

Transformation of Air Warfare: Drones in the Russo-Ukrainian War¹

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Abstract

The primary objective of air power is to coerce the enemy to alter his behavior by manipulating the cost of war. Social scientist Thomas Schelling explained coercion as the ability of military power to “hurt” the enemy – to inflict punishment – and the inherent bargaining power this confers. Traditionally, conventional manned aircraft have been the primary means of coercion, but the increasing reliance on drones by Russia and Ukraine in the ongoing war challenges this paradigm. For instance, according to The Armed Conflict Locations and Event Data Project (ACLED), out of 929 missions conducted by the Ukrainian Air Force in 2023, 887 (95%) were drone missions. This shift prompts an examination into how examining how drones transform air warfare in the Russo-Ukrainian conflict. This paper contends that drones are reshaping air warfare by assuming traditional manned aircraft roles, reducing the cost of warfare, and mitigating the risk of escalation, particularly in contested airspace where conventional aircraft face limitations in operational effectiveness.

Keywords: Russo-Ukraine War, coercion, airpower, drones

¹ This manuscript remains a working paper.

1. Introduction

On Sunday, April 14, 2024, *CNN* reported that Iran launched an unprecedented large-scale drone and missile attack on Israel on Saturday night in retaliation for a suspected Israeli strike on an Iranian diplomatic complex in Syria; therefore, bringing the long-running shadow war between the two sides into the open and raising the prospect of full-blown regional conflict. More than 300 projectiles – including around 170 drones and over 120 ballistic missiles – were fired toward Israel in an immense aerial attack overnight. The reprisals marked the first time the Islamic Republic has launched a direct assault on Israel from its soil, marking a dangerous new inflection point in the fast-widening Middle East conflict.¹ Considering the implicit prior warning disseminated by Iran about the impending strike, the attack appeared more as a calculated political signal rather than a total destruction.

Besides the geopolitical context, the attack is unprecedented in terms of air warfare, too. This marks the first instance in interstate warfare where drones were employed to initiate an air campaign. Moreover, it stands as the first interstate air campaign that entirely omitted the use of manned fighter aircraft. Air power has been Iran's security Achilles heel, and drones compensated for their aged F-14 Tomcat fighter fleet.² From a geostrategic standpoint, drones empowered Iran to convey a calculated, low-cost, coercive political message. The operation incurred minimal human and material costs, crucially enabling the containment of a regional conflict without escalating into full-blown war. Had the Iranian Air Force relied on its F-14s to spearhead this air campaign, the outcome would likely have been significantly different.

The Iranian air strike demonstrates the options modern coercive airpower can offer to political and military leaders. As a strategic concept, coercive air power revolves around using aerial forces to compel adversaries to alter their behavior or policies through the threat or application of force.³

However, as in any other domain, technology is transforming air warfare, too. Technologies such as precision-guided munition, stealth technology, Unmanned Aerial Systems (UAS), and hypersonic missiles have transformed air warfare. Out of these technologies, UASs are drawing special attention in the current international security landscape. This technological advancement has facilitated the war between Russia and Ukraine by offering efficient surveillance, targeted attacks, and reconnaissance with reduced risks to combatants' lives and at a lower cost. Both sides' significant reliance on drones for air power has prompted the question: "Have drones transformed air warfare, particularly in the context of the Russo-Ukraine War?"

Against this backdrop, this paper argues that drones in the Russo-Ukrainian war transform air warfare in three fundamental ways. First, they are replicating traditional air power roles in contested airspace. Second, they are reducing the cost of warfare. Lastly, they are preventing the escalation of war. Drones are assuming air power roles and altering battlefield dynamics, particularly in areas where conventional fighter aircraft are constrained in operational freedom. However, commercial-grade drones at the tactical level have limited transformative impact due to their constrained capabilities.

Accordingly, this paper will first examine the evolution of coercive air power theory to provide a conceptual framework for the paper. Subsequently, it will explore the strategic context behind the Russo-Ukraine War. Finally, an analysis of the aerial landscape in the Russo-Ukraine war will illustrate how drones have transformed air warfare.

2. Conventional Air Power and Coercion

Prior to discussing air warfare in the Russia-Ukraine war, it is imperative to understand coercion as a concept of interstate conflicts. In conventional warfare, when decisive victory is not an option, coercion becomes the strategy of war. Social scientist Thomas Schelling explained coercion as the ability of military power to “hurt” the enemy – to inflict punishment – and the inherent bargaining power

this confers.⁴ Accordingly, Schelling asserts that coercion is about future pain and about structuring the enemy's incentives so that he behaves in a particular way.⁵ Therefore, coercion means efforts to change the behavior of a state by manipulating costs and benefits. Historian Tami Davis Biddle contends that the advent of air power has added a whole new dimension to the possibilities for coercion.⁶

Air power, as a relatively new coercive instrument, has become increasingly powerful as both aircraft and weapons have improved. Air power's ability to alter the behavior of adversaries through bombing – coercion – has been an evolving phenomenon in the theory of air warfare in the twentieth century. Air power theorists in the early days (prior to 1945) were divided over the question of the best way to coerce an enemy. On a strategic level, the question spawned three schools of thought.

First, some advocated a *punishment strategy*, which sought political concessions or changes in behavior by terrorizing civilians from the air.⁷ Members of this included Goulio Douhet, Billy Mitchell (after the mid-1920s), and Royal Air Force's (RAF's) Arthur "Bomber" Harris. Second, there were those who advocated a *risk strategy*, which sought to deprive an enemy of the infrastructure or industrial capacity needed to wage war.⁸ Members of this group included Italian aeronautical engineer Gianni Caproni, Italian journalist Nino Salvaneschi, Father of Royal Air Force Hugh Trenchard (in the 1920s), portions of the Air Corps Tactical School (ACTS)⁹ faculty, and members of the Committee of Operations Analysts and the Economic Objectives Unit¹⁰ in World War II. Third, there were those who advocated a *denial strategy*, which fixated on the destruction of fielded military forces. The RAF's World War II Air Operations Commander John Slessor and continental military establishments such as the German and Russian General Staffs supported this option in order to subordinate airpower to what they saw as more pressing ground warfare needs. However, the outcomes of the strategic bombing campaign of World War II questioned the efficacy of the abovementioned three concepts.¹¹

In the latter part of the twentieth century, a shift in strategic thinking emerged among western strategists, drawing from lessons of past conflicts like the World Wars, Korea, and Vietnam. Colonel

John Warden, a prominent figure in this development, introduced the concept of strategic paralysis, which aims to disable, rather than destroy, the enemy to achieve maximum political impact at minimal military cost. Warden's theory, rooted in modern air power, targets the enemy's Center of Gravity (COG) through his five-ring model, which identifies leadership as the most critical element. This theory was put into practice in Operation Desert Storm, where a massive air campaign effectively coerced the Iraqi Government into capitulation, showcasing the potential of strategic paralysis in contemporary warfare.¹²

3. Strategic Context of the Russo-Ukraine War

The collapse of the Soviet Union more than three decades ago marked a seminal moment in world history; furthermore, it ended a protracted geopolitical struggle and unveiled a new era of global politics. The end of the Soviet Union also saw new global alliances and redeveloped relationships and partnerships.¹³ The war of February 2022 demonstrated the irreconcilable differences that had arisen between Russia and Ukraine, many of them after 2014. Some believe that it is about reclaiming the legacy of the Soviet Union Empire. Others cite Ukraine's potential membership in the North Atlantic Treaty Organization (NATO), and Russia's reaction to that.

The disintegration of the Soviet Union meant countries like Georgia and Ukraine found themselves in a challenging position torn between their aspirations for closer ties with the west and the security concerns posed by neighboring powers. As a result, they did not join either the EU or NATO. The contention between their political aspirations and security dilemmas has left their future uncertain and indecisive. One of the primary obstacles preventing Georgia and Ukraine from joining the European Union (EU) or NATO is the unresolved territorial disputes within the two countries, stemming from conflicts with Russia.¹⁴

Georgia's territorial disputes are centered around the breakaway regions of South Ossetia and Abkhazia, while Ukraine's dilemma arose from the conflict in Donbas, which began in 2014. The EU's

Copenhagen criteria and Article 10 of NATO implicitly requires aspirant member countries to resolve their territorial disputes before joining.¹⁵ This is because unresolved territorial conflicts can threaten the region's security and stability, which contradicts the core values and objectives of both organizations. While Georgia's territorial disputes remain unresolved, tensions between Russia and Ukraine escalated into a full-blown interstate war in 2022, marking the first such conflict in Europe since World War II.

In addition to historical and ethno-nationalist claims, the political, economic, and security dilemma stemming in Russia from Ukraine's westward vectoring, have largely contributed to the ongoing war.¹⁶¹⁷ Furthermore, the ambivalent foreign policy of post-independent Ukraine, particularly before 2014, along with the stance of some EU countries, significantly impacted Ukraine's path towards accession to the EU and NATO.¹⁸ During the presidencies of Leonid Kravchuk (1991-1994) and Viktor Yushchenko (2005-2010), Ukraine pursued steadfast policies aligning with the West. However, the presidency of Leonid Kuchma (1994-2005) was marked by indecision and fluctuating allegiances. On the other hand, Viktor Yanukovich (2010-2014) pursued a more Russia-centric policy, diverging from the Westward trajectory.¹⁹ Additionally, EU nations exhibited indecisiveness regarding Ukraine's political future. As Michael Kimmage observes, the EU adopted a non-committal stance, avoiding an either-or approach between European and Russian affiliations, and instead sought to maintain working relations with both Ukraine and Russia simultaneously.²⁰

Russia's perception of Ukraine as the strategic depth or the buffer zone between Europe and Russia is deeply rooted in historical and geopolitical realities. Russia recalls historical invasions by Napoleon and Hitler, both of which involved military campaigns through Ukrainian territory.²¹ As such, Ukraine has been traditionally viewed by Russia as a crucial component of its defense strategy. Furthermore, Russia perceives the expansion of NATO into former-Soviet Baltic and Eastern European states as a direct threat to its security interests. From Russia's perspective, NATO's eastward expansion represents encroachment on its sphere of influence and a potential military threat.²² Therefore, Ukraine's aspirations to join the EU

and NATO are seen as particularly alarming by Russia, as it viewed these moves as further attempts to contain its influence.

These complex political, economic, and security factors ultimately contributed to a series of events, including the Russian annexation of Crimea, the Maidan protests in Ukraine, the hybrid warfare in the Donbas region, and ultimately, the full-scale invasion of Ukraine by Russia in February 2022.

4. Transformation of Air Warfare in the Russo-Ukraine War

The Air Picture Over Ukraine

The Russo-Ukraine air war is characterized by both protagonists using drones rather than conventional manned offensive air power. The most pertinent question is: why did drones take a front-line role in the Russo-Ukraine air war? The primary reason, shared by both countries, is that neither possesses the command of the air necessary for air, land, and maritime operations while denying the same to the other.²³ Additionally, each country has specific motives for exploiting drone warfare.

From the Russian perspective, two more reasons contributed to the shift towards a drone strategy: firstly, the escalating cost resulting from a protracted war, and secondly, losses incurred by the Russian Aerospace Force due to Ukrainian surface-to-air missiles (SAMs).

Securing control of the air was pivotal to Russia's political objective of swiftly forcing the Ukrainian President and the elites into capitulation and taking over the administration of Kyiv under Russian control.²⁴ Consequently, on February 24, 2024, the primary objective of the Russian Aerospace Forces (VKS) was to gain control of the airspace over Ukraine by neutralizing Ukrainian surface-to-air missiles (SAMs) and establishing a safe corridor for transport aircraft and helicopters to insert Russian Airborne Forces (VDV) and Spetsnaz operatives into Antonov International Airport, located in the town of Hostomel (22 miles northwest of Central Kyiv).²⁵ These troops were tasked with seizing control of Kyiv, including its political leadership, to swiftly conclude the war.

However, the troop insertion did not proceed as planned by the Russian military. Ukrainian SAMs shot down Mi-8 transport helicopters carrying VDV troops and Spetsnaz troops and the Ka-52 attack helicopters escorting them.²⁶ Consequently, the Russian primary objective of seizing control of Kyiv's leadership was thwarted by Ukrainian SAMs. Subsequently, the technologically advanced air defense systems received from the partner countries, such as US-made Patriot and National Advanced Surface-to-Air Missile Systems (NASAMS)²⁷, bolstered the Ukrainian integrated air defense network, rendering Kyiv's airspace impenetrable. As a result, conventional strike aircraft of the Russian Aerospace Forces (VKS) were unable to carry out strategic strikes on Ukrainian leadership and critical infrastructure due to the superiority of the Ukrainian integrated air defense network. The only options for strategic strikes were ballistic and cruise missiles. With this significant initial setback, the invasion transformed into a protracted and costly war in the Eastern and Southern regions of Ukraine.

Besides strategic strikes, VKS tactical air support also suffered from Ukrainian SAMs and (Man Portable Air Defense Systems (MANPADS). As a result, by late March 2023, the VKS had suffered significant losses, including 20 Su-34s out of an initial fleet of approximately 130, and 30 Su-25SMs out of around 120.²⁸ Among the helicopter gunships, confirmed losses included 33 Ka-52 Alligators out of a fleet of approximately 120, and 11 Mi-28 Havocs out of a fleet of similar size.²⁹ Consequently, the air war became increasingly costly in terms of both personnel and materiel in a SAM-infested contested battlespace. Therefore, Russia shifted their strategy to employ drones to reduce the costs of war while maintaining the ability to carry out offensive air power roles such as destroying Ukrainian air defenses, critical infrastructure, and close air support operations.

Similar to VKS, the Ukrainian Air Force's (UkrAF) inability to gain control of the air and conduct attack roles with their fighter fleet led to their transition to drones. The UkrAF struggled to establish air superiority and conduct attack roles from the outset of the invasion due to the inferior capabilities of their fighter fleet, which included Su-27s, MiG-29s, Su-24s, and Su-25s. Modern Russian

fighters such as the Su-35, Su-30SM, and MiG-31, equipped with advanced radars and Beyond Visual Range (BVR) missiles, successfully downed many of the UkrAF's fighter jets.³⁰ The Combat Air Patrols (CAPs) conducted by Russian fighters effectively denied airspace to Ukrainian offensive aviation, thus preventing them from establishing control of the air and supporting their ground troops. However, Ukrainian SAMs remained a formidable threat to the VKS's strategic strikes.

In summary, Ukraine evolved into a contested airspace, with the air defense capabilities of each protagonist effectively denying freedom of air operations to the other and inflicting significant costs of war. The SAM-infested airspace almost crippled the air power projection to both sides. Consequently, Russia and Ukraine resorted to drones to fulfill their air power requirements and sustain the protracted conflict within acceptable cost parameters. Thus, the rapid proliferation of drones raises the question of whether they have transformed conventional air warfare by their capacity to operate effectively in contested airspace. The transformation of warfare by drones in the Russia-Ukraine war manifests itself through both sides' abilities to assume conventional manned airpower roles, to significantly reduce the cost of war, and prevent escalation.

Replicate Traditional Air Power Roles

In the Ukrainian theater, drones are revolutionizing air warfare by assuming the air power roles typically carried out by conventional manned aircraft, which are hindered due to the contested airspace. These roles, as outlined in the UK Air Power Doctrine, include control of air, attack, intelligence, surveillance, reconnaissance (ISR), and air mobility.³¹ When executed individually or in combination, these roles contribute to persistent coercion and deterrence of the adversary.³²

Ukraine encountered a significant threat by the Russian air power, which overwhelmed and incapacitated the Ukrainian Air Force fighter fleet. Thus, drones became the key component of Ukrainian airpower. The Turkish-manufactured TB-2 Bayraktar played a prominent role early in the war

when Russian fighter interceptors prevented Ukrainian ground attack aircraft from providing air support to ground troops to cease the Russian ground invasion.³³ In Ukraine, drones are predominantly employed in battlefield attack roles and Intelligence, Surveillance, and Reconnaissance (ISR). Moreover, Ukraine has deployed drones more frequently than manned aircraft in air operations. For instance, according to The Armed Conflict Locations and Event Data Project, out of a total of 929 missions conducted in 2023, 887 (95%) were drone missions.³⁴ Given Ukraine's significant disadvantage in conventional airpower capabilities, drones provided an asymmetric advantage, offering a cost-effective means to reduce casualties, target Russian tanks with minimal risk, and disseminate propaganda.

However, recently Ukraine has begun to conduct strategic strikes on critical infrastructure within Russia as well. The recent drone attacks targeting energy infrastructure deep within Russian territory signify a transformation in air strategy. With the capability to deploy long-range attack drones integrated with artificial intelligence (AI), Ukraine has initiated strategic strikes deep inside Russian territory—an undertaking impossible for existing Ukrainian Air Force strike aircraft such as the Su-27, MiG-29, Su-25, and Su-24 due to Russia's superior air defense capabilities. In 2024 alone, there have been 16 drone attacks on oil refineries within Russian territory so far, with a significant strike occurring at Russia's Nizhnekamsk oil refinery—one of the five largest in Russia—located in the Tatarstan region, more than 1,100 kilometers (700 miles) from the Ukrainian border.³⁵ Therefore, for Ukraine, drones not only replicate traditional conventional air power roles but also enable air missions that were previously unattainable for traditional fighter aircraft.

In the context of Russia, drones have emerged as a crucial asset to fill the void left by the denial of strategic strikes to the VKS due to the formidable Ukrainian integrated air defense network. Consequently, Russia primarily utilizes drones to carry out strike roles, particularly targeting critical infrastructure (Center of Gravity targets). Notably, Shahed-136 kamikaze drones have taken the place of VKS strategic bombers such as the Tu-95 and Tu-160.³⁶ Despite the challenges posed by Ukrainian

SAMs, the VKS has persisted in employing conventional fighters close to the battlefronts, leveraging their stand-off strike capabilities (through Glide Bombs – KAB) to support Russian ground forces in gaining additional territory.³⁷ In 2023, out of a total of 5122 missions conducted, 4183 (81%) were carried out by conventional strike aircraft, while 939 (11%) were drone attacks.³⁸

Therefore, drones serve as a critical tool for both air forces, filling the gaps created by contested airspace and replicating air power roles that would otherwise be denied. Drones enable Ukraine to maintain tactical air support in an asymmetric environment, while Russia utilizes drones to compensate for the lack of strategic strike capabilities resulting from Ukrainian air defense measures.

Reduce the Cost of Air War

Drones are transforming air warfare by significantly reducing the cost of war when compared to conventional air power. Both Russia and Ukraine currently aim to coerce the opposing side to achieve political objectives on their respective terms by increasing the cost for the other side and decreasing their own costs. According to Schelling, coercion involves shaping the cost-risk calculation of an opponent to make them behave as desired. The objective is not to destroy the enemy but to elicit compliant behavior and deter further political mischief.³⁹ In this context, Russia and Ukraine are employing drones to decrease costs while increasing costs for the other side. Drones reduce human, economic, and political costs compared to conventional aircraft operating in contested airspace.

First, one of the most significant cost factors is that drones have reduced the cost of human lives. Drones eliminate the risk to pilots, making them appealing in a society focused on minimizing hazards and misfortunes, termed a "risk society" by Ulrich Beck.⁴⁰ Militaries, influenced by societal attitudes towards casualties and the desire for clean, low-risk warfare, increasingly turn to technology like drones to minimize battlefield deaths;⁴¹ however, the potential risk to civilian lives is a subject of debate. While it's true that conventional aircraft bombings could result in more civilian casualties due to their higher

yield and relative lack of precision, both Russia and Ukraine have targeted civilians in each other's countries using drones. Nevertheless, drones have considerably reduced the human cost to pilots and civilians compared to conventional air power.⁴²

Second, drones reduce the burden on the economy by decreasing material costs. From the Russian perspective, sustaining a prolonged air campaign is expensive, considering the operational costs of aircraft and the price of ballistic and cruise missiles. For instance, while a single Kalibr cruise missile costs nearly \$1 million, a Shahed drone costs only \$20,000.⁴³ Despite the superior destructive capability of the Kalibr (Warhead – 500kg High Explosive), it remains cost-effective to offset this disadvantage by deploying multiple Shahed drones (War head – 50kg). The most significant factor from the Ukrainian point of view is that drones have lowered the barrier for air operations, enabling the resource-scarce Ukrainian military to maintain air support on the battlefield, thereby serving as an equalizing force to Russia. Without low-cost drones on the battlefield, detrimental effects could have occurred in Ukraine.

Thirdly, drone warfare reduces the political cost to the incumbent government. Drones, by presenting a seemingly cleaner form of warfare with minimized civilian casualties, may render longer military campaigns more sustainable for a public sensitive to casualties.⁴⁴ Unlike the ongoing conflict in the Middle East, characterized by Israeli bombing campaigns resulting in significant civilian casualties, both the Russian and Ukrainian governments have maintained their aerial campaigns with lower levels of collateral damage. The comparatively reduced civilian casualty rate in the Russo-Ukrainian conflict resulting from drone strikes has shielded both sides not only from domestic uproar but also from international condemnation and outcry. Accordingly, drones have lowered the political cost of war, thus enabling more measured responses than conventional air power.

Hence, drones have lowered the human, economic, and political costs associated with air warfare in the Russo-Ukraine conflict, establishing drones as the preferred aerial platform over conventional manned aircraft, which could have inflicted greater costs. Such revelations may prompt the proliferation

of drones among other states. In fact, such a trend is already emerging, as reported by the Stockholm International Peace Research Institute (SIPRI) in 2022, with a notable rise in demand for drone exports from middle-power states like Iran, Israel, and Turkey. Consequently, states may increasingly pivot towards drone-centric air warfare in the future.

Lower the Possibility of Escalation

The final factor transforming air warfare is the ability of drones to reduce the likelihood of war escalation while still maintaining offensive capabilities. If drones alter governments' risk calculations and subsequent behavior, they will inevitably influence responses to violations of the status quo. In scenarios where Iran bombs one of the US-allied states in the Middle East, a significant or equal response from all involved parties might be expected; however, aggression involving drones appears to lack such escalatory effects. For instance, President Trump refrained from a US military response to the destruction of the Global Hawk at the last minute, citing the disproportionate cost of 150 Iranian lives.⁴⁵ Similarly, in another incident where two drones targeted the Kremlin on May 3, 2023, Ukraine denied any involvement. In this case, the plausible deniability afforded by drones prevented Russia from escalatory retaliation.⁴⁶ Had the attack been conducted by Ukrainian fighter aircraft, Russia would likely to have responded with greater intensity. Therefore, drones alter governments' strategic calculations and extend the escalation threshold.

In summary, drones have transformed the air warfare in the Russo-Ukrainian War by assuming conventional air power roles, reducing the cost of war, and mitigating the escalation of war; however, drones have not become the 'silver bullet' of the conflict. Unmanned Aerial Systems have still not coerced either belligerent sufficiently to alter their behavior and bring a political end state to the war. Drones' effectiveness is further exacerbated by their vulnerability to electronic jamming and destruction

by air defense systems; additionally, duration and distance are also limiting factors. Furthermore, drones cannot match the payload of conventional aircraft.

Nevertheless, drones stood up to the occasion to fill a critical void when the lethal air defenses deprived the ground troops of much-needed air support, either to gain or protect territory. Drones present an aggregated effect when incorporated with strategy and policy. For example, an existential threat to energy infrastructure may bring an adversary to the negotiation table. Therefore, drones' ability to penetrate well-laden defenses and project air power makes them a formidable platform, thus transforming aerial combat.

5. Conclusion

The Russo-Ukrainian War demonstrates that drones have a transformational effect on air power granting each country the ability to assign conventional air power roles, its ability to reduce the cost of war, and the ability to deescalate a conflict have led to this transformational effect. However, these transformational effects will not be confined to the Ukrainian battlespace. They will present a cascading policy, strategic, and geopolitical implications.

The evolving landscape of air warfare, marked by the increasing prominence of drones, is poised to drive a global proliferation of unmanned aerial systems (UAS). Beyond the Russo-Ukrainian conflict, drones played a decisive role in conflicts like the Armenian-Azerbaijan war in 2020, while Iran's recent demonstrations of drone effectiveness in interstate warfare have spurred further proliferation. Currently, 102 nation-states operate various military UAS, a significant increase from the 60 nations possessing such technologies in 2010. This surge reflects a 70 percent rise in state militaries deploying armed or unarmed UAS capabilities, signaling a profound shift in the dynamics of modern warfare.⁴⁷

The transformative effect of drones on the strategic choices of state leaders highlights a significant policy implication: the phenomenon of goal displacement, where organizations expand their

ambitions and substitute more expansive goals for their original ones. This process, known as "mission creep" in the military, is driven by cost.⁴⁸ With drones becoming increasingly affordable, governments and other actors are inclined to use them for an expanding array of tasks, even those indirectly related to their original purpose. The affordability of drones leads to a "throw them at the problem" approach. However, if drones alter governments' risk calculations and subsequent behavior, they could disrupt deterrence relationships between long-standing rivals, potentially escalating conflicts rather than de-escalating them.

Geopolitically, the transformative impact of drones could redefine warfare, particularly in conflicts between great powers or peer competitors. In these contexts, airspace would become fiercely contested, with neither side gaining full control. Consequently, alternatives like cruise missiles, ballistic missiles, and drones would come to the forefront. While ballistic and cruise missiles are vulnerable to modern air defense systems, drones retain potency in projecting air power. This competition could trigger a spiral effect, prompting great powers to allocate defense budgets towards the research and development of more advanced UAS and Counter-UAS systems, leading to an arms proliferation cycle.

The proliferation of drones is poised to reshape global power dynamics, granting influential geopolitical leverage to countries manufacturing military drones. Middle-power states like Iran, Israel, and Turkey, despite not being classified as "great" powers, are increasingly influential due to their substantial drone manufacturing capabilities. This phenomenon, termed "drone diplomacy" by experts, underscores the growing political significance of exporting countries.⁴⁹ Through drone exports, Iran, Israel, and Turkey have bolstered their political leverage and expanded their geopolitical influence on the world stage.

Considering these factors, it is evident that the employment of drones in air warfare could be still in its infancy. The geopolitical developments in the world will shape its further evolution.

Notes

¹ [Iran launches unprecedented retaliatory strikes on Israel in major escalation of widening conflict | CNN](#)

² [Iran once had air inferiority. After its attack on Israel, it flies high. - Atlantic Council](#)

³ Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Cornell University Press, 1996), 04.

⁴ John Andreas Olsen, *Airpower Reborn: The Strategic Concepts of John Warden and John Boyd* (Naval Institute Press, 2015), 34.

⁵ Olsen, 35.

⁶ “Biddle - COERCION THEORY A BASIC INTRODUCTION FOR PRACTITI.Pdf,” 4, accessed April 16, 2024, <https://repositories.lib.utexas.edu/server/api/core/bitstreams/a3b50629-ed23-48d2-90ec-e95a48cbffcd/content>.

⁷ John Andreas Olsen, *Airpower Reborn: The Strategic Concepts of John Warden and John Boyd* (Naval Institute Press, 2015), 30,

⁸ Olsen, 30.

⁹ The Air Corps Tactical School, also known as ACTS and "the Tactical School", was a military professional development school for officers of the United States Army Air Service and United States Army Air Corps, the first such school in the world. Miller, Donald L. (2006). *Masters of the Air: America's Bomber Boys Who Fought the Air War Against Nazi Germany*, New York: Simon & Schuster. p. 38.

¹⁰ The Enemy Objectives Unit (EOU) was formed in the United States during the Second World War to identify targets for strategic bombing in Nazi Germany. The team, consisting of economists, was one section within the Office of Strategic Services. Working within external guidelines, the unit used a systematic methodology to identify military and economic targets where air attack would be most effective.

¹¹ Despite the dropping of 2.5 million tons of bombs during World War II, neither Germany nor Japan experienced any significant backlash against their regimes from the suffering population.

¹² Olsen, *Airpower Reborn*, 2015, 139.

¹³ The disintegration of the Soviet Union created new geopolitical realities, particularly in Eastern Europe. The fourteen new states that emerged from the dissolution sought their independent political, economic, and security futures. Many of these countries, including Estonia, Latvia, Lithuania, Poland, the Czech Republic, Slovakia, Hungary, Bulgaria, and Romania, looked towards the West and joined the European Union (EU) and the North Atlantic Treaty Organization (NATO). On the other hand, Belarus and the Central Asian countries turned towards the East and aligned themselves with the Commonwealth of Independent States (CIS) initiated by Russia.

¹⁴ Georgia's territorial disputes are centered around the breakaway regions of South Ossetia and Abkhazia, while Ukraine's dilemma arose from the conflict in Donbas, which began in 2014. The EU's Copenhagen criteria¹⁴ and Article 10 of NATO¹⁴ implicitly require aspirant member countries to resolve their territorial disputes before joining. This is because unresolved territorial conflicts can threaten the region's security and stability, which contradicts the core values and objectives of both organizations.

¹⁵ "Accession Criteria - European Commission," accessed April 29, 2024, https://neighbourhood-enlargement.ec.europa.eu/enlargement-policy/glossary/accession-criteria_en.

¹⁶ Historically, Russia perceives a passionate fraternal connection to Ukraine as the birthplace of Rus as a nation is Kiev dating back to 9th century. From an ethno-nationalist perspective, Russia claims a responsibility to protect the Russian-speaking population in the East and South of Ukraine after the spark of Ukrainian nationalism in West Ukraine, especially in post-Soviet time.

¹⁷ From Russia's perspective, Ukraine held significant importance as the largest state among the post-Soviet countries, and Russia sought to maintain its influence over Ukraine for political, economic, and security reasons. Russia believed that aligning Ukraine with its political ideology would contribute to stability in the region. Economically, Ukraine served as a crucial market for Russian trade, and more importantly, it played a vital role in Russia's gas exports to Europe, as major gas pipelines traversed Ukrainian territory. However, it was the security concerns that ultimately escalated tensions and contributed to the outbreak of the current war.

¹⁸ During the presidencies of Leonid Kravchuk (1991-1994) and Viktor Yushchenko (2005-2010), Ukraine pursued steadfast policies aligning with the West. However, the presidency of Leonid Kuchma (1994-2005) was marked by indecision and fluctuating allegiances. On the other hand, Viktor Yanukovych (2010-2014) pursued a more Russia-centric policy, diverging from the Westward trajectory.

¹⁹ Michael Kimmage, *Collisions: The Origins of the War in Ukraine and the New Global Instability* (Oxford University Press, 2024), 107,

²⁰ Kimmage, 100.

²¹ Kimmage, 9.

²² Kimmage, 8.

²³ "Russian-Combat-Air-Strengths-and-Limitations.Pdf," 2, accessed April 29, 2024, <https://www.cna.org/reports/2023/04/Russian-Combat-Air-Strengths-and-Limitations.pdf>.

²⁴ Plokhy, *The Russo-Ukrainian War*, 158.

²⁵ Plokhy, 160.

²⁶ Plokhy, 160.

²⁷ "Russian-Combat-Air-Strengths-and-Limitations.Pdf," 3.

²⁸ "Russian-Combat-Air-Strengths-and-Limitations.Pdf," 11.

²⁹ “Russian-Combat-Air-Strengths-and-Limitations.Pdf,” 11.

³⁰ “Russian-Combat-Air-Strengths-and-Limitations.Pdf,” 6.

³¹ “Raf Aerospace Power Doctrine - Google Search,” April 10, 2023, 27,

³² Control of the air serves as the cornerstone of all air operations, ensuring freedom of action in the air domain while constraining or preventing its use by adversaries. Air power's ability to influence actors and events is centered on the use of overwhelming force through aerial attacks, which can deter adversaries, disrupt their activities, or ultimately defeat them by targeting their resources and capabilities. The ISR role plays a crucial part in developing situational awareness and enhancing understanding, thereby shaping the conduct of operations. Additionally, air mobility enables the deployment, sustenance, and retrieval of personnel and equipment, often across considerable distances.

³³ Sarah Kreps and Paul Lushenko, “Drones in Modern War: Evolutionary, Revolutionary, or Both?,” *Defense & Security Analysis* 39, no. 2 (April 3, 2023): 2, <https://doi.org/10.1080/14751798.2023.2178599>.

³⁴ “ACLED | Bringing Clarity to Crisis,” ACLED, October 28, 2022, <https://acleddata.com/>.

³⁵ [Ukraine’s AI-enabled drones are trying to disrupt Russia’s energy industry. So far, it’s working | CNN Business](#)

³⁶ “Russian-Combat-Air-Strengths-and-Limitations.Pdf,” 3.

³⁷ Tom Watling, “The Russian Glide Bombs Changing the Face of the Ukraine-Russia War,” *The Independent*, April 10, 2024, sec. News, <https://www.independent.co.uk/news/world/europe/glide-bomb-russia-ukraine-air-strikes-weapons-b2526347.html>.

³⁸ “ACLED | Bringing Clarity to Crisis.”

³⁹ Olsen, *Airpower Reborn*, 2015, 36.

⁴⁰ Michael J. Boyle, *The Drone Age: How Drone Technology Will Change War and Peace* (Oxford University Press, 2020), 16, <https://books.google.com/books?hl=en&lr=&id=uOveDwAAQBAJ&oi=fnd&pg=PP1&dq=the+drone+age+boyle&ots=UxxL0Gq3xB&sig=ZyJZHSdLJWvXjfKe-wJW8YbH1l4>.

⁴¹ Nicholas Grossman, *Drones and Terrorism: Asymmetric Warfare and the Threat to Global Security* (Bloomsbury Publishing, 2018), 25.

⁴² Boyle, *The Drone Age*, 16.

⁴³ Steven Feldstein, “How Global Demand for Military Drones Is Transforming International Security and Geopolitics,” *Georgetown Journal of International Affairs* 24, no. 2 (September 2023): 150, <https://doi.org/10.1353/gia.2023.a913640>.

⁴⁴ Boyle, *The Drone Age*, 17.

⁴⁵ Boyle, 263.

⁴⁶ Julian E. Barnes et al., “Ukrainians Were Likely Behind Kremlin Drone Attack, U.S. Officials Say,” *The New York Times*, May 24, 2023, sec. U.S., <https://www.nytimes.com/2023/05/24/us/politics/ukraine-kremlin-drone-attack.html>.

⁴⁷ “2. A-Comprehensive-Approach-to-Countering-Unmanned-Aircraft-Systems_Joint Air Power Center.Pdf,” n.d., 485.

⁴⁸ Boyle, *The Drone Age*, 20.

⁴⁹ Feldstein, “How Global Demand for Military Drones Is Transforming International Security and Geopolitics,” 146.