internal ethnic nationalities, while the Prosperity Party views the problem as one of regional ethnicities rejecting the larger national unity of 'Ethiopianness'. In this sense, the Ethiopian government's political objectives have not changed – reasserting federal control over the regional state of Tigray. Yet the threat posed by Tigray and its shifting political objectives over the course of the conflict forced the Ethiopian government into a war of survival.

The expansive political objectives of the Tigray population suggest protracted conflict with little room for settlement, if not peace. While the TPLF claim that they never had ambitions to change the regime 'or take over Addis',[109] its alliance with the Oromo Liberation Army made these ambitions impossible. As the Oromo leader Kumsa Diriba told the Associated Press, 'The only solution now is overthrowing this government militarily, speaking the language they want to be spoken to'.[110]

The two parties remain locked into a military stalemate. With little federal control remaining to the Ethiopian government, Tigray remains under blockade. The limited objectives of the Tigray rebellion seem to have been fulfilled, yet its expansive objectives of Ethiopian regime change, of the character of the similar 1991 TPLF rebellion, seem unlikely to come to fruition. In turn, the Ethiopian government's objectives of federal control over Tigray seem unlikely in the near term, but its survival in the face of a Tigray rout was achieved by slim margins. This result is, in part, due to the acquisition by the Ethiopian government of air power on the cheap.

Capabilities deployed in Ethiopia

The ENDF acquired Wing Loong IIs from the UAE, TB2s from Turkey, and Mohajer-6s from Iran to use against the advancing TDF.[111] The TB2s specifically were a force multiplier, as they are capable of loitering for up to 24 hours. The ENDF received sophisticated munitions for these platforms, such as the MAM-L, an anti-armour air-to-surface missile used against battle tanks and other vehicles as well as personnel using laser guidance technology.[112] As the TDF moved its heavy artillery along the highways, their convoys were easy targets for these new ENDF acquisitions.

Accurate information regarding strikes, their origin, and their effect are difficult to come by and verify. Rossiter and Cannon argue that conventional airstrikes by SU-25 and MiG-23 attack aircraft account for much of Ethiopia's airpower in the war, but there is not much evidence to support

[106] Walsh, 'Foreign drones tip the balance in Ethiopia's civil war'.

[107] Tronvoll, 'The anatomy of Ethiopia's vivil war', p. 163.

[108] Ibid.

[109] Plaut and Vaughan describe the TDF as surrounded in the west, east, and north, leaving an offensive towards the southern Ethiopian capital as the only option for opening Tigray to supplies from Djibouti, as well as coercing government recognition of Tigrayan autonomy: Plaut and Vaughn, *Understanding Ethiopia's Tigray War*; also see Michael Evans and Jane Flanagan, 'Ethiopia's war turns into a testing ground for the deadliest drones', *The Times* (31 December 2021), available at: {https://www.thetimes.co.uk/article/civilians-are-drone-warfare-guinea-pigs-in-ethiopia-r5x50b230}.

[110] Anna, 'Ethiopia armed group says it has alliance with Tigray forces'.

[111] Walsh, 'Foreign drones tip the balance in Ethiopia's civil war'.

[112] Max Bearak, Meg Kelly, and Joyce Sohyun Lee, 'How Ethiopia used a Turkish drone in a strike that killed nearly 60 civilians', *The Washington Post* (7 February 2022), available at: {www.washingtonpost.com/world/interactive/2022/ethiopia-tigray-dedebit-drone-strike/}.

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this.[113] Ethiopian SU-27s have been seen carrying dumb bombs close to the front lines of the war, but there are very few indications that conventional aircraft have been used with any significant impact on the battlefield. Historically, the Ethiopian air force has been very careful to preserve its most valued assets, and the four conventional aircraft verified to have been shot down by Tigray rebels likely explains why Ethiopia's SU-25s have remained absent.[114]

Reports of drone usage, on the other hand, are more prevalent. The Ethiopian government reports that by 2024, 'a total of 125 documented drone attacks have been recorded, with eight occurring before the Tigray War and the remaining 117 during and after'.[115] Indeed, the accuracy of these numbers might be assessed based on how large we understand Abiy's drone inventory to have been during the war. As Walsh reports,[116] 'by several estimates, [Abiy] has no more than a few dozen combat drones at his disposal, and they can be expensive to run, repair and supply with weapons'. Nevertheless, Walsh concludes,[117] drones 'remain a potent threat to Tigrayan forces, which themselves have no access to drones'.

Assessment of drone impact on the conflict

Media commentary on the revolutionary impact of drones following the TDF retreat was substantial. The *New York Times* called it 'a stunning victory'; Ethiopian forces were able to harness the drones' firepower to overpower an armed convoy of Tigray rebels heading to the capital to overthrow the government. Tigray leadership commentary supports these claims: it was 'the drones provided by foreign powers' that caused TDF leaders to order an immediate withdrawal from the attack.[118] It would be a mistake to think, however, that drones were solely responsible for this change in fortune.

Offensives tend to be susceptible to counteroffensives once they have reached a 'culminating point'.[119] Is it possible that, rather than drones providing the knock-out blow, the Tigray offensive simply culminated around the time the Ethiopian government acquired a drone fleet? To the contrary, preliminary evidence suggests that the TDF had not reached a culminating point, despite high attrition rates and offensive setbacks. While the TDF began the conflict with approximately 300,000 soldiers, attrition rates were high as the Tigray offensive progressed southwards.[120] The TDF suffered several operational setbacks on its course towards Addis Ababa, particularly between August and October during the start of the government's counteroffensive. Yet the five-pronged move towards Addis Ababa steadily continued until the ENDF was able to effectively cut supply lines to the rebels, contributing to the routing of the Tigray forces. It was Class II and III drones that made this possible.

Did the Tigray rebellion succeed in its political objectives? As we mention above, one measure of victory in a civil war is if the insurgents can deny the government effective control over its territory or force their withdrawal from separatist territory. At this point, the TDF seems to have accomplished this. So what did drones offer the Ethiopian government? In short, they offered the government the means to survive. In this sense, armed drones proved decisive. The ENDF's Wing Long IIs, TB2s and Mohajer-6s destroyed TDF forces and their supply convoys as they threatened

[113] Ash Rossiter and Brendon J. Cannon, 'Game-changing drones? The record from Libya to Ukraine', in James Patton Rogers (ed.), *De Gruyter Handbook of Drone Warfare* (Berlin/Boston: De Gruyter, 2024), pp. 325–338 (p. 330).

[114] Stijn Mitzer and Joost Oliemans, 'Tankovy dusters: Su-25TK attack aircraft in Ethiopian service', *Oryx* (2021), available at: {https://www.oryxspioenkop.com/2021/08/tankovy-busters-russian-su-25tk-attack.html}; Stijn Mitzer and Joost Oliemans, 'List of aircraft losses of the Tigray War (2020–2021)', *Oryx* (2021), available at: {https://www.oryxspioenkop.com/2021/09/list-of-aircraft-losses-of-tigray-war.html}.

[115] Daniel Kassahune, 'Decoding the patterns of drone strikes in Ethiopia', *Capital Ethiopia* (2 January 2024), available at: {https://www.capitalethiopia.com/2024/01/02/decoding-the-patterns-of-drone-strikes-in-ethiopia/}.

[116] Walsh, 'Foreign drones tip the balance in Ethiopia's civil war'.

[117] Ibid.

[118] Ibid.

[119] Milan N. Vego, 'Operational overreach and the culminating point', *Joint Forces Quarterly*, 25 (2000), pp. 99–106.

[120] Plaut and Vaughn, *Understanding Ethiopia's Tigray War*.

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Addis Ababa. Without drones, there might be a very different Ethiopian government today. While nuanced, this is an excellent example for the proponents of drone revolutions, since armed drones created distinct military and in turn political advantages for the Ethiopian government, literally deciding the fate of the nation.

Conclusion

A synthesis across the drone debate suggests that drone technologies, depending on the type of conflict, the political objectives at stake in the conflict, and the types of technologies employed, can be game-changers, offer their acquirers magic bullets, and even in some circumstances decide the fate of a nation. Conversely, we have also found that drones can fail to provide an independent determining effect on the outcomes of other conflicts. It is important to take these findings with the grain of salt with which they are intended. These are very specific circumstances and contexts, but they offer scholars and policymakers a list of questions to ask to determine the potential impact of drones in future conflicts. What kind of conflict? What are the objectives? Which drone technologies and who has them? The effectiveness of drone employment will differ depending on the answers to these questions.

We have also tried to emphasise the role that technology plays in war while cautioning against a *technological focus* on war. Somewhat ironically, it is Martin Van Creveld who puts this most succinctly, noting 'the idea that war is primarily a question of technology … and must seek victory by acquirement and maintain technological superiority – that idea has been shown to be neither self-evidence, nor necessarily correct, nor even very old'.[121] If we assume that a single technology can change war universally, we will certainly be proven incorrect. If we assume that a single technology will always work in favour of its possessor, or that the actor with the most capabilities will wield that technology most effectively, we will be proven shortsighted. To the contrary, the underlying assumption of this study suggests that when asking questions such as these, we should look to the deeper political contexts the conflict.

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[121] Martin Van Creveld, *Technology and War: From 2000 BC to the Present* (New York: Simon & Schuster, 2010), p. 312.

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