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Human Impacts of Drone Warfare

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Developed by Elena Roe

Background

Though drone technology is not a 21st century novelty, the U.S. invasion of Afghanistan in 2001 brought about a sea-change in the utilization of unmanned aerial vehicles (UAVs), or drones, in military combat operations (Borg, 2021). To scholars of contemporary military affairs and international conflict, drones present both strategic and ethical queries; often hailed as a technological marker of rapid military reform due to their precise targeting, low cost, and virtual elimination of physical vulnerability on the part of the utilizing force, drones present both strategic advantages and serious questions of legality and morality due to these very same truths (Borg, 2021).

Following the 9/11 attacks on the World Trade Center and the Pentagon in September of 2001, the widespread use of drone technology throughout the War on Terror kicked off a “first wave” of drone scholarship and academic inquiry (Pong, 2022). Though the covert nature of drone operations, handled almost exclusively by the President and the Central Intelligence Agency (CIA), makes the specificities of this use difficult to track, the Bush administration’s use of drone warfare was continued and increased by the Obama administration. During his first four years in office, President Obama authorized nearly six times as many drone strikes as his predecessor did throughout both terms, utilizing these strikes to target terrorists in at least four countries—Afghanistan, Pakistan, Yemen, and Somalia (Boyle, 2013; Pong, 2022). This increase has led scholars to first examine the strategic impacts of drone warfare; namely, the lack of vulnerability experienced by the U.S. military in their ability to keep boots *off* the ground (Boyle, 2013; Borg, 2021). The Obama approach allowed the administration to avoid

nation-building missions, instead focusing on decapitation and high-value targets (HVTs). Hailed by those attached to the administration as “efficient, and even morally necessary given the state of the US economy and the war-weariness of the American people” (Boyle, 2013; 2), the strategic argument for drone warfare at this stage breaks down into four major advantages. These include: 1) that drones are effective at killing terrorists with minimal civilian casualties; 2) that drones have been successful at killing so-called ‘high value targets’ (HVTs); 3) that the use of drones puts such pressure on terrorist organizations that it degrades their organizational capacity and ability to strike; and 4) that a cost-benefit analysis of their use relative to other options—such as the deployment of ground troops—provides a compelling argument in their favor. In essence, drones have been praised for their ability to provide strategic and operational superiority with minimal human or economic cost to the U.S. (Boyle, 2013; Borg, 2021).

Despite these face-value attributes, others have questioned the real strategic value of drone warfare. As Boyle (2013) argues, the claim that drone warfare has killed fewer civilians than traditional warfare is difficult, if not impossible, to verify. Numbers published by different organizations vary widely; further, the U.S. would classify all military-age males within a given “kill-box” (target area) as enemy militants. Given the highly interrelated nature of social networks in targeted countries, it is almost impossible to single out targets living with their families, or targets mingling with innocent bystanders purchasing food and supplies at markets (Boyle, 2013). The low likelihood of singling out targets makes drone strikes, despite their supposed precision, highly susceptible to wide “collateral damage”, i.e, civilian deaths. Boyle further argues that the increased frequency and damage caused by drone strikes in fact brings about a strategic disadvantage to the United States, as civilian casualties were invoked as rhetorical and emotional leverage by terrorist groups to recruit for their causes, yielding higher numbers than those still imprisoned in Guantanamo Bay in the later Obama years (Boyle, 2013; Borg, 2021).

This background only touches on some of the strategic and ethical arguments for and against drone warfare, but ultimately rests on the tension found in asymmetric warfare. As many scholars have argued, the invulnerability of the state utilizing the drone changes the nature of warfare from a Clausewitzian “battle of the wills,” wherein each party must defend itself into a game of killing—where the killing is often indiscriminate, and conducted with both impunity and invisibility (Chamayou, 2013). This case study seeks not to examine the precise ethics of this kind of warfare, but rather to illuminate the human and psychological impacts of drone warfare. This is first discussed in an asymmetric context, as drone warfare is typically conducted, before

moving into a case study on the Russo-Ukrainian War, considered to be the world's first *symmetric* "drone war".

Human and Psychological Impacts of Drones

In the context of asymmetric warfare - considered to be non-traditional by military standards, but the more typical context within which drone warfare is analyzed - questions have arisen as to the psychological impacts of drone warfare on populations targeted by drones. Perhaps the most direct form of trauma in drone warfare involves the strikes themselves. Specific to drone operations are "signature strikes", which target individuals based on "pattern of life analysis"; in essence, operators and analysts will use drone surveillance to track and target individuals suspected of terrorism based on their daily activities and whereabouts (Richardson, 2023). If and when these individuals are targeted by a strike, civilians in the surrounding home or social environments are often injured or killed. Further, drone operations also include "double-tap" strikes, wherein another strike is launched after an initial blast to ensure completion. In these situations, civilians who might rush to help those caught in the blast are often injured or killed themselves (Richardson, 2023). Beyond this physical trauma, however, Hijazi et. al (2019) emphasize the impact of drone surveillance, which exists in much greater frequency compared to actual strikes.

"Anticipatory anxiety" refers to the feelings of helplessness, fear, and overwhelm experienced by populations living in areas patrolled by drone surveillance. The constant hum of surveillance drones overhead indicates the presence of a destructive force, but civilians are unable to predict if or when a strike might target them (Hijazi et. al, 2019). This unpredictability is increased by the nature of signature strikes, which have little to do with an individual's identity and everything to do with their daily activities being marked as suspicious (Hijazi et. al, 2019). In essence, individuals living in zones patrolled by drones live in constant fear of the next strike, and are constantly reminded of previous strikes by the presence of drones in the sky. A thirteen-year-old Pakistani boy named Zabir testified to the U.S. Congress in 2013 that "I no longer love blue skies. In fact, I now prefer grey skies. The drones do not fly when the skies are grey" (Richardson, 2023).

The seemingly random and always-possible threat of drone warfare and surveillance has been emphasized most recently in Israel's operations in the Gaza Strip. Borg (2021) traces the trajectory of drone utilization in Israel, ultimately arriving at the conclusion that the use of drones

for surveillance in Gaza has provided a strategic benefit for the purposes of the Israeli Defense Forces (IDF) in addition to their use for actual strikes. As early as 2004, the head of the IAF expressed that “Our vision of air control zeroes in on the notion of control. We’re looking at how you control a city or a territory from the air when it’s no longer legitimate to hold or occupy that territory on the ground” (Li, 2006: 48). In the context of the current war, this notion of control remains in place. Citizens in Gaza have provided extensive accounts of both heightened and constant anticipatory anxiety, as Israeli drones remain in the skies at nearly all hours of the day and night, providing a constant reminder of the potential for rapid and precise destruction at any time. This function of surveillance remains just one element of drone warfare in Gaza, however, for citizens have also provided eyewitness testimony detailing the use of drones for dropping of explosives as well as sniper drones (Lonsdorf, 2024). These small quadcopters, fitted with guns capable of firing single bullets, have been utilized both independently and in the wake of larger airstrikes targeting civilians and children (Lonsdorf, 2024; White, 2024).

In summation, the psychological effects of drone warfare on targeted populations are manifold. Beyond the ability of militaries possessing drone technology to conduct high-intensity airstrikes without risking the lives of their own military personnel, drones also project power and control—anticipatory anxiety rooted in the constant hum of surveillance drones overhead, the feeling of constantly being watched, and the reminder that a strikes could occur at any point ensures that civilians within a “kill box” or larger area remain in a state of constant fear and helplessness. As warfare evolves across the globe, however, drone capabilities are no longer limited to large militaries such as the United States and IDF. As of 2016, at least 90 countries were in possession of extensive drone technology, up from just 17 nations in 2000 (Borg, 2021). This has almost inevitably led to the first major symmetric drone war, in which both warring parties have utilized drone technology to their operational advantage; following Russia’s invasion of Ukraine in 2022, drone warfare has become integral to both Russian and Ukrainian forces.

Case Study - The Russo-Ukraine War

As the first major conflict with symmetric use of drones, the Russo-Ukrainian War provides a markedly different context within which to study the strategic and human impacts of drone warfare. Throughout the early stages of Russia’s invasion, both Russian and Ukrainian forces utilized more sophisticated drones in their operations; high loss rates of non-kamikaze (reusable) drones, however, prompted a shift in tactics to more low-cost models (DeVore, 2023).

While Russia first utilized the Orlan-10 and Ukraine relied on the Bayraktar TB-2 (Pong, 2022), amateur drones have also become quite common over the course of the conflict. Off-the-shelf commercial drones, such as the DJI Mavic 3, have been used to conduct surveillance and deliver small explosives, while some models have been found to contain amateur equipment—for example, a captured Orlan-10 model that was found to contain a Canon DSLR camera secured with velcro (Pong, 2022). Figure 1 demonstrates a deconstruction of a typical low-cost drone being used on the Russo-Ukrainian battlefield, as the employment of such models has become extremely organized within both forces (but particularly those of Ukraine) (Zafra et. al, 2024).

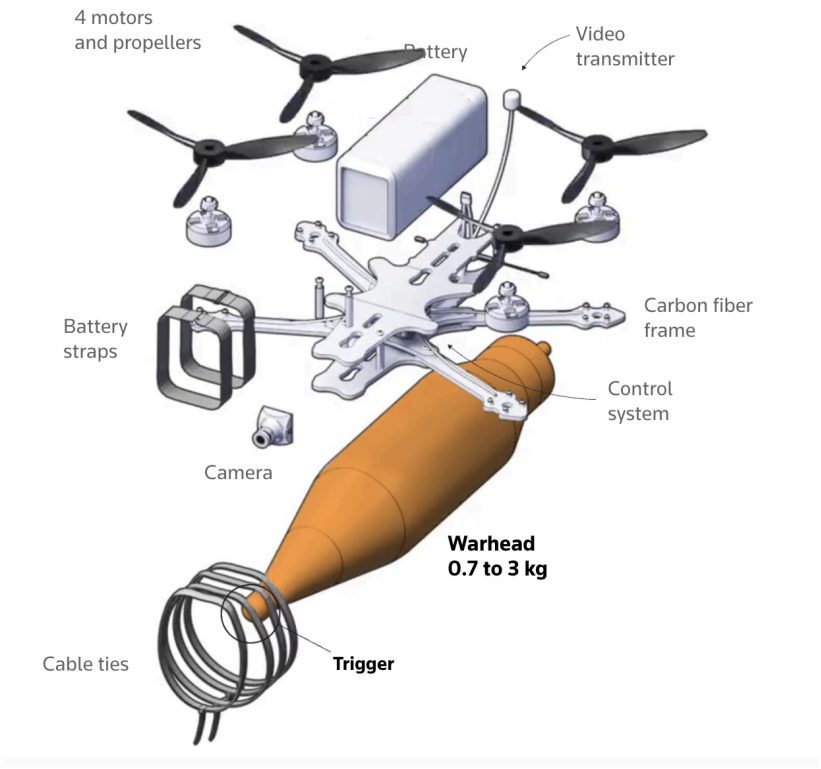

Figure 1. Reuters, 2024.

Models such as that demonstrated in the figure above can be secured and assembled for $500 or less—mere pennies in comparison to the millions of dollars required to obtain traditional manned aerial vehicles or even more sophisticated drone models (Zafra et. al, 2024). As a result of this accessibility, Ukraine aimed to manufacture 1 million FPV drones in 2024, while the Russian government scrambled to create drones guided by artificial intelligence (AI). This assistance from AI in targeting would eliminate a major weakness of drone warfare, in that

drones require a viable signal to send information back to their operators; such a signal is easily jammed, but with AI assistance, drones would no longer require such a signal, rendering them impervious to such a vulnerability.

With the low-cost element of drone warfare, however, comes interesting side effects—namely, that footage of strikes conducted in Ukraine is widely available across the internet. A video recently uploaded to Facebook, for example, depicts a Ukrainian Special Forces (SSO) operation where an SSO drone and armored vehicle battalion eliminated a Russian platoon and weapons depot along the front lines (Reyes, 2025). While war footage circulating in the media is certainly not new, the near-immediate accessibility of these kinds of operations to the general public on social media platforms is both novel and specific to the deployment of drones capturing such events. The long-term consequences of such a dynamic have yet to be seen, but they present an interesting source of inquiry. This video does not only capture standard combat operations; it also serves as evidence of war crimes, taken directly from the scene.

Despite the symmetric nature of drone utilization in the Russo-Ukrainian War, themes from the background of this case study re-emerge in the use of drones to target civilians. In videos verified by the BBC, Russian drones can be seen intentionally targeting Ukrainian civilians; five of the six videos were originally uploaded to a Telegram channel alongside goading and threats to the Ukrainian public (Limaye, 2024). These comments mocked victims, calling them “pigs” and using derogatory language to describe one woman victimized by the attack (Limaye, 2024). Ukrainians have spoken out about this targeting: Kristina Synia, who works at an aid center close to the border, said, “You feel like you’re constantly being hunted, like someone is always looking at you, and can drop explosives at any moment. It’s the worst thing” (Limaye, 2024). This kind of anticipatory anxiety, suffered by populations targeted by drones during the War on Terror, has re-emerged in Ukraine despite the symmetric nature of drone warfare. From July to October of 2024, at least 30 civilians were killed by explosives dropped by Russian drones in Kherson, a city near the frontline in Ukraine; and there have been at least 5,000 attacks over the same period, with over 400 injured (Limaye, 2024). The evidence of such attacks is, in many cases, plastered across the internet for all eyes to see.

Focus Questions

1. What are some of the strategic advantages of drone warfare for militaries using this technology?

2. How have these advantages been challenged by critics, and what strategic disadvantages could drone warfare create?
3. What are the major psychological impacts of drone surveillance and drone strikes on those living in conflict zones?
4. How have drones been utilized in the Russo-Ukraine War, and why have they been effective?
5. How does the use of drones impact civilians in Ukraine, as well as individuals all over the world and on social media?

Thematic Reflection and Discussion

Strategic Advantages and Disadvantages of Drone Warfare

Since the onset of the War on Terror, drone warfare has fundamentally changed the way wars are fought. Emphasis has moved away from boots on the ground or troop-focused approaches to warfare, and towards technological advancements. In their ability to render the deployer invulnerable, drones accomplish such a technological leap. While traditional soldiers have been required to physically operate on the battlefield or in traditional aerial combat scenarios, unmanned vehicles allow their users to carry out military operations without risking their own lives; from many thousands of miles away, militaries can kill, quickly and efficiently.

While the widespread use of UAVs has been hailed as a trademark of smaller, more efficient militaries and the strategy that accompanies this shift, debate remains as to the true strategic advantage of drone warfare. Drones can target suspected terrorists and HVTs, conducting surveillance over periods of weeks and months, and can supposedly eliminate these targets with minimal blowback. Does the inevitable collateral damage, however, constitute a strategic disadvantage if civilian deaths contribute to the recruitment of more and more combatants? Such a dynamic has been shown to sow instability among those grieving their loved ones, or those unhappy with incursions into their territory by foreign drones.

Questions:

1. Can the strategic benefits of drone warfare be balanced with the risks?
2. What other potential blowback might arise from drone warfare?
3. How might strategic advantages and disadvantages of drone warfare vary across time (ex. the Obama administration vs. current conflicts)?

4. What might the potential fallout of traditional fighter pilots being replaced with drones and drone operators be?

Ethical Concerns of Drone-Induced Trauma and Psychological Effects

As described in the cases above, drone surveillance and drone strikes impart severe psychological anguish upon victim populations in addition to actual casualties sustained from explosives themselves. While PTSD and conflict-induced trauma is high in any war zone, anticipatory anxiety appears to be more specific to drone warfare. The constant hum of drones overhead, along with the knowledge that any individual could be targeted by a signature strike through pattern-of-life analysis, creates an environment in which individuals experience constant surveillance, constant reminders of previous strikes, and constant fear of further violence. This raises questions not only as to the ethics of drone warfare, but also the persistent use of drones as a means of surveillance and control over populations. Particularly for populations such as that of the Gaza Strip, which exists in a cordoned-off area with limited entry and exit, there is little to no escape from such surveillance; this suggests that perhaps the strategic value of drones to those utilizing this technology is not simply their invulnerability and accuracy, but their potential function as a means of control and agent of psychological warfare.

Questions:

1. In what contexts is the use of drones ethical, and in where should the lines be drawn?
2. What are the major differences in ethics between drones as surveillance tools and drones as weapons of war? Is there a difference between the two?
3. Is there an effective means of governing drone use in conflict? Should there be?
4. What might the long-term effects of drone surveillance be on populations currently experiencing this, but also for the rest of the world's populations that may come under drone surveillance themselves?

Drone Use in Major Conflict, Targeting of Civilians, and War Footage on Social Media

The Russo-Ukrainian War signifies the first full-scale conflict in which drones have been used by both warring parties, and on a massive scale, at that. Moving towards lower and lower cost models as the war has gone on, both Russian and Ukrainian forces have utilized drones in a

largely “kamikaze” context, conducting strikes against opposing troops and artillery, all while capturing video evidence of said operations. This footage often goes viral on social media, posted to various platforms and channels alongside support for either side of the conflict. In an era increasingly defined by the dominance of social media, this shift cuts out the middleman role of major news outlets; war footage is funneled directly from the battlefield to the international public through the direct upload of drone footage, often documenting drone operations.

This footage does not only capture skirmishes between combatants, however. Drone footage has also captured the targeting of civilians along Ukraine’s border, many of whom have been injured or killed. The buzzing of drones overhead in these regions is not dissimilar to the perpetual noise experienced in Pakistan or Gaza, with citizens reporting feelings of constant helplessness and fear of the next strike. Unable even to enter their workplaces without extreme caution, these Ukrainian civilians often experience the violence of drones, the violence of surveillance, and the violence of attacks on their hometowns spreading across social media all at once. Taken together, these observations paint a fundamentally changed picture of contemporary warfare, as well as the way this warfare is conducted, perceived, and disseminated as a set of broader international narratives.

Questions:

1. What might the use of drones on the battlefields of Russia and Ukraine indicate about the changing nature of contemporary warfare?
2. How can we interpret the use of amateur drones in the context of combat? What issues might this present?
3. What might some of the effects of drone footage being publicly disseminated on social media be? Is this harmful, and if so, why?
4. How might the targeting of civilians in Ukraine be interpreted differently by major media outlets and/or governments than the targeting of civilians during the War on Terror or war in Gaza? What differentiates these populations relative to major world powers, and how are they ascribed different roles and identities by international actors?

References

Borg, Stefan. 2021. “Assembling Israeli Drone Warfare: Loitering Surveillance and Operational Sustainability.” *Security Dialogue* 52(5): 401–17. doi:10.1177/0967010620956796.

Boyle, Michael J. 2013. “The Costs and Consequences of Drone Warfare.” *International Affairs* 89(1): 1–29.

DeVore, Marc R. 2023. “‘No End of a Lesson:’ Observations from the First High-Intensity Drone War.” *Defense & Security Analysis* 39(2): 263–66. doi:10.1080/14751798.2023.2178571.

Hijazi, Alaa, Christopher J. Ferguson, F. Richard Ferraro, Harold Hall, Mark Hovee, and Sherrie Wilcox. 2019. “Psychological Dimensions of Drone Warfare.” *Current Psychology* 38(5): 1285–96. doi:10.1007/s12144-017-9684-7.

Limaye, Yogita. 2024. “Russian Drones Hunt Civilians, Evidence Suggests.” *BBC*. https://www.bbc.com/news/articles/c207gz7key6o.

Lonsdorf, Kate. 2024. “Eyewitnesses in Gaza Say Israel Is Using Sniper Drones to Shoot Palestinians.” *NPR*. https://www.npr.org/2024/11/26/g-s1-35437/israel-sniper-drones-gaza-eyewitnesses.

Lushenko, Paul. 2022. “U.S. Presidents’ Use of Drone Warfare.” *Defense & Security Analysis* 38(1): 31–52. doi:10.1080/14751798.2022.2031708.

Pong, Beryl. 2022. “The Art of Drone Warfare.” *Journal of War & Culture Studies* 15(4): 377–87. doi:10.1080/17526272.2022.2121257.

Reyes, Ronny. 2025. “Ukraine Special Forces Take out Russian Platoon, Weapons Caches: Video.” *MSN*. https://www.msn.com/en-us/news/world/ukraine-special-forces-take-out-russian-platoon-weapons-caches-video/ar-AA1zWMsl?ocid=BingNewsSerp.

Richardson, Michael. 2023. “Drone Trauma: Violent Mediation and Remote Warfare.” *Media, Culture & Society* 45(1): 202–11. doi:10.1177/01634437221122257.

White, Marcus. 2024. “Gaza Surgeon Describes Drones Targeting Children.” *BBC*. https://www.bbc.com/news/articles/c7893vpy2gqo.

Zafra, Mariano, Max Hunder, Anurag Rao, and Sudev Kiyada. 2024. “How Drone Combat in Ukraine Is Changing Warfare.” *Reuters*. https://www.reuters.com/graphics/UKRAINE-CRISIS/DRONES/dwpkeyjwkpm/.