Remote Controlled Restraint

The Effect of Remote Warfighting Technology on Crisis Escalation

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ABSTRACT

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How do technologies that remove warfighters from the front lines affect the frequency and intensity of military confrontations between states? Many scholars and policymakers fear that weapons that reduce the risks and costs of war – in blood and treasure – will lead states to resort to force more frequently during crises, destabilizing the international security environment. These concerns have featured prominently in debates surrounding the proliferation and use of remote warfighting technologies, such as drones. This project sets out to evaluate whether and how drones affect crisis escalation. Specifically, do drones allow decisionmakers to deploy military forces more frequently during interstate crises? Once deployed, how do these systems affect escalation dynamics? I argue that drones can help control escalation, raising questions about scholarly theories that suggest the world is more dangerous and less stable when technology makes conflict cheaper and less risky.

At the core of this project is a theory of technology-enabled escalation control. The central argument is that technologies like drones that remove friendly forces from the battlefield may lead states to use force more frequently, but decrease the likelihood of escalation when used in lieu of inhabited platforms. More specifically, these technologies lower the political barriers to initiating military operations during crises, primarily by eliminating the risk of friendly force casualties and the associated domestic political consequences for launching military operations. At the same time, removing personnel from harm's way may reduce demand for escalatory reprisals after remotely operated systems are lost to hostile action. Drones can also help to mitigate escalatory spirals by

collecting intelligence that overcomes information asymmetries that often contribute to armed conflict, helping facilitate more measured decision-making and tailored targeting of enemy forces. By more fully considering how technology affects escalatory dynamics after the initial use of force, technology-enabled escalation control theory advances our understanding of the link between technology and conflict.

I test the theory using a multi-method approach that combines case studies with original experiments embedded in surveys fielded on public and military samples. The dissertation also introduces a new research method for international relations research: experimental manipulations embedded in wargames with military participants.

In Chapter 1 and 2, I define the concept of crisis escalation and review the literature that examines the effect of technology on escalation and conflict dynamics. I then introduce the theory of technology-enabled escalation control and outline four mechanisms that undergird the theory – *increased initiation*, *tempered/tailored targeting*, *restrained retaliation*, and *amplified aggression*. Each of these hypothesized mechanisms describes ways in which emerging technologies can prevent crises from escalating into broader or more intense conflicts.

Chapter 3 describes each component of the multi-method research design that I use to test the theory in Chapters 4 through 7. Chapter 4 uses experiments embedded in surveys and wargames to assess whether and how drones allow states to more frequently initiate military operations. Chapter 5 tests whether drones enable decisionmakers to control escalation by restraining retaliation after attacks on a state's drones. Chapter 6 and 7 test the theory in the context of U.S drone use during the Cold War and Israeli drone use from the 1960s through late-2010s. The findings of these empirical tests provide strong support for technology-enabled escalation control.

In Chapter 8, I conclude with a summary of the analysis and test the generalizability of the theory beyond the state use of drones. I find that tenets of technology-enabled escalation control explain escalation dynamics associated with U.S. cyber operations against North Korea and Hezbollah's use of drones against Israel and during the Syrian Civil War. The chapter also maps out pathways for future research and identifies policy implications. My findings suggest the growing proliferation of drones will increase the frequency of military confrontations during crises, yet these confrontations are unlikely to escalate. Even though drones may help control escalation, clearer doctrine, rules of engagement, and international agreements to govern their use will help to further avoid crisis escalation and conflict.

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Acknowledgments

Shortly after graduating from college, I arrived at Beale Air Force Base, just north of Sacramento, California, as a newly minted lieutenant. During my time there, I had the humbling opportunity to work with a team of Airmen responsible for analyzing information gathered by America's fleet of reconnaissance aircraft – including remotely piloted aircraft operating above battlefields in Afghanistan and Iraq. Little did I know that my experiences at Beale would shape the trajectory of my research. I am immensely grateful to have had the opportunity to serve alongside such a dedicated team.

At Columbia I benefitted from an incredible group of mentors, colleagues, and friends. I am particularly indebted to several faculty members who offered intellectual stimulation and professional mentorship. Richard Betts, Robert Jervis, Jeffrey Lax, and Tonya Putnam helped me think more deeply about the empirical and theoretical implications of my project, provided meticulous comments on my typically less than meticulous drafts, kept me on schedule, prevented me from deviating too far off course, and offered reassurance each time I thought the project was on a downward spiral. Tonya, in particular, did far more than what was expected of a committee member. She set an example for advising and mentorship that I can only hope to one day achieve. I am also grateful to Séverine Autesserre who took me on as a research assistant early in my graduate student career and showed me the ropes on research and grant writing processes, both of which helped facilitate this project. Stephen Biddle and Sarah Kreps served as outside committee members for the dissertation defense and provided incredibly insightful feedback.

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Several organizations provided generous funding that enabled the research. I am particularly grateful to Columbia University, Stanford University's Center for International Security and Cooperation, the Smith Richardson Foundation, the Horowitz Foundation for Social Policy Research, the Eisenhower Institute at Gettysburg College, the Morris Abrams Family/JFSA Cleveland, Tobin Project, and the Harriman Institute. Funding from these organizations covered the cost of research trips, enabled the fielding of surveys and experiments, and helped defray the expenses of living and working in New York City and the Bay Area. I would be remiss if I failed to acknowledge the Department of Veterans Affairs both for helping to fund graduate school and for forcing me to spend more time than I ever planned reading the Code of Federal Regulations.

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Chapter 1

Introduction

At the same time man found airplanes could be a military weapon he discovered that pilots were the costliest ingredient of the weapon. In our way of life, aircraft are expendable; human life is not. So man dreamed of removing the pilot from the weapon.

History of the US Air Force 3205th Drone Group, 1954[1]

In October 2015, Turkey shot down a Russian drone that had strayed into Turkish airspace. Russia virtually ignored the loss of the drone – Moscow publicly denied losing any aircraft and took no observable retaliatory measures.[2] In stark contrast, Russia escalated significantly after Turkey downed a manned attack jet just one month later, leading to the death of a Russian pilot. In response, Russian forces bombarded Turkish-backed rebels in Syria, launched airstrikes on a Turkish supply convoy, and deployed warships armed with long-range air defense systems to the Mediterranean.[3] On the diplomatic front, President Putin took steps to halt Russian tourism to

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[1] 3205th Drone Group History, 31 March 1954 (Secret); Air Force Historical Research Agency, Maxwell AFB, Alabama, 1.

[2] Orhan Coskun, "Turkey Shoots down Drone near Syria, U.S. Suspects Russian Origin," *Reuters*, October 16, 2015, https://www.reuters.com/article/us-mideast-crisis-turkey-warplane/turkey-says-its-warplanes-shot-down-unidentified-aircraft-near-syria-idUSKCN0SA15K20151016. This dissertation uses the more widely used term "drone" to refer to remotely piloted aircraft.

[3] Victoria Richards, "Russia Deploys Warship to Mediterranean to Destroy 'any Target' after Plane Shot down by Turkey," *The Independent*, November 25, 2015, https://www.independent.co.uk/news/world/middle-east/russia-deploys-missile-cruiser-in-mediterranean-to-destroy-any-target-after-plane-shot-down-by-a6747721.html; "Russia Bombards Syrian Rebels near Site of Downed Russian Jet," *Reuters*, November 25, 2015, https://www.reuters.com/article/us-mideast-crisis-syria-latakia/russia-bombards-syrian-rebels-near-site-of-downed-russian-jet-idUSKBN0TE1FN20151125; Natasha Bertrand, "Russia Is Already Exacting Its Revenge on Turkey for Downing a Russian Warplane," *Business Insider*, November 26, 2015, https://www.businessinsider.com/russia-turkey-downed-jet-2015-11.

Turkey, Foreign Minister Sergey Lavrov cancelled a planned trip to Ankara, and the Russian government announced sanctions and ratcheted up anti-Turkish rhetoric.[4]

Russia was not the first state to demonstrate starkly divergent responses to attacks on manned and unmanned assets. Over the course of the Cold War, the Soviet Union and China downed dozens of U.S. military aircraft – both manned and unmanned – outside of combat zones.[5] Some were attacked in international airspace, while others had deliberately or unintentionally strayed into the airspace of Communist states. When drones were involved, the United States generally refused to acknowledge their loss, even after rivals paraded the wreckage through national capitals.[6] However, when manned assets were lost, Washington frequently took escalatory measures. In most instances, "escalation" was limited to strongly worded diplomatic communiqués. In more drastic cases, like the large-scale U.S. mobilization that followed North Korea's 1969 downing of a U.S. Navy reconnaissance plane, the threat of military action was real. More recently, China and Iran have intercepted and seized U.S.-operated drones, and Pakistan has shot down Iranian drones that penetrated into its airspace — incidents that did not result in any significant escalation.[7] Confrontations like these have the potential to become increasingly

[4] "Russia Plans Sanctions against Turkey," *BBC News*, November 26, 2015, https://www.bbc.co.uk/news/world-europe-34933608; "Russia Places Sanctions on Turkey," *The New York Times*, November 28, 2015, https://www.nytimes.com/2015/11/29/world/europe/russia-places-sanctions-on-turkey.html; "Missing Russian Pilot 'Alive and Well,'" *BBC News*, November 25, 2015, https://www.bbc.co.uk/news/world-middle-east-34917485.

[5] Larry Tart and Robert Keefe, *The Price of Vigilance* (New York: Ballantine Books, 2001); William E. Burrows, *By Any Means Necessary: America's Secret Air War in the Cold War* (New York: Farrar, Straus and Giroux, 2001).

[6] William Wagner, *Lightning Bugs and Other Reconnaissance Drones* (Fallbrook, CA: Aero Publishers, 1982), 78.

[7] Scott Shane and David E. Sanger, "Drone Crash in Iran Reveals Secret U.S. Surveillance Bid," *The New York Times*, December 7, 2011, sec. Middle East, https://www.nytimes.com/2011/12/08/world/middleeast/drone-crash-in-iran-reveals-secret-us-surveillance-bid.html; Jane Perlez and Matthew Rosenberg, "China Agrees to Return Seized Drone, Ending Standoff, Pentagon Says," *The New York Times*, December 17, 2016, http://www.nytimes.com/2016/12/17/world/asia/china-us-drone.html; Naveed Siddiqui, "Iranian Drone Shot down by PAF, Confirms FO," *The Dawn*, June 21, 2017, https://www.dawn.com/news/1340897.

common as drones proliferate to military arsenals around the world, but there is little consensus in existing scholarly and policy work on whether and how drones shape escalatory dynamics in confrontations where they are used. Indeed, much of our current understanding of escalation focuses on the risk of conventional conflicts escalating across the nuclear threshold, sidelining important questions about the effect of other technologies on escalation.[8]

This project sets out to explain how drones affect crisis escalation. What explains the radically different responses to the loss of drones and manned military platforms? To this end, I engage several questions. Do drones increase or decrease the likelihood and intensity of military confrontations? What underlying mechanisms drive these effects? More broadly, do new technological innovations in warfighting affect decision-making on escalation among civilian elites, military leaders, and the general public? How might these effects factor into broader military and political strategies? What implications can be drawn, and what kinds of new questions generated for scholarly debates on military innovation, crisis bargaining, and the initiation and escalation of the use of force? Last but not least, how can a better understanding of these dynamics help to inform policy on remote warfighting, drone proliferation, and modern warfare.

This chapter proceeds in six parts. First, it draws from scholarly and policy literatures to define the project's dependent variable, crisis escalation. Second, I define drones, describe their characteristics that make them unique from inhabited – traditionally manned – platforms, and explain how they can enable states to carry out military operations with less risk to friendly personnel and lower costs than manned assets. Third, I introduce the dissertation's central theory: *technology-enabled escalation control*. I describe how when used as a substitute for manned assets

[8] For example, see Herman Kahn, *On Escalation: Metaphors and Scenarios* (New York: Fredrick A. Praeger, 1965); Richard Smoke, *War: Controlling Escalation* (Cambridge, MA: Harvard University Press, 1977); Barry Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks* (Ithaca, NY: Cornell University Press, 1991).

during crises, drones increase the frequency with which states launch military operations during crises, but can prevent these operations from spiraling into broader conflicts. I also outline the theory's scope conditions. Fourth, I describe the project's multi-method research design, which combines case studies with experiments embedded in surveys and in military wargames. Fifth, I briefly summarize the empirical findings. I then provide an overview of the project's scholarly and policy contributions.

CONCEPTUALIZING CRISIS ESCALATION AND ESCALATION CONTROL

Before proceeding, I define project's dependent variable: crisis escalation. At its most fundamental level, escalation is an increase in the intensity or scope of a conflict between two actors.[9] Herman Kahn, one of the first scholars to contemplate the nature of escalation, characterized it as a hypothetical 44-rung ladder.[10] An actor can climb this ladder – from "political gestures" to interstate war and beyond – in several ways: by increasing the intensity of actions vis-à-vis a rival (vertical escalation), by broadening the affected geographic area (horizontal escalation), or by simultaneously intensifying and broadening a crisis. According to Thomas Schelling, each of these actions represents a crossing of a threshold, "dividing lines" that "distinguish new activity from more of the same activity."[11] The crossing of multiple thresholds can lead a localized crisis to escalate into a broader, more intense, and potentially more destabilizing general conflict.

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[9] Forrest E. Morgan et al., *Dangerous Thresholds: Managing Escalation in the 21st Century* (Santa Monica, CA: RAND Corporation, 2008), 8. Escalation often includes more than two actors, but I treat it here as a dyadic process to more clearly identify the effects of technology on escalatory dynamics.

[10] Kahn, *On Escalation*, 3–5.

[11] Thomas C. Schelling, *Arms and Influence* (New Haven, CT: Yale University Press, 1967), 135.

Escalation is therefore a context dependent, action-reaction process. One actor's escalation triggers potential counter-reaction by a rival.[12] Whether and how the rival responds dictates whether the crisis subsequently escalates, remains at its current intensity, or deescalates. An actor's decision on the appropriate counter-reaction depends largely on its interpretation of what thresholds were crossed by the other actor's escalation.[13] For instance, an intentional action may be seen as a more significant affront than an accidental one and elicit a more escalatory response.[14] The use of some weapons may be seen as crossing a higher escalatory threshold – even if they generate equivalent battlefield effects – and trigger a more significant response.[15] Attacks on some targets may be interpreted as crossing more thresholds than others, generating more intense retaliation.

Because decisions on escalation are shaped by an actor's interpretation of a rival's actions, escalation inherently involves a psychological dimension. An individual's perceptions about a rival's motives or intent, for instance, can be colored by a variety of factors such as the individual's background, emotional response, or institutional position. Since individual perceptions vary, so will decisions on escalation. Some individuals, for instance, might be more prone to support escalatory moves than others. This subjectivity of perceptions also makes room for misperceptions that can lead to inadvertent or unintended escalation.[16] For instance, a decisionmaker might

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[12] Smoke, *War: Controlling Escalation*, 36; Morgan et al., *Dangerous Thresholds*, 11.

[13] Smoke, *War: Controlling Escalation*, chap. 2. The timing of events also matters. The same type of event at different times may be perceived differently. For instance a fighter jet's penetration into a rival's airspace may be considered more escalatory during a crisis than during periods of peace.

[14] Smoke, *War: Controlling Escalation*.

[15] Nina Tannenwald, "The Nuclear Taboo: The United States and the Normative Basis of Nuclear Non-Use," *International Organization* 53, no. 3 (Summer 1999): 433–68.

[16] On misperception see Robert Jervis, *Perception and Misperception in International Politics* (Princeton, NJ.: Princeton University Press, 1976) and Keren Yarhi-Milo, *Knowing the Adversary: Leaders, Intelligence, and*

misinterpret a rival's accidental action as deliberate and launch a significant escalatory response. In turn, decisionmakers in the rival state then need to decide if and how to respond. What military or political objective will a reaction achieve? And, how might the other actor respond?[17] Predicting the other actor's reaction is difficult, and even tactical moves can have far-reaching strategic consequences during crises.

This dissertation examines escalation during crises – situations where a change in the type and intensity of interaction between two or more states heightens the probability of military hostilities and destabilizes interstate relations.[18] By the time a crisis has erupted actors have already ascended rungs on the escalation ladder. Indeed, Herman Kahn describes "ostensible crisis" as the first rung, "political, economic, and diplomatic gestures" as his second rung, and "solemn and formal declarations" as the third rung.[19] I focus on crises for several reasons. First, given the heightened tension during crises, decisionmakers may find themselves in a position to deploy military forces against a rival. Leaders may launch missions to collect intelligence on a rival or consider launching armed strikes. At the same time, their rivals may also be more prone to use force, potentially triggering confrontations between forces and further escalation. Second, acts of escalation are often more directly observable than those that occur once large-scale armed hostilities have erupted. This can make it easier to map the cause and effects of escalation.

I consider escalation to be controlled when crisis behavior remains at low-rungs on the hypothetical ladder. To be clear, escalation control does not require a complete absence of armed

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Assessment of Intentions in International Relations (Princeton, New Jersey: Princeton University Press, 2014). On inadvertent escalation see Posen, *Inadvertent Escalation*.

[17] Smoke, *War: Controlling Escalation*, 3–5.

[18] Michael Brecher, *Crises in World Politics: Theory and Reality* (Oxford: Pergamon, 1993), 3.

[19] Kahn, *On Escalation*, 39.

conflict. Indeed, two actors might frequently engage in low-scale skirmishes, but these types of interactions generally involve far lower costs in blood and treasure than a more escalatory large-scale war. In general, escalation control during crises means actions fall below the threshold of sustained armed conflict and are geographically localized. For instance, I consider escalation to be controlled when an isolated armed clash between two actors ends (or perhaps continues) without triggering broader military action. In most cases, this is a deliberate decision of decisionmakers who chose not to escalate, because the risks of escalating are too great or not worth the issues at stake. Past studies have defined escalation control similarly.[20] Herman Kahn viewed escalation control as keeping activity at lower rungs on the ladder.[21] More recently, Austin Carson has argued that states can maintain relatively peaceful relations and avoid direct confrontations, even while engaging in limited, covert military activity against each other.[22] This notion of escalation control is not just theoretical – similar conceptions appear in the defense policies of states around the world. United States military doctrine, for instance, describes steady state operations as, "a stable condition…characterized by shaping operations and activities at a relatively low level of intensity, urgency, and commitment of military forces."[23] Similarly, Israel's current defense strategy focuses on controlling escalation and extending the duration of "campaigns between wars" – the low intensity conflicts that take place between major combat operations.[24]

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[20] Smoke, *War: Controlling Escalation*, chap. 3.

[21] Kahn, *On Escalation*, 3–9.

[22] Austin Carson, *Secret Wars: Covert Conflict in International Politics* (Princeton, NJ: Princeton University Press, 2018).

[23] U.S. Air Force, "Steady-State Operations," in *Air Force Basic Doctrine*, vol. 1 (Maxwell Air Force Base, AL: Curtis E. Lemay Center for Doctrine Development and Education, 2015).

[24] *Deterring Terror: English Translation of the Official Strategy of the Israel Defense Forces* (Cambridge, MA: Belfer Center for Science and International Affairs, 2016), https://www.belfercenter.org/israel-defense-forces-strategy-

To be sure, controlling escalation can be challenging, in part because of the subjective nature of escalation thresholds defined above.[25] Decisionmakers may misinterpret their rival's actions or launch actions that their rival's view as more escalatory than intended, triggering spirals of inadvertent escalation.[26] Decisionmakers may also face pressure from domestic actors including nationalistic domestic constituents or bureaucratic interest groups to take aggressive and escalatory actions, potentially pushing them or providing the political support to escalate crises into broader conflicts.[27] New technologies may create new thresholds and allow actors to carry out actions that may be perceived as falling at lower thresholds because they involve less risk to friendly personnel and less costly systems. In the subsequent chapters, I explore whether and how drones provide policymakers and military commanders with a tool to control escalation during crises. I also highlight cases in which crises might escalate – due to misperceptions or accidents – even when drones are involved.

I treat escalation and escalation control as a dyadic phenomenon. This is a simplification of actual escalation dynamics as decisions on the use of force routinely occur in a far more complicated context. Crises often include more than two actors; states can constrain the crisis behavior of their allies; and patron states can deter escalation by third parties against their clients. While additional state and non-state actors can play a major role in shaping whether and how

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document; Interview with Brigadier General, Former Director of IDF Strategic Planning Division, Tel Aviv, Israel. 31 August 2016.

[25] Morgan et al., *Dangerous Thresholds*, 12.

[26] Morgan et al., 23–26.

[27] John E. Mueller, "Presidential Popularity from Truman to Johnson," *The American Political Science Review* 64, no. 1 (March 1970): 18–34; Jack Snyder, *The Ideology of the Offensive: Military Decision Making and the Disasters of 1914* (Ithaca, N.Y.: Cornell University Press, 1989); Lars-Erik Cederman, T. Camber Warren, and Didier Sornette, "Testing Clausewitz: Nationalism, Mass Mobilization, and the Severity of War," *International Organization* 65, no. 4 (October 2011): 605–38.

escalation dynamics unfold, focusing on dyadic relationships allows me to concentrate my analysis on the effect of specific warfighting technologies on escalation dynamics, rather than other political or geographic factors.

Although escalation thresholds are context dependent, scholars have developed a set of measures that categorize actions along ordinal scales of intensity that range from non-militarized actions like diplomatic demarches to high-intensity combat during interstate war.[28] I draw from these ordinal scales to assess when and how much escalation occurs in the empirical chapters. While these measures do not capture case-specific nuances, they allow for standardized comparison across multiple cases and allow me to align my findings with existing research on crisis and conflict escalation.

DRONES: EXPANDING THE MENU OF MILITARY OPTIONS

Understanding the effects of drones on crisis escalation dynamics is increasingly important as remotely operated weapons proliferate to militaries around the world. The United States uses armed drones to target suspected terrorists in Pakistan and Yemen.[29] China flies drones over contested islands in the East China Sea.[30] Nigeria deploys drones against Boko Haram.[31] And,

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[28] 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, no. 2 (September 1, 1996): 163–213.

[29] Chris Woods, *Sudden Justice: America's Secret Drone Wars* (Oxford: Oxford University Press, 2015).

[30] "Japan Scrambles Jets over China Drone Flight near Disputed Islets," *Reuters*, May 19, 2017, https://www.reuters.com/article/us-japan-china-drone/japan-protests-to-china-over-drone-flight-near-disputed-islets-idUSKCN18E1Q9.

[31] Jeremy Page and Paul Sonne, "Unable to Buy U.S. Military Drones, Allies Place Orders With China," *Wall Street Journal*, July 17, 2017, https://www.wsj.com/articles/unable-to-buy-u-s-military-drones-allies-place-orders-with-china-1500301716.

Pakistan has shot down an Indian reconnaissance drone in Kashmir.[32] Despite their proliferation, the effect of drones on escalation dynamics has yet to be fully theorized or empirically explored.[33] Existing studies tend to focus on either the moral implications of using "unmanned" weapons or the role drones play in overcoming political barriers to initiating military operations, without focusing on subsequent uses of force.[34] This focus on conflict onset sidelines important questions about how drones shape broader escalation dynamics.

This project focuses specifically on military drones, a technology that allows actors to generate battlefield effects, but without requiring friendly personnel on the physical battlefield.[35] Modern drones like the MQ-9 Reaper can both collect intelligence and launch airstrikes against rival leaders and infrastructure in distant combat zones, all while being piloted by operators located thousands of miles from the front lines and out of harm's way.[36] To be sure, militaries and engineers throughout history have worked to reduce the risk to military personnel associated with combat by increasing the distance between friendly troops and their adversaries. Arrows and swords supplanted clubs. These gave way to artillery, muskets, and rifles, which were eventually

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[32] "India Denies Losing a Surveillance Device on the LoC," *Daily Mail (India)*, July 15, 2015, http://www.dailymail.co.uk/indiahome/indianews/article-3162926/India-shoots-Pakistan-s-spy-drone-claim-Military-deny-losing-surveillance-device-LoC-say-object-small-drone.html.

[33] For one recent exception see, Michael C. Horowitz, Sarah E. Kreps, and Matthew Fuhrmann, "Separating Fact from Fiction in the Debate over Drone Proliferation," *International Security* 41, no. 2 (Fall 2016): 7–42.

[34] John Kaag and Sarah Kreps, *Drone Warfare* (Cambridge: Polity, 2014); Grégoire Chamayou, *A Theory of the Drone* (New York: The New Press, 2015).

[35] I use the term friendly personnel to describe military personnel associated with the side conducting drone operations. Some scholars believe that drones redefine battlefields and expand them well beyond areas where active hostilities are occurring. Unlike these studies that insightfully ask whether facilities such as drone bases in the United States are extensions of the battlefield, I use the term "battlefield" in the more traditional sense. See Chamayou, *A Theory of the Drone*; Hugh Gusterson, *Drone: Remote Control Warfare* (Cambridge, Massachusetts: The MIT Press, 2016).

[36] "MQ-9 Reaper Fact Sheet" (U.S. Air Force, September 23, 2015), http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/104470/mq-9-reaper.aspx.

supplemented and replaced by aircraft and missiles. Drones represent a further step in this evolution, but are unique in several ways. First, drones can generally be launched without the presence of any friendly forces in a conflict zone. This significantly reduces the potential human cost to a state carrying out military operations.[37] Second, many modern drones are capable of carrying out multiple phases of military operations. For instance, a single armed drone can locate a target, track it, and then attack it, reducing the number of assets needed to carry out an operation. Despite their burgeoning use in the current era, most theories that link military technology to conflict onset and escalation fail to factor in the characteristics of remotely operated systems. This limitation is understandable, as many theories on conflict dynamics were developed during the Cold War, when drones and other remote warfighting technology had less prominent roles in military operations.

This project focuses on situations where drones are, or may be, used in lieu of traditionally manned systems or troops in a substitutive manner. According to theories of policy substitution, decisionmakers choose from a range of interchangeable foreign policy approaches after assessing the costs and benefits of each option.[38] In response to a rival's hostile actions, for instance, a state might launch retaliatory military strikes, issue a diplomatic demarche, enact economic sanctions, or employ some combination of these measures. While theories of policy substitution have

[37] A targeted state could still hold at risk a rival's drone operators outside the conflict zone – for instance by launching attacks on a drone's ground control station located in the Continental United States. Such a move, however, would likely be considered to be highly escalatory.

[38] Benjamin A. Most and Harvey Starr, "International Relations Theory, Foreign Policy Substitutability, and 'Nice' Laws," *World Politics* 36, no. 3 (April 1984): 383–406; Harvey Starr, "Substitutability in Foreign Policy: Theoretically Central, Empirically Elusive," *The Journal of Conflict Resolution* 44, no. 1 (February 2000): 128–38; David H. Clark and William Reed, "The Strategic Sources of Foreign Policy Substitution," *American Journal of Political Science* 49, no. 3 (July 2005): 609–24.

traditionally been applied to explaining broader foreign policy decisions of national leaders, the logic applies equally well to decisions on the conduct of military operations.

National security decisionmakers must pick the military tools that can best achieve a desired objective while minimizing political and operational risks, factoring in what is known about the operational environment where a mission will occur and levels of domestic and international political support. For example, after intelligence officials had located Osama bin Laden, President Obama and his national security team considered several options for targeting the Al Qaeda leader. They reportedly considered using B-2 bombers to launch airstrikes, a ground operation in conjunction with Pakistani forces, and a U.S. special operations forces raid. Ultimately, the administration settled on the special operations raid on ground that it offered a high likelihood of successfully eliminating bin Laden and allowing the intelligence community to confirm his death, with less risk of leaks and mission complications than a joint operation with Pakistan.[39]

Each of these potential policy options falls along a continuum of military intensity, or in Schelling's lexicon, different escalatory thresholds.[40] Some military actions may be considered less aggressive and escalatory because they involve less potent uses of force – conducting a single precision missile strike rather than a massive area bombing campaign. Others actions might be seen as less hostile due to the location of forces involved. Positioning gunboats or an aircraft carrier off a country's coast avoids the affront of placing troops on a rival's territory and violating a state's sovereignty. Finally, some types of military capabilities may be considered less escalatory than

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[39] Mark Bowden, *The Finish: The Killing of Osama Bin Laden* (New York: Grove Press, 2013), chap. 6; Robert M. Gates, *Duty: Memoirs of a Secretary at War* (New York: Knopf, 2014), 540.

[40] Schelling, *Arms and Influence*, 135.

others. For instance, the use of special operations forces or troops without visible military identification – like Russia's "little green men" in Crimea and Ukraine – is more concealed and deniable than a large-scale ground invasion. To be sure, those on the receiving end of a military action may perceive the action as more escalatory than decisionmakers on the sending side.[41] Still, a continuum exists in which targeted actors view some actions as more escalatory than others. Strategies on the lower end of this continuum may not trigger domestic calls for further escalation or international criticism that generate significant global attention.[42] To be sure, these thresholds likely vary across time and actors as escalation is a context-dependent process. Decisionmakers may interpret the actions of their rivals based on their past interactions or biased perceptions.[43]

Under the logic of policy substitution, drones expand a decisionmaker's set of military options. In some cases, drones offer an alternative to taking no action, potentially increasing the frequency of crisis onset. In other cases, drones may offer a less aggressive alternative to deploying inhabited assets or ground forces. Deploying and targeted states may perceive an asset without crew members onboard as a less significant infringement of sovereignty than the deployment of ground forces or manned aircraft. In the event of a shootdown or accident, the lack of captured or dead personnel makes it easier for states to simply deny or ignore a mission gone awry – mitigating the risk of further escalation. The Pentagon, for instance, took months to acknowledge that Syrian

[41] Jervis, *Perception and Misperception in International Politics*.

[42] Austin Carson, "Facing Off and Saving Face: Covert Intervention and Escalation Management in the Korean War," *International Organization; Cambridge* 70, no. 1 (Winter 2016): 103–31; Dan Altman, "Advancing without Attacking: The Strategic Game around the Use of Force," *Security Studies* 27, no. 1 (January 2, 2018): 58–88.

[43] Jervis, *Perception and Misperception in International Politics*; Yarhi-Milo, *Knowing the Adversary*.

forces had shot down a U.S. Air Force drone in 2015.[44] Captured or killed crew members preclude this deniability, ratcheting up tensions, as the Soviet Union's 1960 shootdown of U-2 pilot Gary Powers illustrates. Further, the lower unit cost of most remotely piloted aircraft compared to manned aircraft, makes it less financially costly to lose a drone than a manned aircraft.

In addition to the lower human risk of drone operations, the unit cost of drones is generally lower than those of manned aircraft.[45] For instance, the unit cost of an F-35 fighter is $115.5 million.[46] In comparison, the long-range, stealthy, and near-supersonic XQ-58 combat drone has an expected unit cost of just $2 million.[47] Indeed, the XQ-58 was developed as part of the U.S. Air Force's Low Cost Attritable Aircraft Technology program, highlighting the U.S. government's desire to develop systems that are intentionally attritable – or designed to be lost in combat.[48] While the F-35 and XQ-58 have different capabilities, they are potentially substitutable in several missions as both are designed to carry out a range of operations.[49] To be sure, operating "unmanned" systems often requires hundreds of personnel and complex communication networks, driving up operating costs.

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[44] Brian Everstine, "Air Force: Lost Predator Was Shot down in Syria," *Air Force Times*, June 29, 2015, https://www.airforcetimes.com/news/pentagon-congress/2015/06/29/air-force-lost-predator-was-shot-down-in-syria/.

[45] Andrea Gilli and Mauro Gilli, "The Diffusion of Drone Warfare? Industrial, Organizational, and Infrastructural Constraints," *Security Studies* 25, no. 1 (January 2016): 50–84.

[46] "Producing, Operating and Supporting a 5th Generation Fighter," Lockheed Martin: F-35 Lightning II, n.d., https://www.f35.com/about/cost.

[47] William Kucinski, "The Air Force's New Unmanned Wingmate Completes Inaugural Flight," SAE International, March 20, 2019, https://www.sae.org/news/2019/03/the-air-force%E2%80%99s-new-unmanned-wingmate-completes-inaugural-flight.

[48] "XQ-58A Valkyrie Demonstrator Completes Inaugural Flight," Wright-Patterson Air Force Base, March 6, 2019, http://www.wpafb.af.mil/News/Article-Display/Article/1777743/xq-58a-valkyrie-demonstrator-completes-inaugural-flight.

[49] Although the XQ-58 was designed to operate alongside fifth-generation fighters, it could also operate independently. Kucinski, "The Air Force's New Unmanned Wingmate Completes Inaugural Flight."

In an effort to avoid the cost and risk of military operations and the associated escalation risks, states are increasingly turning to remotely operated systems instead of inhabited ones. To fully substitute for an inhabited system drones would ideally have the same likelihood of successfully completing a given mission. In some areas – such as intelligence, surveillance, and reconnaissance – drones have been nearly as effective as manned assets. In other areas, drone capabilities in stealth, payload, and maneuverability continue to improve, but have yet to establish parity with manned assets.[50] The United States has, however, already developed drones that are stealthier and more maneuverable than current platforms like the slow-moving Predator and Reaper, which are vulnerable to enemy fire in contested airspace.[51]

Decisionmakers are therefore often forced to wrestle the tradeoff between risk reduction, cost and operational effectiveness. In other words, decisionmakers need to decide whether to accept a lower likelihood of success in exchange for deploying an asset that is cheaper or less risky to deploy. These tradeoffs, however will likely decrease as drone capabilities continue to increase. Indeed, remotely operated systems will likely supplant manned ones in an ever-growing number of mission areas. Even without parity in capabilities, however, drones have provided militaries with an alternative to manned assets on a range of missions. Indeed, as one British Ministry of Defense official explained, drones "increase the policy menu" for decisionmakers.[52]

[50] U.S. Department of Defense plans indicate drone capabilities will continue to advance in these areas, see *Unmanned Systems Integrated Roadmap: 2017-2042* (Washington, D.C.: U.S. Department of Defense, 2016).

[51] John Reed, "Predator Drones 'Useless' in Most Wars, Top Air Force General Says," Foreign Policy, September 19, 2013, https://foreignpolicy.com/2013/09/19/predator-drones-useless-in-most-wars-top-air-force-general-says/; Valerie Insinna, "Kratos Gets Green Light to Market Potentially-Armed Mako 'Loyal Wingman' Drone to Allies," Defense News, May 1, 2018, https://www.defensenews.com/air/2018/05/01/kratos-gets-green-light-to-market-potentially-armed-mako-loyal-wingman-drone-to-allies/; Colin Clark, "US 'Loyal Wingman' Takes Flight: AFRL & Kratos XQ-58A Valkyrie," Breaking Defense, March 7, 2019, https://breakingdefense.com/2019/03/us-loyal-wingman-takes-flight-afrl-kratos-xq-58a-valkyrie/.

[52] Interview with UK Ministry of Defense Official, London UK, 9 September 2016.

Critics might question the utility of a project that studies a single class of weapons. To be sure, the project's focus on drones may limit the generalizability of its findings. Yet, the endeavor is valuable for several reasons. First, as I describe above, drones are becoming an increasingly common tool in military operations around the world. They have fundamentally reshaped how and when states conduct military operations. This makes understanding their effects important for national security policy. Second, elements of technology-enabled escalation control theory can be applied to military systems beyond drones. For instance, several mechanisms of the theory should apply to cyber warfare, another realm where warfighters are removed from harm's way. I explore these broader applications of technology-enabled escalation control in the dissertation's concluding chapter. Finally, research on a single type of weapon is not uncommon in the fields of international relations and security studies. Hundreds of works, for instance, probe the development and effectiveness of nuclear weapons, strategic airpower, and submarines.[53]

THE ARGUMENT IN BRIEF: TECHNOLOGY-ENABLED ESCALATION CONTROL

To identify the effect of drones on crisis escalation dynamics, I develop and test an original theory of *technology-enabled escalation control*. This theory expects that when used as a substitute for manned assets during crises, remotely operated weapons allow decisionmakers to increase the frequency with which states deploy military forces during crises, but can limit the intensity of these crisis deployments in ways not possible when manned platforms are used – preventing crises from spiraling into broader conflicts. In other words, there will be more, but milder conflicts. In contrast

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[53] For recent examples, see Mark S. Bell, "Beyond Emboldenment: How Acquiring Nuclear Weapons Can Change Foreign Policy," *International Security* 40, no. 1 (July 1, 2015): 87–119; Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, NY: Cornell University Press, 1996); Sherry Sontag, Christopher Drew, and Annette Lawrence Drew, *Blind Man's Bluff: The Untold Story Of American Submarine Espionage* (New York: PublicAffairs, 1998); Erik Gartzke, "The Myth of Cyberwar: Bringing War in Cyberspace Back Down to Earth," *International Security* 38, no. 2 (October 1, 2013): 41–73; Phil Haun and Colin Jackson, "Breaker of Armies: Air Power in the Easter Offensive and the Myth of Linebacker I and II in the Vietnam War," *International Security* 40, no. 3 (January 1, 2016): 139–78.

to this stabilizing outlook on drones, many scholars and policymakers fear these weapons will destabilize international security by allowing states to launch military operations without the political risk of sending troops into battle. These claims are often grounded in theories that predict greater levels of conflict onset when military action is perceived to entail low-risks. As a result, analysts have suggested that drones, particularly armed ones capable of launching airstrikes, will be used more frequently to carry out attacks or other intrusive missions, potentially destabilizing border and maritime disputes or violating human rights.[54]

While drones may indeed increase the likelihood that states will cross the threshold of deploying military force, existing theories have not adequately explored the subsequent escalatory dynamics that ultimately dictate whether an encounter triggers an immediate crisis, and whether localized crises spiral into broader and more destabilizing conflicts. To be clear, I do not argue that drones are a panacea to escalation. Actions carried out by drones can indeed be escalatory and escalation may still occur due to misperceptions and accidents. But drones possess important characteristics that can help mitigate escalatory spirals in a way not possible when manned assets are involved. Indeed, the historical record yields no cases where major escalation followed the an attack on a remotely operated drone.

On one hand, drones may *increase initiation* rates of military operations. By removing warfighters from the front lines, drones are generally thought to reduce the human cost of military operations to a deploying state or non-state actor. This reduced risk mitigates the political obstacles often associated with sending troops into harm's way. In turn, these reduced risks are generally

[54] Micah Zenko and Sarah Kreps, "Limiting Armed Drone Proliferation" (New York: Council on Foreign Relations, June 2014), http://www.cfr.org/drones/limiting-armed-drone-proliferation/p33127; "IntelBrief: The Rising Threat from Armed Drones," *The Soufan Center* (blog), January 12, 2018, https://thesoufancenter.org/tsc-intelbrief-rising-threat-armed-drones/.

seen as lowering the threshold for deploying forces and enabling states to launch military operations – ranging from peacetime reconnaissance missions to airstrikes on adversary personnel and infrastructure – in cases where the risk might otherwise be considered too high for the objectives at stake.[55] This willingness to initiate operations that would have been avoided absent remotely operated systems should increase the frequency with which states use military forces to monitor, probe, or attack their rivals.[56]

Even though drones may increase the frequency of military activity, these deployments need not lead to highly escalatory confrontations. First, drones expand the menu of available military options during crises, allowing leaders to deploy drones instead of taking an alternative action – such as a ground incursion or special operations raid – that could lead to higher casualties of friendly forces, greater damage to a rival's infrastructure, or simply be perceived by actors in the target country as more aggressive.[57]

At the same time drones can ameliorate escalation dynamics. Selecting remote warfighting technologies with low human and domestic political risks can limit escalation – relative to similar actions using manned aircraft – in two primary ways. First, drones can help *temper* or *tailor targeting*. Drones deployed on intelligence, surveillance, and reconnaissance (ISR) missions collect intelligence that can, under certain conditions, *temper* escalation. For example, drones may collect information that reveals an adversary either has more limited capabilities or less hostile intent than initially assessed. In other cases, drones may gather intelligence that reveals an

[55] Kaag and Kreps, *Drone Warfare*.

[56] For empirical assessments that support this claim see, James Igoe Walsh and Marcus Schulzke, *The Ethics of Drone Strikes: Does Reducing the Cost of Conflict Encourage War?* (Carlisle Barracks, PA: United States Army War College Press, 2015).

[57] Some studies find that certain types of actions may be considered less escalatory than others, helping to manage escalation. See, Carson, "Facing Off and Saving Face"; Carson, *Secret Wars*.

adversary is far more capable that originally assessed. In both situations, the use of drones may ameliorate information asymmetries that otherwise lead to escalation and conflict. Drones can *tailor* targeting by collecting intelligence that leads operations to be more precise, potentially limiting the amount of destruction in a way that prevents retaliatory escalation.

Second, when drones are attacked, their owners may exercise *restrained retaliation*. Relative to an attack on a traditionally inhabited (manned) system, the loss of a drone to hostile action is less likely to trigger the sort of rationalist and emotional reactions among a target state's military decisionmakers and general public that lend themselves to escalatory decisions. Without the loss of lives, the population may not experience the same degree of anger that can lead to acts of revenge or the belief that significant military action is needed to prevent subsequent attacks.[58] Indeed, an attack on a drone may be viewed as falling below the threshold needed to justify a military or diplomatic response – a limit that some political scientists have referred to as a salience criterion.[59]

The belief that rivals will restrain retaliation after attacks on drones may lead decisionmakers on the receiving end of drone operations to take acts of *amplified aggression* – intentionally more aggressive action against a rival's drones than against their manned assets. These actions may be aimed at stopping a rival from using drones to carry out attacks or from gathering intelligence. At the surface, *amplified aggression* challenges the notion that drones enable escalation control. To be sure, these attacks represent a use of force that they might not

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[58] Analysis of emotions in conflict include Roger D. Petersen, *Understanding Ethnic Violence: Fear, Hatred, and Resentment in Twentieth-Century Eastern Europe* (New York: Cambridge University Press, 2002); Rose McDermott, Anthony C. Lopez, and Peter K. Hatemi, "'Blunt Not the Heart, Enrage It': The Psychology of Revenge and Deterrence," *Texas National Security Review* 1, no. 1 (December 2017): 68–88.

[59] Richard Smoke, *War: Controlling Escalation* (Cambridge, Mass: Harvard University Press, 1977) uses the terminology "salience criterion"; Austin Carson, *Secret Wars: Covert Conflict in International Politics* (Princeton, NJ: Princeton University Press, 2018) introduces the term "salience threshold".

otherwise take. However, those taking defensive measures against drones do so only because they anticipate a limited response. These types of interactions may be less likely to escalate into broader conflicts, thus contributing to greater escalation control.

Scope Conditions

Technology-enabled escalation control theory explains how drones affect escalatory dynamics during crises between actors with relatively symmetric military capabilities. Escalation involving actors with symmetric capabilities can be more destabilizing than escalation between actors with uneven military capabilities. When actors have roughly equal capabilities, they are better able to hold each other's assets and interests at risk. This means they climb vertically up the escalation ladder, and intensify crises through the use of additional firepower and forces. They are also more able to horizontally escalate crises into new theaters or geographic areas. This type of escalation can prevent actors from easily deescalating and lead them to escalate small localized crises into broader regional or global conflicts.

In contrast, a weaker actor may be less able to directly retaliate and escalate vis-à-vis a stronger rival. Weaker actors might carry out limited attacks in an existing theater of operations or attempt to project power into new theaters of operations using unconventional means. For instance, in 2010 the Pakistani Taliban attempted to detonate a car bomb in New York City as retaliation for American drone attacks in Pakistan.[60] While these sorts of actions can damage infrastructure and cause casualties, they generally do not result in the more extensive (and even existential) security risks that can follow actions taken by more capable actors. The potential for

[60] Lorraine Adams and Ayesha Nasir, "Inside the Mind of the Times Square Bomber," *The Guardian*, September 18, 2010, https://www.theguardian.com/world/2010/sep/19/times-square-bomber.

significant escalation and instability makes understanding escalatory dynamics in symmetric contexts particularly important.

The proliferation of drones increases the likelihood that they will be used in crises where actors have parity in military capability. Dozens of states and non-state actors around the world have acquired drones, and their proliferation continues.[61] Many of these actors have operationally employed drones against rivals, which, in many cases, also operate drones. China, for instance, routinely operates drones near the contested Senkaku Islands, triggering intercepts by Japan Air Self Defense Force fighter jets.[62] Iran has flown drones into Israeli and Pakistani airspace, prompting intercepts and shootdowns.[63] And, India and Pakistan rely on reconnaissance drones to gather intelligence on each other.[64] Although technology-enabled escalation control applies primarily to symmetric contexts, I explore whether elements of the theory apply asymmetric conflicts in the dissertation's concluding chapter.

TESTING THE THEORY

To test technology-enabled escalation control, I use a mixed-method research design that leverages both experimental and observational approaches. I combine experiments embedded in

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[61] Matthew Fuhrmann and Michael C. Horowitz, "Droning On: Explaining the Proliferation of Unmanned Aerial Vehicles," *International Organization* 71, no. 2 (Spring 2017): 397–418.

[62] Ankit Panda, "Meet China's East China Sea Drones," *The Diplomat*, June 30, 2015, https://thediplomat.com/2015/06/meet-chinas-east-china-sea-drones/.

[63] Alexander Fulbright, "Iranian Drone Shot down in Northern Israel in February Was Armed with Explosives," *The Times of Israel*, April 13, 2018, https://www.timesofisrael.com/iranian-drone-shot-down-in-northern-israel-in-february-was-armed-with-explosives/; Khalil Dewan, "Why Are Iran's Drones Crossing into Pakistani Airspace?," *Middle East Monitor*, July 11, 2017, https://www.middleeastmonitor.com/20170711-why-are-irans-drones-crossing-into-pakistani-airspace/.

[64] Ramananda Sengupta, "India Unperturbed by Drone Sale to Pakistan- The New Indian Express," *The New Indian Express*, October 11, 2018, http://www.newindianexpress.com/nation/2018/oct/11/india-unperturbed-by-drone-sale-to-pakistan-1883942.html; Imtiaz Ahmad, "India Denies Its Drone Shot down by Pakistan along LoC," *The Hindustan Times*, January 3, 2019, https://www.hindustantimes.com/india-news/india-denies-its-drone-shot-down-by-pakistan/story-8vUAq8aP3RyS8JafNjUbHN.html.

military wargames, survey experiments fielded on expert and public samples in the United States, and nested case studies of U.S. and Israeli drone operations. The various components of the research design allow me to probe and compare how drones affect preferences for escalation across different groups of actors in different countries. Wargames and surveys fielded on military officers allow me to test if and how drones affect military decision-making on escalation. Surveys fielded on public samples allow me to assess whether members of the public are more supportive of operations carried out by drones than those conducted using manned assets, and whether they demand different reactions after a rival's attack on a manned aircraft than an attack on a remotely operated one. Case studies allow me to move beyond hypothetical experimental scenarios to investigate whether and how drones shape decisions made by actual senior civilian and military leaders during real world crises. By examining drone use by both the United States and Israel, the case studies allow me to compare whether different political, security, and cultural contexts influence the effect of drones on escalation.

The project draws from fieldwork in Europe, the Middle East, and the Americas, where I gathered archival materials and conducted extensive interviews that provide firsthand insights into national security decision-making. During research at military and presidential archives, I unearthed documentary evidence of how drones affected decisions on escalation and the use of force from the tactical to strategic levels. I discovered numerous records including assessments of drone missions over China and minutes of National Security Council meetings where Secretary of Defense Robert McNamara and President Lyndon Johnson discussed whether to launch drones or manned aircraft on missions over Cuba. I also conducted over 70 interviews with subjects ranging from drone operators and intelligence analysts to former national security advisors, generals, and senior defense officials from more than a dozen states including the United States, the United Kingdom, China, and Israel.

While interview and archival materials shed light on how decisionmakers factor drones into strategic and operational planning, these observational data alone are insufficient for assessing whether drones contribute to more or less escalation than manned assets. This is because real world events do not allow us to observe both an incident where a drone is involved and the counterfactual: the exact same incident, but where a manned aircraft is involved instead of the drone. More formally, the observational data suffer from the fundamental problem of causal inference: It is impossible to observe the degree of escalation following an incident involving a drone and the same incident involving a manned aircraft. As a result, it is impossible to measure the causal effect of drones on escalatory dynamics on the basis of such data alone.[65]

To overcome this challenge, I use a variety of experimental approaches to generate original data that I use to identify the causal effect of drones on escalatory dynamics. I rely on survey experiments in which military officers and members of the public answer questions about preferences for escalation in a variety of hypothetical crises, where I vary whether drones or manned assets are involved. These survey instruments also collect qualitative inputs from free response questions that allow me to assess the mechanisms underlying respondent preferences. I also introduce a methodological approach that is new to the social sciences – embedding experimental manipulations into wargames played by teams of military personnel.

As chapter three describes in greater detail, I design a scenario-based exercise in which participants are exposed to various crises that have the potential to escalate: the shootdown of a

[65] Archival materials can shed light on the decision-making process leading to the deployment or non-deployment of certain types of assets or specific reactions to incidents, yet a more controlled comparison through experimental research enables more robust inferences. To be sure, however, these experiments face challenges of external validity.

U.S. Air Force reconnaissance plane, the intrusion of an adversary's attack aircraft into friendly airspace, and an operation to strike a rival's chemical weapons facility. In each of these scenarios I randomly vary whether a drone or manned assets are involved and ask participants to develop a response to the crisis. By holding all other elements of the scenario constant across the wargaming teams (i.e. treatment groups), the research design allows me to identify how drones affect decisions on escalation. Interaction between participants during the wargames also provides rich qualitative insights on the assumptions and logics that inform decisions on the use of force. I replicate the wargames multiple times to explore and document trends in decision-making among military personnel.

SUMMARY OF FINDINGS

The findings offer support for technology-enabled escalation control theory and yield theoretical and policy contributions. In short, the experiments, wargames, and case studies demonstrate that drones simultaneously enable policymakers to deploy military force more frequently and to prevent significant escalation during crises. In line with the increased initiation logic, members of the public, military officers, and senior civilian national security officials are generally more willing to deploy remotely operated platforms than manned assets on risky missions. Survey respondents, on average, provide greater support for risky missions carried out by drones than the same missions carried out using manned assets. These results, however, are premised on the systems having roughly equivalent capabilities and being similarly able to successfully complete an operation. When drones are less capable than their manned counterparts, both members of the public and national security practitioners are typically willing to accept the human and political risk associated with a manned deployment. For instance, drones were frequently considered as low risk means to collect intelligence over Cuba, North Korea, and China during the Cold War, but decisionmakers typically settled on manned aircraft as a more capable and efficient means of conducting reconnaissance operations.

Survey respondents and wargame participants were also more willing to take aggressive action against a rival's drones than their manned assets. Experimental participants generally decided to shoot down a drone that violated friendly airspace, but opted for less escalatory action against manned aircraft, providing support for the amplified aggression logic. Indeed, many wargaming teams searched for ways to avoid engaging the intruding manned aircraft. Underlying these preferences was the belief – shared between military members and civilians – that losing a machine fell at a fundamentally lower threshold than losing a crewmember. As a result, participants in the experiments and real-world decisionmakers generally restrained retaliation after the loss of drones, opting to initiate no significant retaliatory action or only minor shows of force or diplomatic action.

The findings also demonstrate how states like Israel use drones specifically to tailor targeting in a way that controls escalation. As part of Israel's national security strategy, the military and intelligence community use remotely operated weapon systems to carry out precision strikes on their rival's critical infrastructure or leadership figures before the outbreak of large-scale hostilities. The intent of these strikes is twofold. First, limited strikes using systems like drones reduce the risk of collateral damage and reduces exposure of Israeli forces to hostile fire. Second, the strikes are thought to lengthen the periods of relative stability between conflicts. By striking adversary targets during these "campaigns between wars," Israel prevents the development of capabilities or enemy plans that could pose a more significant threat or conventional conflict.

CONTRIBUTIONS TO SCHOLARSHIP AND POLICY

Technology-enabled escalation control complements and builds upon existing theories that probe the relationship between technology and conflict escalation in three two ways. First, it better explains previously sidelined questions about escalation dynamics. Existing scholarship on technology and conflict generally predict more conflict when military action is perceived to entail low costs and risks, in part because of technologies that reduce the costs of military operations.[66] Indeed, weapons that reduce the risk of projecting power are often characterized as particularly destabilizing.[67] These theories, however, focus primarily on the initiation of the use of force, and do not fully consider how weapons that significantly reduce the human cost of military operations affect the potential for subsequent escalation.

Second, the theory accounts for a class of technologies – remotely operated weapons – that are widely used today, but were not prevalent when most existing escalation theories first emerged during the Cold War. Much existing literature on escalation emerged during the Cold War and studies how crises between two superpowers could spiral toward nuclear Armageddon.[68] These older theories overlook the emergence of new warfighting technologies and the shift toward more limited military operations in the post-Cold War era.[69] Specifically, drones have features and capabilities that are often associated with escalation control and the prevention of conflict: they can help overcome information control, can conduct precision targeting, and can be attacked

[66] For example see, Robert Jervis, "Cooperation Under the Security Dilemma," *World Politics* 30, no. 2 (January 1978): 167–214; Bruce Bueno de Mesquita, *The War Trap* (New Haven: Yale University Press, 1983).

[67] Karen Ruth Adams, "Attack and Conquer? International Anarchy and the Offense-Defense-Deterrence Balance," *International Security* 28, no. 3 (2003): 45–83.

[68] Kahn, *On Escalation*; Smoke, *War: Controlling Escalation*; Posen, *Inadvertent Escalation*.

[69] On the shift toward more limited military operations see, Micah Zenko, *Between Threats and War: U.S. Discrete Military Operations in the Post-Cold War World* (Stanford, CA: Stanford University Press, 2010); Thomas J. Wright, *All Measures Short of War: The Contest for the Twenty-First Century and the Future of American Power* (New Haven: Yale University Press, 2017).

without endangering friendly personnel. This project broadens our understanding of whether and how remote warfighting technology may redefine escalation thresholds, contribute to inadvertent escalation, and create off-ramps that help control or de-escalate crises. Although the empirical findings shed light on the specific effects of drones, the theory itself may have broader applicability, something I explore in the concluding chapter.

In addition to contributing to theoretical debates, the project helps inform policy debates about drones and international security. As the number of states and non-state actors operating remotely operated weapons increases, so too will the need for research that explains how these systems affect escalatory dynamics. Existing policy studies on drones have concentrated largely on moral questions,[70] issues of drone proliferation,[71] and on public support for the initiation of drone operations.[72] Important questions about their effects on decision-making around escalation are often overlooked. Understanding how drones may reduce the risk of crises spiraling into broader conflicts can inform national security policies in a way that promotes escalation control.

My findings have several important policy implications. The wargames and survey experiments offer insights on how real-world crises might play out. As remotely operated – and eventually, fully autonomous – systems become more common, so too does the likelihood of interstate crises involving remotely operated assets. Indeed, in some mission areas, choosing between use of a manned platform and a remotely piloted one may soon be only a hypothetical

[70] Daniel Byman, "Why Drones Work: The Case for Washington's Weapon of Choice," *Foreign Affairs* 92, no. 4 (2013): 32–43; Audrey Kurth Cronin, "Why Drones Fail: When Tactics Drive Strategy," *Foreign Affairs* 92, no. 4 (2013): 44–54; Kaag and Kreps, *Drone Warfare*.

[71] Fuhrmann and Horowitz, "Droning On," Spring 2017.

[72] Walsh and Schulzke, *The Ethics of Drone Strikes: Does Reducing the Cost of Conflict Encourage War?*; Julia Macdonald and Jacquelyn Schneider, "Presidential Risk Orientation and Force Employment Decisions: The Case of Unmanned Weaponry," *Journal of Conflict Resolution* 61, no. 3 (March 2017): 511–36.

issue. As the use of remotely operated weapon systems becomes more pervasive, the world might see more confrontations of military assets during crises.

Because of the frequency of militarized disputes will likely increase as drones proliferate, states and militaries would likely benefit from establishing doctrine, rules of engagement, and international agreements that distinguish drones from manned assets. Although both manned and remotely piloted craft are equivalent under international law, in practice, military commanders respond differently to drones than manned aircraft. Developing clear policies that govern interactions involving remotely operated assets could help guide military decisionmakers, and avoid accidents or inadvertent escalation. The findings may also influence the domestic and international agreements used to regulate drone exports. Limitations on drone proliferation are often motivated by a desire to avoid the destabilization thought to be associated with drone use. If drones can – at times – maintain stability rather than decrease it, states may be willing to loosen export restrictions and transfer drones to other states.

In addition to the project's substantive contributions, it also makes a methodological contribution. While militaries have long used wargaming to prepare for contingencies, this is the first known scholarly social science work to embed experimental manipulations in wargames played by military personnel.[73] Introducing experimental manipulations helps overcome selection issues present in observational research and allows researchers to assess the causal effect of

[73] Past scholarly use of wargames have often drawn from declassified records of past wargames without experimental manipulations, or include experimental manipulations fielded on public samples participating in the wargames remotely. Jacquelyn Schneider, "Cyber Attacks on Critical Infrastructure: Insights from War Gaming," War on the Rocks, July 26, 2017, https://warontherocks.com/2017/07/cyber-attacks-on-critical-infrastructure-insights-from-war-gaming/; Reid Pauly, "Would U.S. Leaders Push the Button? Wargames and the Sources of Nuclear Restraint," *International Security* 43, no. 2 (Fall 2018): 151–92; Andrew W. Reddie et al., "Next-Generation Wargames," *Science* 362, no. 6421 (December 21, 2018): 1362–64.

variables of interest during crises and conflicts, a task that would be difficult using purely observational methods.

DISSERTATION ROADMAP

The next six chapters lay out the dissertation's theory, research design, and findings of a variety of empirical tests. Chapter 2 introduces technology-enabled escalation control theory. I describe what constitutes a drone and define the key concepts of escalation. In developing my theory, I draw from literature on crisis bargaining, political psychology, and security studies to argue that drones increase the frequency with which actors resort to military force during crises, but enable escalation control by limiting the intensity of crises if force is employed. I outline the four mechanisms that undergird the theory – *increased initiation*, *tempered/tailored targeting*, *restrained retaliation*, and *amplified aggression* – and connect the theory to existing scholarly work on escalation, technology, and the use of force.

Chapter 3 describes the dissertation's multi-method research design. I provide a justification for a methodological approach that layers survey experiments, case studies, with wargames played by national security practitioners. I lay out the case selection and sampling strategy, describe experimental manipulations and the design of the survey instruments and wargames, and most importantly, explain the comparative advantage of each line of research. The chapter argues that the synthesis of qualitative and quantitative data collected from a variety of sources and using different data generating processes allows for more robust tests of technology-enabled escalation control.

Chapters 4 and 5 use a variety of experimental and wargaming approaches to test the mechanisms associated with technology-enabled escalation control theory. Chapter four focuses on the *increased initiation* mechanism and explores whether drones contribute to an uptick in the frequency with which states take military action. Chapter give pivots to the elements of the stabilizing elements of theory: *tempered/tailored targeting*, *restrained retaliation*, and *amplified aggression*. In both of these chapters I leverage original data from survey experiments fielded on public and expert samples and from wargames played by national security practitioners. I evaluate both qualitative and quantitative data and compare responses from civilian and military respondents. In each of these chapters I explore *how* drones affect conflict dynamics and *why* they have these effects.

In chapters 6 and 7, I build upon the findings from chapters 4 and 5 by testing the mechanisms associated with technology-enabled escalation control theory in real world contexts. A series of nested case studies of U.S. drone use during the Cold War and Israeli drone use from the late 1960s to mid-2010s explores how drones have influenced the use of force by states with a long and active history of drone operations. Drawing data from archival materials and interviews I map the decision-making processes surrounding the development and deployment of military drones. I assess the factors military and civilian leaders consider when choosing between employing drones and alternative manned assets, and compare their responses to adversary action against drones and manned assets. This series of nested sub-cases across several decades allows me to assess patterns of change and stability in drone use as leaders, threat conditions, and technology evolve, and also to probe similarities and differences between the effect of drones on American and Israeli conflict decision-making.

MOVING FORWARD

As with any study, scope conditions limit the generalizability of findings that can be gleaned from a given project. The empirical tests in the following chapters, for instance, primarily feature drone use by democratic states during interstate crises. But how well does the theory of technology-enabled escalation control travel beyond these conditions? How might drones affect conflict dynamics in situations other those examined in the experimental tests and case studies? Do non-state actors think about the use of force with and against drones in the same way as state actors? Do other military technologies that remove personnel from the physical front lines influence escalatory dynamics in the same way as drones? Finding answers to these questions is important given the proliferation of drone technology to non-state actors and the development and spread of other military technologies – like cyber warfare – that allow actors to carry out military operations without placing troops in harm's way.

To begin exploring these questions, the dissertation's concluding chapter pushes the application of the theory into new domains. The chapter considers how the growing role of remotely operated weapons and the emergence of autonomous weapons might change the nature of escalation and the norms and laws governing the use of force. It also assesses the generalizability of the theory to different operational contexts. I probe the theory's applicability to offensive cyber operations by examining how the United States reportedly used cyber operations to degrade North Korea's long-range missile program. I also explore Hezbollah's drone use to assess whether elements of technology-enabled escalation control apply to non-state actors. These cases suggest that aspects of technology-enabled escalation control apply across a variety of operational domains. In addition to these extensions, the final chapter summarizes core features of my argument, reviews the empirical findings and discusses the scholarly and policy implications of technology-escalation control.

Chapter 2

Technology-Enabled Escalation Control

The relatively low-cost, unmanned aircraft offered the possibility of using large numbers to overwhelm defensive systems as well as single entry into sensitive areas, with a reduced probability or precipitating open hostilities.

U.S. Air Force Tactical Air Command Assessment, 1979[1]

Scholars and practitioners view technology as an important factor underlying the causes, conduct, and effects of armed conflict.[2] Militaries and other armed actors acquire new technologies to gain tactical and strategic advantages over adversaries, increase power projection capabilities, and reduce risk to friendly personnel. On the battlefield, military technology can shape the intensity of fighting, influence the tactics employed by combatants, and determine conflict outcomes.[3] Beyond the front lines, military technologies often influence when states decide to use force, influence the structure of military organizations, and inform a state's national security

[1] John Lumpkin, Tactical Air Command Drones/RPVs 1966-1968, February 1979 (Secret); K417.042-22 66-78; Air Force Historical Research Agency, Maxwell AFB, Alabama, iii.

[2] Robert Jervis, *Perception and Misperception in International Politics* (Princeton, N.J.: Princeton University Press, 1976); William H. McNeill, *The Pursuit of Power: Technology, Armed Force, and Society since A.D. 1000* (Chicago: University Of Chicago Press, 1984); Martin Van Creveld, *Technology and War: From 2000 B.C. to the Present*, Revised Ed. (New York: Touchstone, 1991); Alex Roland, "Science, Technology, and War," *Technology and Culture* 36, no. 2 (1995): S83–100; Eliot A. Cohen, "A Revolution in Warfare," *Foreign Affairs* 75, no. 2 (1996): 37–54. For critiques, see Keir A. Lieber, *War and the Engineers: The Primacy of Politics over Technology* (Ithaca, NY: Cornell University Press, 2008); Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton, NJ: Princeton University Press, 2004).

[3] Biddle, *Military Power*; Jason Lyall and Isaiah Wilson, "Rage Against the Machines: Explaining Outcomes in Counterinsurgency Wars," *International Organization* 63, no. 1 (January 2009): 67–106; Jonathan D. Caverley and Todd S. Sechser, "Military Technology and the Duration of Civil Conflict," *International Studies Quarterly* 61, no. 3 (September 2017): 704–20.

doctrine and strategy.[4] While much has been written on these topics, relatively little attention has focused on how the introduction of new technologies may influence escalation dynamics – the patterns by which crises can expand in intensity or scope.[5] At the core of this project is a theory of technology-enabled escalation control. The central argument is that technologies that remove warfighters from the battlefield – like drones – allow states to use force more frequently, but decrease the intensity of military operations when used in lieu of inhabited platforms.

In this chapter, I seek to contribute to three ongoing debates in the international relations and security studies literatures. First, studies on conflict often examine the onset and termination of military operations, sidelining questions about the factors that drive escalation or de-escalation.[6] Second, studies on military technologies typically focus on issues of strategy and doctrine, organizational and combat effectiveness, and organizational dynamics – again overlooking how specific types of technology influence escalation.[7] Third, the burgeoning body of literature on

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[4] On the interaction of military technology and military organizations see, Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel.* (Stanford, CA: Stanford University Press, 2010); Michael C. Horowitz, *The Diffusion of Military Power: Causes and Consequences for International Politics* (Princeton, NJ: Princeton University Press, 2010). For assessments of how technology can affect military doctrine, see Austin Long and Brendan Rittenhouse Green, "Stalking the Secure Second Strike: Intelligence, Counterforce, and Nuclear Strategy," *Journal of Strategic Studies* 38, no. 1–2 (January 2, 2015): 38–73; Keir A. Lieber and Daryl G. Press, "The New Era of Counterforce: Technological Change and the Future of Nuclear Deterrence," *International Security* 41, no. 4 (April 1, 2017): 9–49.

[5] Kahn, *On Escalation*; Morgan et al., *Dangerous Thresholds*.

[6] Jervis, "Cooperation Under the Security Dilemma"; Mesquita, *The War Trap*; Richard K. Betts, "Must War Find a Way?: A Review Essay," *International Security* 24, no. 2 (Fall 1999): 166–98; Stephen Van Evera, *Causes of War* (Ithaca, NY: Cornell University Press, 2001); Alex Weisiger, *Logics of War: Explanations for Limited and Unlimited Conflicts*, Cornell Studies in Security Affairs (Ithaca, NY: Cornell University Press, 2013).

[7] Jack S. Levy, "The Offensive/Defensive Balance of Military Technology: A Theoretical and Historical Analysis," *International Studies Quarterly* 28, no. 2 (1984): 219–38; Cohen, "A Revolution in Warfare"; Lieber, *War and the Engineers*; Adamsky, *The Culture of Military Innovation*; Horowitz, *The Diffusion of Military Power*.

drones often examines decisions on their initial use and their proliferation, without fully exploring their effect on escalation dynamics during crises.[8]

Studying the effect of military technology on escalation is critical to understanding interstate relations. Scholars have long deliberated whether certain technologies increase the likelihood of armed conflict, but these debates typically sideline important questions about the arc of a crisis or conflict after the initial use of force.[9] Although technologies that make power projection and offensive action less costly – in blood and treasure – incentivize states to launch military operations, how these systems shape subsequent escalation dynamics needs additional theorization.[10] This theorization is particularly necessary given the proliferation of systems that reduce the risks and costs of military operations. This project attempts to provide a framework by examining how one class of increasingly common military technologies – remotely operated weapon systems – shape escalation dynamics.

On one hand, drones arguably reduce the financial costs of operations and the risk to friendly forces by introducing the capacity to carry out operations without putting personnel in harm's way. In turn, this may lower the associated political barriers to using force. In sum, all else equal, we can expect the availability of drones to *increase an actor's propensity to initiate* military operations. At the same time, the lack of a human in harm's way and the lower unit cost of drones

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[8] Sarah Kreps and Micah Zenko, "The Next Drone Wars: Preparing for Proliferation," *Foreign Affairs* 93, no. 2 (April 2014): 68–79; Kaag and Kreps, *Drone Warfare*; Andrea Gilli and Mauro Gilli, "The Diffusion of Drone Warfare? Industrial, Organizational and Infrastructural Constraints: Military Innovations and the Ecosystem Challenge," SSRN Scholarly Paper (Rochester, NY: Social Science Research Network, March 18, 2015), http://papers.ssrn.com/abstract=2425750; Matthew Fuhrmann and Michael C. Horowitz, "Droning On: Explaining the Proliferation of Unmanned Aerial Vehicles," *International Organization* 71, no. 2 (Spring 2017): 397–418.

[9] Levy, "The Offensive/Defensive Balance of Military Technology"; Van Evera, *Causes of War*; Adams, "Attack and Conquer?"; Lieber, *War and the Engineers*.

[10] For a study that examines how the lower cost of military operations allows states to carry out military operations, see Dianne Pfundstein Chamberlain, *Cheap Threats: Why the United States Struggles to Coerce Weak States* (Washington, D.C.: Georgetown University Press, 2016).

may make states on the receiving end of such operations more willing to take *deliberate defensive* actions against their rivals' drones.

Despite this increased propensity of initiating military operations, drones can contribute to other processes that reduce the potential for situations to escalate in two key ways. First, drones allow states to gather intelligence that overcomes information asymmetries. Decisionmakers often launch military operations when they have incomplete information about a rival's capabilities and intentions. If decisionmakers are more willing to deploy drones than manned platforms, this may increase collection of intelligence that helps reduce information asymmetries. This intelligence can prevent decisionmakers from launching conflicts due to faulty information. In the event of conflict, however, the vast amounts of intelligence that drones can gather can help make targeting more precise – potentially reducing the risks of inaccurate targeting and collateral damage.[11] Drones can therefore help *temper or tailor targeting* of rivals.

Second, the lack of friendly personnel onboard drones and, in some cases their lower unit cost than manned platforms, allows decisionmakers to *restrain retaliation* after a rival attacks a drone. In comparison, decisionmakers may feel more obligated to retaliate after an attack on a manned asset. The death or capture of crewmembers can generate demands for retaliation from the population or lead military decisionmakers to take more aggressive actions to prevent future losses. These two mechanisms may prevent crises from spiraling into broader and more destabilizing conflicts. This logic of technology-enabled escalation control runs counter to the

[11] Avery Plaw, "Counting the Dead: The Proportionality of Predation in Pakistan," in *Killing by Remote Control: The Ethics of an Unmanned Military*, ed. Bradley Jay Strawser and Jeff McMahan (New York: Oxford University Press, 2013), 126–53.

policy and scholarly discourse that suggests military technologies that reduce operational risk and costs are necessarily destabilizing.[12]

The theory best explains escalation dynamics when systems like drones – that allow decisionmakers to launch operations without exposing friendly personnel to direct harm – are used in a substitutive manner in lieu of a manned asset. In some of these cases, remotely operated weapons are used on missions that would not have been launched in their absence. In other cases, missions arguably would happen, but remotely operated weapons are used in place of manned ones. The subsequent discussion focuses on drone use by and against actors with relatively symmetric capabilities. These represent the most dangerous cases as these actors are more able to both use drones and attack their rivals' drones and have a greater potential to generate extensive damage. Even so, elements of technology-enabled escalation control theory can be applied to other technologies and to operations between rivals with asymmetric capabilities. I explain scope conditions of the inquiry later in this chapter. The concluding chapter also explores the theory's generalizability to cyber operations and to the use of drones by and against non-state actors.

This chapter begins by charting existing research that links military technology to conflict dynamics, paying particular attention to studies that examine technologies that take friendly troops off the battlefield. Next, I provide a more detailed discussion of technology-enabled escalation control theory and its foundations in international relations theory, crisis bargaining, and political psychology. I then describe how three distinct groups of decision-making agents – the public, the military, and elite civilian decisionmakers – influence decisions about conflict escalation. I

[12] For instance, capabilities that provide offensive advantages contribute to more "dangerous" threat environments according to Jervis, "Cooperation Under the Security Dilemma."

conclude by briefly assessing challenges to technology-enabled escalation control, highlighting conditions where drones might contribute to, rather than control, escalation dynamics.

EXISTING RESEARCH ON TECHNOLOGY AND ESCALATION

The term "drone" describes a range of surveillance and combat systems that are remotely operated, meaning that crew members are not physically onboard the system.[13] They can operate in the air, sea, and land domains. They can be armed or unarmed. To be sure, drones are not the first technology that has decreased risks to friendly forces. Militaries have historically sought to decrease the risks of operations by developing or acquiring weapons that increase the distance between friendly and hostile forces or increase survivability by using stealth technology or other countermeasures. Weapons like rifles, long-range artillery, and bomber jets have allowed adversaries to engage from greater distances and stealth materials allow ships and planes to evade radar detection. However, these technologies still require human operators to be physically present on the battlefield. Remotely operated systems like drones enable military operations that do not place friendly personnel in the direct line of fire. Removing friendly forces from the battlefield fundamentally shifts calculations on when and how to use force, and when and how to escalate confrontations involving armed force.[14]

The use of drones by states around the world swelled in the years following 9/11. So too did the body of drone-focused research. Much of this work traces the history of drone operations, or analyzes the United States' controversial use of drones to carry out targeted killings in places

[13] To reiterate a point from Chapter 1, I use the terms drone, remotely piloted aircraft, and remotely operated weapon system interchangeably. I do not engage in parochial debates over the terminology used to describe systems that are remotely operated. To be clear, however, I do not use the terms here to describe fully autonomous weapons, systems that are able to make decisions on the use of force without real-time inputs from a human operator.

[14] Erik Gartzke, "No Humans Were Harmed in the Making of This War: On the Nature and Consequences of Costless Combat" (UC San Diego Working Paper, December 24, 2016).

like Yemen and Pakistan.[15] Other studies probe normative issues surrounding the use of robotic weapons against human targets, raising important questions about chivalry, fairness, and the nature of modern combat.[16] These studies generally agree that removing pilots from harm's way lowers the political obstacles to launching military operations, leading drones to be viewed increasingly as "one-size-fits-all" solution to a variety of national security policies.[17] Indeed, some scholars have characterized drones as creating a moral hazard that enables states to launch risky operations that they might otherwise avoid.[18]

Empirical analyses have tested these claims using a variety of approaches and find that U.S. presidents, members of the U.S. national security bureaucracy, and the American public are, in most instances, more likely to support the deployment of drones than manned platforms. Members of the public and government decisionmakers often view drones as a more prudent means of carrying out military operations as they reduce the risk to friendly personnel. [19] Civilian

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[15] Richard Whittle, *Predator: The Secret Origins of the Drone Revolution by Richard Whittle* (Picador, 2015); Woods, *Sudden Justice*.

[16] Daniel Byman, "Why Drones Work: The Case for Washington's Weapon of Choice," *Foreign Affairs* 92, no. 4 (2013): 32–43; Audrey Kurth Cronin, "Why Drones Fail: When Tactics Drive Strategy," *Foreign Affairs* 92, no. 4 (2013): 44–54; John Kaag and Sarah Kreps, *Drone Warfare*, (Cambridge: Polity, 2014); Grégoire Chamayou, *A Theory of the Drone* (New York: The New Press, 2015); Woods, *Sudden Justice*; Hugh Gusterson, *Drone: Remote Control Warfare* (Cambridge, Massachusetts: The MIT Press, 2016); Asfandyar Mir, "What Explains Counterterrorism Effectiveness? Evidence from the U.S. Drone War in Pakistan," *International Security* 43, no. 2 (Fall 2018): 45–83.

[17] Loren DeJonge Schulman, *Weird Birds: Working Paper on Policymaker Perspectives on Unmanned Aerial Vehicles and Their Impact on National Security Decision-Making* (Washington, D.C.: Center for New American Security, 2018), 14.

[18] Kaag and Kreps, *Drone Warfare*.

[19] Sarah Kreps, "Flying under the Radar: A Study of Public Attitudes towards Unmanned Aerial Vehicles," *Research & Politics* 1, no. 1 (May 13, 2014): 4–7; Macdonald and Schneider, "Presidential Risk Orientation and Force Employment Decisions: The Case of Unmanned Weaponry"; Walsh and Schulzke, *The Ethics of Drone Strikes: Does Reducing the Cost of Conflict Encourage War?*; Jacquelyn Schneider and Julia Macdonald, *U.S. Public Support for Drone Strikes: When Do Americans Prefer Unmanned over Manned Platforms* (Washington, D.C.: Center for New American Security, 2016).

leaders – who are subject to domestic public opinion – view drones as particularly attractive as they reduce the political risk attached to incurring casualties during military operations.[20]

These studies have generally examined how the availability of drones increases the likelihood that the public and decisionmakers will launch military operations – particularly those that involve launching strikes on adversaries, paying little attention to their effect on subsequent escalatory dynamics. In one notable exception, Horowitz, Kreps, and Fuhrmann, examine how drone proliferation affects conflict dynamics and stability across a range of operational contexts. Their analysis identifies heterogeneous effects: the availability of drones may allow states to launch military operations with greater ease, but the operational context can dictate whether drones have a stabilizing or destabilizing effect. In the context of counterterrorism and civil wars, for instance, drones may enable leaders to more easily carry out strikes in otherwise hard to reach regions. In contrast, when deployed during crises, drones may have a stabilizing effect by revealing information about adversary capabilities and by enabling de-escalation in the event of confrontations.[21] Horowitz, Kreps, and Fuhrmann's analysis provides a solid foundation for additional theorization and testing of the mechanisms that determine the effect of drones on escalation and stability.[22]

The broader international relations and security studies literature also yields few direct insights on how technologies – like drones – that reduce the risks and costs of fighting affect

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[20] Schulman, *Weird Birds: Working Paper on Policymaker Perspectives on Unmanned Aerial Vehicles and Their Impact on National Security Decision-Making*, 14.

[21] Horowitz, Kreps, and Fuhrmann, "Separating Fact from Fiction in the Debate over Drone Proliferation."

[22] In Chapters 3 through 7 of this dissertation I describe and employ a variety of methods to empirically test the arguments that Horowitz, Kreps, and Fuhrmann introduce.

escalation dynamics.[23] Theoretical and empirical work on military technology has studied the development of new technologies and the diffusion of these innovations. Historians and scholars of military strategy have traced the role of weapons in changing the nature of warfare, often studying how specific weapons – like the machine gun or strategic bombers – altered the face of combat or the projection of state power.[24] Political scientists have examined variation in the process of technological innovation,[25] the integration of new technology,[26] and the effects of technology on combat effectiveness.[27] Studies that explicitly tie military technology to escalation are less common and generally focus on conflict onset – the initial decision to escalate and use military force – without fully considering subsequent escalatory dynamics.

One notable exception where scholars have explicitly studied the effects of a specific technology on escalation dynamics is the literature on nuclear weapons and deterrence. One view on nuclear deterrence is premised in part on the concept that nuclear weapons enable mutually assured destruction. Under this logic, the devastating consequences of a nuclear exchange lead

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[23] One notable exception is the literature on nuclear escalation that emerged during the Cold War. A more recent line of research literature examines escalation in the cyber domain. I draw from this literature later in this chapter.

[24] Bernard Brodie and Fawn M. Brodie, *From Crossbow to H-Bomb: The Evolution of the Weapons and Tactics of Warfare*, Revised edition (Bloomington, IN: Indiana University Press, 1973); McNeill, *The Pursuit of Power*; John Ellis, *The Social History of the Machine Gun* (Baltimore: Johns Hopkins University Press, 1986); Robert L. O'Connell, *Of Arms and Men: A History of War, Weapons, and Aggression* (New York: Oxford University Press, 1990); Creveld, *Technology and War*; Pape, *Bombing to Win*; J. F. C. Fuller, *Armament And History: The Influence Of Armament On History From The Dawn Of Classical Warfare To The End Of The Second World War* (New York: Da Capo Press, 1998); Tami Davis Biddle, *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas about Strategic Bombing, 1914-1945* (Princeton, NJ: Princeton University Press, 2004).

[25] Barry Posen, *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars* (Ithaca, NY: Cornell University Press, 1986); Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca, NY: Cornell University Press, 1994).

[26] Morton H. Halperin, *Bureaucratic Politics and Foreign Policy* (Washington, D.C.: Brookings Institution, 1974); Horowitz, *The Diffusion of Military Power*; Adamsky, *The Culture of Military Innovation*.

[27] Cohen, "A Revolution in Warfare"; Biddle, *Military Power*.

decisionmakers to avoid escalating interstate disputes.[28] According to this argument, nuclear weapons can prevent unlimited escalation through the threat of massive losses. In contrast, drones and other remote warfighting technologies may help prevent escalation by offering small losses by deploying machines instead of personnel and by enabling more precise targeting. To be sure, some theories of nuclear escalation suggest that limited nuclear options such as the use of tactical nuclear weapons can help prevent escalation.[29] Still, these weapons would likely generate larger numbers of casualties than drones carrying out conventional airstrikes, and would be viewed as violating a taboo that could lead the international community to impose military or diplomatic consequences.[30] Further, nuclear weapons have changed escalation dynamics only among the small group of states that possess them. Drones, however can affect escalation dynamics among a far larger number of actors given their rapid and widespread proliferation

Central within the work on conflict onset is the debate surrounding offense-defense theory.[31] Proponents of the theory argue that technology plays a significant role in shaping the likelihood of wars by affecting the ability to conduct offensive operations.[32] When technologies that increase firepower and mobility are in widespread use, decisionmakers often perceive

[28] Schelling, *Arms and Influence*; Lawrence Freedman, *The Evolution of Nuclear Strategy*, Third Edition (New York: Palgrave Macmillan, 2003); Robert Jervis, *The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon*, First Edition (Ithaca: Cornell University Press, 1990).

[29] For a summary of the literature on limited nuclear options, see Freedman, *The Evolution of Nuclear Strategy*, 89–113.

[30] Tannenwald, "The Nuclear Taboo."

[31] Dozens of works engage this debate including, Levy, "The Offensive/Defensive Balance of Military Technology"; Charles L. Glaser and Chaim Kaufmann, "What Is the Offense-Defense Balance and Can We Measure It?," *International Security* 22, no. 4 (Spring 1998): 44; Van Evera, *Causes of War*; Adams, "Attack and Conquer?"

[32] There are two schools of offense-defense theorists according to Lieber, *War and the Engineers*. The core school focuses almost exclusively on military technologies, while the broad school also considers factors including geography, alliances, and characteristics of the domestic regime.

offensive action and conquest as easy. As a result, the risk of conflict increases. In contrast, when technologies are believed to make defensive action less costly and more effective, actors avoid initiating conflicts.[33] Although the theory tells us about onset, it yields few predictions about the degree of escalation that is expected after the initial use of force. If we apply the offense-defense logic to escalation, we would expect decisionmakers to continue escalating so long as the perceived cost of military operations remained low. Yet crises and conflicts often vary significantly in their intensity and scope – in part due to decisions that those conducting and overseeing operations make, and how adversaries respond.[34]

Critics have raised several challenges to offense-defense theory. First, they argue that technologies that favor defense are often indistinguishable from those that favor the offense.[35] The inability to distinguish between these types of technologies makes it difficult to estimate how they might affect strategy and risk-taking. Second, offense-defense theory is generally considered a systemic theory that focuses on "the gross 'state of the art' in the international system at any given time, rather than the particulars of individual states' holdings."[36] This can limit the theory's ability to explain the dynamics of a specific conflict.

While not explicitly citing technology, rational choice theorists draw similar conclusions as proponents of offense-defense theory. Scholars in this camp, including Bruce Bueno de Mesquita and James Fearon, formalize conflict as an expected utility calculation in which actors initiate and continue conflicts so long as the expected benefits of victory are perceived to exceed

[33] Snyder, *The Ideology of the Offensive*; Van Evera, *Causes of War*.

[34] Weisiger, *Logics of War*.

[35] Jervis, "Cooperation Under the Security Dilemma"; Levy, "The Offensive/Defensive Balance of Military Technology"; Lieber, *War and the Engineers*.

[36] Biddle, *Military Power*, 15.

the cost of fighting.[37] To be sure, states would be better off negotiating a mutually acceptable settlement before launching military operations, rather than suffering the costs of fighting, but incentives for actors to misrepresent their willingness to fight can make these settlements difficult to achieve.[38] As a result, actors initiate fighting when they perceive a positive expected value for doing so. Under this logic, technologies that lower the perceived material and human costs of military operations should increase the expected payoffs for fighting, and incentivize actors to more frequently start (and continue) fights.

Rational choice logics also differ from offense-defense theory by taking a dyadic approach, rather than a systemic one. This arguably provides greater insight into the onset and duration of specific conflicts as researchers can assess the specific costs and benefits of conflict between two parties at a given time. Even so, work in the rational choice framework has not yet explored why and how crises escalate, and how technology affects these calculations.

Other studies have examined the role of technology in areas beyond conflict onset – such as combat effectiveness and outcomes – and produced divergent conclusions on the effect of technology. Stephen Biddle, for instance, argues that technology has a less significant effect on combat than force employment, the way in which an actor uses its forces.[39] Technology can make military operations more accurate and precise, but Biddle suggests even advanced weapons can be

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[37] Mesquita, *The War Trap*; James D. Fearon, "Rationalist Explanations for War," *International Organization* 49, no. 3 (Summer 1995): 379–414; Dan Reiter, "Exploring the Bargaining Model of War," *Perspectives on Politics* 1, no. 1 (2003): 27–43.

[38] James Fearon (1995) describes three primary reasons for the lack of negotiated ex ante settlements. First, some disagreements involve stakes like holy sites that are indivisible (although few things are truly indivisible). Second, leaders may shun negotiated agreements out of fear that rivals will defect from settlements in the future. Third, leaders may misrepresent information about their capabilities and intentions, which can often lead states to go to war.

[39] Biddle, *Military Power*, 23–26.

overcome by adversary countermeasures or environmental factors.[40] On the other hand, Jonathan Caverley and Todd Sechser suggest that military technology plays a more important role. They contend technology shortens the length of wars by mitigating information asymmetries that can prolong conflicts.[41] Although these studies more explicitly assess the role of military technology on conflict duration and combat effectiveness, they still do not fully explore the relationship between technology and escalation.

If military technology can influence decisions on initial deployment of forces,[42] strategy and doctrine,[43] crisis bargaining, combat effectiveness, and organizational dynamics,[44] it should also affect decisions on escalation. New military technologies can affect when, where, and how actors deploy military forces, potentially generating far-reaching impacts on battlefield and political outcomes. It is critical to note, however, that "weapons don't make war." Although technology has been described as one of the most important influences on warfare, its effect on conflict dynamics is not deterministic. Instead, military technology is an instrument of policy.[45] Militaries generally acquire and employ weapons in line with bureaucratic preferences and in accordance with orders from government decisionmakers, who in turn are accountable to the actors

[40] Biddle, 62–66.

[41] Caverley and Sechser, "Military Technology and the Duration of Civil Conflict."

[42] Jervis, "Cooperation Under the Security Dilemma"; Van Evera, *Causes of War*.

[43] Posen, *The Sources of Military Doctrine*; Snyder, *The Ideology of the Offensive*; Alex Roland, "The Technological Fix: Weapons and the Cost of War." (Carlisle Barracks, PA: Army War College Strategic Studies Institute, June 6, 1995); Roland, "Science, Technology, and War."

[44] Cohen, "A Revolution in Warfare"; Horowitz, *The Diffusion of Military Power*.

[45] Colin S. Gray, *Weapons Don't Make War: Policy, Strategy, and Military Technology* (Lawrence, KS: University Press of Kansas, 1993).

that enable them to maintain power.[46] As anthropologist Hugh Gusterson argues, weapons like drones are "socio-technical ensembles" that "will be deployed to different effects in different cultural and organizational settings."[47] Policymakers and military officials thus mediate the effect of technology on conflict dynamics.

This may raise concerns of endogeneity if actors' desires to minimize escalation lead them to more actively employ drones when they seek to minimize escalation. In other words, what if leaders deploy drones only on peripheral missions where stakes are low? First, there are many examples of states deploying drones in cases with relatively high stakes: China, for instance, uses drones to monitor disputed territory in the East and South China Sea, and the United States has deployed drones to monitor Russian military in the Baltics and Central Europe.[48] Second, I do not argue that military technology is fully exogenous. Conceptually, escalation dynamics involve interactions between actors. Even if one actor uses a technology with the intent of avoiding a military confrontation and escalation, the rival actor's decisions also matter to whether a situation escalates.

This dynamic is not purely a theoretical matter. During a high-level U.S. wargame during the Cold War, for instance, participants attempted to limit escalation through the use of tactical nuclear weapons. Wargame participants, which included Secretary of Defense Casper Weinberger and the Chairman of the Joint Chiefs of Staff, believed using low-yield tactical nuclear weapons

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[46] Bruce Bueno de Mesquita et al., *The Logic of Political Survival* (Cambridge, MA: The MIT Press, 2004) describes this group as a selectorate. This selectorate can hold leaders accountable and remove them from office, either through elections or, in non-democratic settings, by using force or by withholding other forms of support.

[47] Gusterson, *Drone*, 92.

[48] Panda, "Meet China's East China Sea Drones"; Kyle Rempfer, "Air Force Reapers Are Now Flying ISR Missions from Poland," *Air Force Times*, June 1, 2018, https://www.airforcetimes.com/news/2018/06/01/air-force-reapers-are-now-flying-isr-missions-from-poland/.

could minimize escalation during a conflict with the Soviet Union. Instead of de-escalation, however, the Soviet Union responded with a massive nuclear salvo that resulted in the destruction of large swaths of Europe and the United States.[49] This suggests that even if one side views its choices of weapons and tactics as less escalatory than some alternatives, it does not necessarily follow that this will be perceived as such by an adversary, or that escalation will not occur. In chapters four and five I isolate the effect of technology on escalatory dynamics by controlling for the stakes of missions in the experimental designs.

A THEORY OF TECHNOLOGY-ENABLED ESCALATION CONTROL

Technology-enabled escalation control builds upon existing theories that link technology with conflict dynamics. It builds upon these theories by explaining how a specific class of technologies affects escalation in situations where the option often exists between whether to use unmanned or inhabited assets. The theory consists of two divergent, but related elements: technologies like drones can increase the frequency of military deployments. Simultaneously, the use of uninhabited assets can decrease the likelihood of escalation, relative to similar operations using manned assets. In the pages that follow, I map out the mechanisms that underlie the theory and propose several testable hypotheses.

Decreasing Costs, Increasing Initiation of Military Operations

The first pillar of technology-enabled escalation control theory posits that drones lower the threshold for deploying forces, increasing the frequency at which states launch military operations relative to similar operations conducted with manned assets. These operations can include a range of missions such as reconnaissance flights or combat airstrikes. Regardless of the mission type,

[49] Paul Bracken, *The Second Nuclear Age: Strategy, Danger, and the New Power Politics* (St. Martin's Griffin, 2013). I am grateful to Amy Zegart for suggesting this example.

removing pilots from harm's way decreases the risks and expected costs of military operations. This decreased cost then expands the range of issues for which states are willing to deploy force. This argument has dominated much of the existing scholarly and policy work on drones, with researchers and practitioners describing how the relatively costless nature of drone wars increases the propensity of leaders to launch military operations.[50]

Rational choice accounts suggest that actors initiate military operations when the expected gains of an operation exceed the expected costs.[51] The costs of military operations encompass a variety of factors including treasure, reputation, and blood. First, military operations are financially costly. Maintaining overseas bases, acquiring new systems, and operating weapons are costly endeavors. The United States, for example, has poured over $5 trillion into its post-9/11 wars.[52] Even more limited deployments that rely on systems the public views as cheap, like drones, involve extensive infrastructure and maintenance that can drive up financial costs.[53] Second, launching military operations can have reputational costs for the deploying state. Much of the international

[50] Kaag and Kreps, *Drone Warfare*.

[51] Formal models that characterize conflict as an expected utility calculation, generally represent the gain as control of some good that can be secured through fighting, such as territory or a political objective. The good at stake, however, can be thought of more broadly to include anything that an actor seeks to gain, and the actor's rival seeks to maintain. For instance, the good might be intelligence about a rival's military capabilities and intentions – information the rival may prefer to keep private. In this case, the expected utility to the intelligence gathering state is the value it assigns to the intelligence multiplied by the probability of successfully attaining the information, minus the cost of collecting the intelligence.

[52] This sum includes the cost of operations along with expenditures for homeland security and veterans care. See, Neta Crawford, "United States Budgetary Costs of Post-9/11 Wars Through FY2018," Costs of War (Providence, RI: Watson Institute for International and Public Affairs, November 2017), https://watson.brown.edu/costsofwar/files/cow/imce/papers/2017/Costs%20of%20U.S.%20Post-9_11%20NC%20Crawford%20FINAL%20.pdf.

[53] Gilli and Gilli, "The Diffusion of Drone Warfare?," January 2016.

community, for instance, criticized the United States for its 2003 invasion of Iraq.[54] This sort of opposition can weaken a state's international standing and stymie other efforts that require multinational collaboration. The Iraq War, for instance, strained ties between the United States and its NATO allies at a time when the Bush administration needed NATO support for ongoing operations in Afghanistan.[55] Finally, military operations are inherently risky. When military personnel are at the front lines of these operations and are vulnerable to capture, injury, or death, the political costs of failure increase.[56]

Decisionmakers consider all of these factors as they contemplate whether to initiate military action, but the potential cost in blood appears to be particularly salient.[57] Casualties are often thought to diminish public support for military operations and reduce public approval of government leaders seen as responsible for the operations, although this is the subject of academic debate.[58] In turn, the fear of these political costs can lead policymakers to be casualty-averse when

[54] "France and Germany Unite against Iraq War," *The Guardian*, January 22, 2003; "A Year After Iraq War: Mistrust of America in Europe Ever Higher, Muslim Anger Persists," Global Attitudes Project (Washington, D.C.: The Pew Research Center for the People & the Press, March 16, 2004), 11.

[55] Lucile Eznack, *Crises in the Atlantic Alliance: Affect and Relations among NATO Members* (New York: Palgrave Macmillan, 2012), 85–114.

[56] John E. Mueller, *War, Presidents, and Public Opinion* (New York: John Wiley & Sons, 1973), 58–62; Louis Klarevas, "The 'Essential Domino' of Military Operations: American Public Opinion and the Use of Force," *International Studies Perspectives* 3, no. 4 (November 2002): 426–28.

[57] Klarevas, "The 'Essential Domino' of Military Operations," 426–28.

[58] Mueller, *War, Presidents, and Public Opinion*, 58–62; T. Clifton Morgan and Sally Howard Campbell, "Domestic Structure, Decisional Constraints, and War: So Why Kant Democracies Fight?," *The Journal of Conflict Resolution* 35, no. 2 (1991): 187–211; Dan Reiter and Allan C. Stam, *Democracies at War* (Princeton, NJ: Princeton University Press, 2002), chap. 6; Scott Sigmund Gartner, "The Multiple Effects of Casualties on Public Support for War: An Experimental Approach," *American Political Science Review* 102, no. 1 (February 2008): 95–106; Teresa A. Myers and Andrew F. Hayes, "Reframing the Casualties Hypothesis: (Mis)Perceptions of Troop Loss and Public Opinion about War," *International Journal of Public Opinion Research* 22, no. 2 (July 2010): 270–72; James Burk, "Public Support for Peacekeeping in Lebanon and Somalia: Assessing the Casualties Hypothesis," *Political Science Quarterly* 114, no. 1 (March 1999): 53–78; Christopher Gelpi, Peter D. Feaver, and Jason Reifler, *Paying the Human Costs of War: American Public Opinion and Casualties in Military Conflicts* (Princeton, NJ: Princeton University Press, 2009).

weighing options for military action, particularly when it is unclear whether or to what degree an operation will serve a state's vital interests.[59] While the role of casualty aversion in non-democratic contexts is less understood, non-democratic leaders may be punished for launching unpopular military actions, just like their democratic counterparts.[60] Even though autocrats may not be constrained by a voting public, the coalition that enables them to maintain power can hold them accountable for foreign policy and military blunders.[61]

The political costs associated with incurring casualties have long led political and military leaders to pursue ways of conducting operations with less risk to friendly troops. These approaches generally involve either tactics or systems that can threaten adversaries while minimizing exposure to friendly forces. During Operation Allied Force, for instance, NATO relied on an air campaign, rather than ground forces, to strike Serbian military and strategic targets. To further minimize the risk posed by Serbian air defenses, many of these strikes were carried out from high-altitudes beyond the reach of anti-aircraft artillery, even though doing so came at the risk of accuracy and mission effectiveness.[62] In other cases, specialized assets like stealth aircraft that can evade enemy

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[59] Bruce W. Jentleson, "The Pretty Prudent Public: Post Post-Vietnam American Opinion on the Use of Military Force," *International Studies Quarterly* 36, no. 1 (1992): 49–73; Bruce W. Jentleson and Rebecca L. Britton, "Still Pretty Prudent: Post-Cold War American Public Opinion on the Use of Military Force," *Journal of Conflict Resolution* 42, no. 4 (August 1998): 395–417.

[60] Cigdem V. Sirin and Michael T. Koch, "Dictators and Death: Casualty Sensitivity of Autocracies in Militarized Interstate Disputes," *International Studies Quarterly* 59, no. 4 (December 2015): 803–10.

[61] Jessica L. Weeks, "Autocratic Audience Costs: Regime Type and Signaling Resolve," *International Organization* 62, no. 1 (January 2008): 35–64; Jessica L. P. Weeks, *Dictators at War and Peace* (Ithaca, NY: Cornell University Press, 2014).

[62] Daniel L. Byman and Matthew C. Waxman, "Kosovo and the Great Air Power Debate," *International Security* 24, no. 4 (April 1, 2000): 5–38; Benjamin S. Lambeth, *NATO's Air War for Kosovo: A Strategic and Operational Assessment* (Santa Monica, CA: RAND Corporation, 2001), 48–49.

detection are used to mitigate risk to friendly forces.[63] Drones represent one such risk-reducing technology. Indeed, the crews that fly platforms like the MQ-9 Reaper remotely piloted aircraft are typically located thousands of miles away from the battlefields where their aircraft are physically operating.[64] Unlike many earlier forms of risk reducing technologies that still required personnel to be on the physical battlefield, remotely operated systems leave virtually no chance that friendly personnel will be captured or killed on the battlefield.

Because drones substantially reduce the risk to friendly forces and to expensive platforms, they may allow decisionmakers to undertake military operations they might not otherwise conduct. Assuming that drones can accomplish the same mission with similar levels of efficacy, the lower overall expected human costs associated with missions conducted with drones (relative to manned assets) means that drones should offer a higher expected utility for completing a mission. This means that states with drones may launch military operations that would not be initiated if only manned systems or ground forces are available. This yields the first testable hypothesis:

> ***Increased Initiation (H_1):*** *All else equal, states are more likely to launch military operations when drones can substitute for manned assets or ground forces.*

This may be particularly true in cases where decisionmakers view the objective as insufficiently worthy of risking casualties of friendly forces and the loss of expensive assets. Yet drone use need not be limited to peripheral, low stakes cases. Drones can also substitute for manned assets on higher stakes crises.

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[63] Edward C. Keefer, *Harold Brown: Offsetting the Soviet Military Challenge 1977-1981* (Government Printing Office, 2017), 604–7.

[64] M. C. Elish, "Remote Split: A History of US Drone Operations and the Distributed Labor of War," *Science, Technology, & Human Values* 42, no. 6 (November 1, 2017): 1100–1131.

To be clear, the increased initiation logic does not suggest that decisionmakers will always deploy drones because they are a lower risk alternative to manned assets. In some cases, decisionmakers may select drones because of their operating characteristics. For instance, the longer endurance of drones vis-à-vis manned platforms make them well suited for dull or time-intensive missions. Military planners, for instance, sometimes rely on drones rather than manned aircraft if missions must cover vast amounts of territory, traverse a long distance to a target area, or loiter over a target for many hours.[65] In these cases, reduced risk to friendly forces comes as an incidental benefit of their selection. In other cases, a manned asset might have capabilities better suited to a given mission. For instance, if tasked to carry out an airstrike on a large, hardened target, planners may prefer a manned bomber over a drone because of the former's higher weapons payload. The capabilities gap should decrease as drone capabilities increase. Indeed, the U.S. Air Force's newest bomber, the B-21 Raider, is designed to be operated either as a traditionally inhabited aircraft or as a remotely piloted platform.[66] Finally, decisionmakers may also be reluctant to deploy new technologies for fear of revealing sensitive capabilities to an adversary. Revealing emerging capabilities can eliminate the element of surprise associated with using a new system during combat operations, allow the adversary to gather intelligence on the system, or trigger arms racing.[67]

[65] Interview with U.S. Air Force planner, Headquarters U.S. Air Forces in Europe, Ramstein Air Base, Germany, 3 June 2016.

[66] Jeremiah Gertler, "Air Force B-21 Raider Long-Range Strike Bomber" (Washington, D.C.: Congressional Research Service, October 12, 2018), 1.

[67] Bernard Brodie, "Military Demonstration and Disclosure of New Weapons," *World Politics* 5, no. 3 (1953): 281–301.

Stabilizing Mechanism 1: Restrained Retaliation

By lowering the cost of military operations, drones recalibrate the calculus on the use of force. The expected costs of conducting military operations affect not only decisions to initiate military operations – as existing theories contend – but should also influence decisions on whether to escalate. The more actors value the object at stake, the more they will expend in effort and resources to obtain it from a rival, guard it from adversaries, or avenge its loss. When the perceived value is low, actors have fewer reasons to aggressively defend it or retaliate after it is attacked. Indeed, certain military operations may not meet what Richard Smoke called the "salience criterion," falling below the threshold of escalation that warrants retaliation.[68] Low-intensity attacks or covert action may even be tacitly accepted and publicly ignored – especially if the actions are not publicized or are plausibly deniable. These incidents often do not elicit direct retaliation, helping to control escalation or deescalate crises by providing off-ramps to escalatory spirals.[69] A less intense response – or lack of a response – is subsequently less likely to trigger rival counter-reactions that could set off a destabilizing escalatory spiral.

An attack on a drone may be more likely to fall below the salience criterion than an attack on an inhabited asset. Since no friendly pilot or crewmembers are captured or killed in the downing of a drone, military and civilian leaders may feel less of a need to punish a rival or launch an intrusive personnel recovery mission. Indeed, the loss of a drone might be ignored or disavowed in a way that is not possible when an inhabited asset is lost. As one Air Force intelligence planner explained, when "there are [pilots] on the ground screaming in pain" there is an emotional reaction

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[68] Smoke, *War: Controlling Escalation*, 32–33.

[69] Carson, "Facing Off and Saving Face."

that is not present in cases where a drone is lost.[70] Incidents involving captured or killed crews can also stay in news headlines and generate public opinion that shapes military operations, something that is less likely when only a machine is lost.[71] This higher risk of escalatory retaliation to the downing of a manned aircraft appears across regime types. As one retired Chinese People's Liberation Army officer put it, "losing a machine is not the same as losing a life."[72]

Instrumental and emotional factors may create escalatory pressures after attacks on an actor's military forces. On one hand, responses can be rationally motivated efforts to discourage future harm. These retaliatory measures are typically intended to degrade an adversary's warfighting potential or threaten future damage by signaling the "power to hurt."[73] These responses, sometimes described as "negative reciprocity," attempt to alter a rival's behavior using a tit-for-tat logic to inflict a similar amount of harm to that of the initial transgression.[74] To be effective, Schelling suggests these reprisals be unambiguously connected to and in the same scale – or "currency" – as the rival's initial actions.[75] Nikita Khrushchev, for instance, threatened to strike U-2 spy plane bases in Norway and Pakistan in response to repeated violations of Soviet

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[70] Interview with U.S. Air Force Lieutenant Colonel (Reconnaissance Pilot/ISR Planner), Ramstein Air Base, Ramstein Air Base, Germany, 3 June 2016.

[71] Interview with Brigadier General, Former Director of IDF Strategic Planning Division , Tel Aviv, Israel, 31 August 2016.

[72] Interview with retired PLA Senior Colonel (former strategist at China's Academy of Military Science), 27 July 2016.

[73] Schelling, *Arms and Influence*.

[74] Robert M Axelrod, *The Evolution of Cooperation* (New York: Basic Books, 2006); McDermott, Lopez, and Hatemi, "Blunt Not the Heart, Enrage It," 72.

[75] Schelling, *Arms and Influence*, 146–47.

airspace by the aircraft.[76] In 2018 Israeli forces destroyed Syrian air defense sites after a Syrian surface to air missile shot down an Israeli F-16 fighter jet.[77]

As the perceived value of the asset attacked increases, actors may face pressure to escalate vertically or ratchet up the intensity of their response. Military and civilian leaders may believe more significant action is necessary to achieve an adequate tit-for-tat response. At the same time, the general public may demand more assertive forms of retaliation in the face of more costly losses.[78] In turn, policymakers may be driven to action by the fear of the political costs for failing to respond sufficiently. These responses, in turn, have potential to elicit a more significant counter-reaction that pushes interaction up the escalation ladder.

Another large body of research suggests responses to adversary activity also have emotional and psychological underpinnings. These studies are encapsulated by Neta Crawford's argument that emotions are "institutionalized in the structures and processes of world politics."[79] Emotions like anger serve as a "switch" that activates behavior that can lead decisionmakers to adopt non-instrumental behavior or take harsh action against adversaries.[80] Practitioners like Carl von Clausewitz also acknowledge that "primordial violence, hatred, and enmity…are to be

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[76] Schelling, 146–47.

[77] Amos Harel, "Israel Believes Syria Strikes Took out Nearly Half of Assad's Air Defenses," *Haaretz*, February 14, 2018, https://www.haaretz.com/middle-east-news/israel-took-out-half-of-syria-s-air-defenses-military-beliefs-1.5808981.

[78] Robert Jervis, "Political Implications of Loss Aversion," in *Avoiding Losses/Taking Risks: Prospect Theory and International Conflict*, ed. Barbara Farnham (Ann Arbor: University of Michigan Press, 1995), 24.

[79] Neta C. Crawford, "The Passion of World Politics: Propositions on Emotion and Emotional Relationships," *International Security* 24, no. 4 (2000): 116–56.

[80] Petersen, *Understanding Ethnic Violence*, 3; Jennifer S. Lerner et al., "Effects of Fear and Anger on Perceived Risks of Terrorism: A National Field Experiment," *Psychological Science* 14, no. 2 (March 1, 2003): 144–50.

regarded as a blind natural force" that play a central role in conflict.[81] The death or capture of personnel is likely to trigger greater feelings of loss and anger than the loss of a machine.

Attacks carried out by adversaries can generate emotions of anger or perceptions that the honor of a targeted group is at stake. The emotions may trigger a behavioral reaction aimed at avenging a loss or providing defense.[82] In addition, emotions may shape how actors interpret events and affect their decisions on the use of force.[83] Anger, for instance, can lead to harsher policies in response to a rival's actions.[84] Adversary actions may also be perceived as an affront to national honor – a challenge to prestige that triggers a "don't tread on me" mindset to defend one's interests and avenge violations.[85] Certain actions – including those that result in the loss of lives during crises – may be seen as particularly provocative and honor-infringing.[86] It follows that actions that trigger negative or protective emotional responses are likely to trigger responses that can lead to escalation.

Leaders frequently invoke the notion of state honor to justify escalatory behavior: President Johnson, for instance, characterized North Vietnam's alleged attack on naval vessels in the Tonkin

[81] Carl von Clausewitz, *On War* (Princeton, N.J.: Princeton University Press, 1989), 89.

[82] Harold D. Lasswell, *World Politics and Personal Insecurity* (New York: The Free Press, 1950); Petersen, *Understanding Ethnic Violence*.

[83] Jonathan Mercer, "Emotional Beliefs," *International Organization* 64, no. 1 (January 2010): 1–31; Jonathan Mercer, "Emotion and Strategy in the Korean War," *International Organization* 67, no. 2 (April 2013): 221–52.

[84] Lerner et al., "Effects of Fear and Anger on Perceived Risks of Terrorism."

[85] Barry O'Neill, *Honor, Symbols, and War* (Ann Arbor, MI: University of Michigan Press, 1999), 87.

[86] Todd H. Hall, "On Provocation: Outrage, International Relations, and the Franco–Prussian War," *Security Studies* 26, no. 1 (January 2017): 1–29; Hyun-Binn Cho, "Playing With Fire: Provocation, Crisis Escalation, and Inadvertent War" (Ph.D. Dissertation, University of Pennsylvania, 2018); Allan Dafoe, Sophia Hatz, and Baobao Zhang, "Coercion and Provocation," *Working Paper*, 2018.

Gulf as an attack on American honor.[87] Responding to these attacks can then be regarded as avenging a perceived threat to one's identity and standing. In extreme cases, the desire to defend honor and standing can lead states to pursue these goals at the expense of more instrumental objectives.[88] In other words, prestige and honor sometimes supplant material objectives as the ends of military operations.

Just as greater perceived losses trigger larger instrumentally-driven responses, they should also result in larger emotionally-driven reactions. Psychologists argue that the intensity of an actor's behavior is defined in part by the external events that elicit the behavior.[89] In other words, more offensive or damaging provocations evoke more intense reactions. When an affront is perceived as particularly grievous, actors may carry out emotion-driven acts of revenge that are disproportionate to the initial harm. This clearly presents a risk of further escalation.[90] Indeed, Tversky and Kahneman's seminal research on prospect theory finds that actors take riskier actions when faced with significant perceived losses than when seeking comparable gains.[91] Scholars applying prospect theory to international relations find that states are likely to initiate risky military escalation when responding to acts that are perceived as grievous affronts to national honor or reputation.[92] When actions are seen as less of an affront, actors may avoid recognizing the incident

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[87] O'Neill, *Honor, Symbols, and War*, 103.

[88] Richard Ned Lebow, *Why Nations Fight: Past and Future Motives for War* (New York: Cambridge University Press, 2010), 174; Kalevi J. Holsti, *Peace and War: Armed Conflicts and International Order, 1648-1989* (Cambridge: Cambridge University Press, 1991), 19.

[89] Nico H. Frijda, *The Emotions* (New York: Cambridge University Press, 1986), 34.

[90] McDermott, Lopez, and Hatemi, "Blunt Not the Heart, Enrage It," 78.

[91] A. Tversky and D. Kahneman, "The Framing of Decisions and the Psychology of Choice," *Science* 211, no. 4481 (January 30, 1981): 453–58.

[92] Robert Jervis, "Political Implications of Loss Aversion," in *Avoiding Losses/Taking Risks: Prospect Theory and International Conflict*, ed. Barbara Farnham (Ann Arbor: University of Michigan Press, 1995).

as a challenge and minimize their response, helping to deescalate the situation.[93] By removing friendly personnel from the front lines and by putting an asset with a lower unit cost on the front lines, the loss of a drone should be less likely to trigger the emotional and instrumental responses as an attack on a manned asset.

> ***Restrained Retaliation (H_2):*** *Actors will take more restrained retaliation after the loss of a drone to enemy activity than to the loss of a manned asset.*

The lower value attached to drones may not only restrain retaliation after they are lost to enemy action, but may also affect how actors use force against their rivals' drones. Since decisionmakers often practice mirror imaging, they may assume their rivals will respond in the same way following the loss of a drone.[94] If an actor anticipates its adversary will take a limited response to the downing of a remotely piloted aircraft, the actor may make the calculated decision to take more aggressive action against an intruding rival drone. In the minds of military decisionmakers, taking action against drones may provide a relatively low risk means to conduct strategic signaling or generate military effects. Attacking drones that have violated national airspace or territorial waters can eliminate a threat, signal displeasure with a rival's policies or operations, and provide an opportunity to seize a rival's equipment to obtain intelligence information or a physical bargaining chip – all with a perceived lower risk of adversary retaliation than interfering with a rival's manned assets. Indeed, taking aggressive action against drones, but not manned assets may demonstrate an actor's decision to not cross an escalatory threshold. This yields a third testable hypothesis:

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[93] O'Neill, *Honor, Symbols, and War*, 125.

[94] Jervis, *Perception and Misperception in International Politics*.

> ***Amplified Aggression (H_3):*** *Actors will take more aggressive action against remotely operated assets (drones) than against manned assets because they anticipate a less aggressive adversary reaction.*

It is worth noting that actors on the receiving end of drone missions might perceive an armed drone as more threatening than a reconnaissance drone. Armed aircraft possess the capability to carry out strikes, and therefore might be interpreted as more aggressive than their unarmed counterparts. Indeed, many military shows of force missions are conducted using aircraft like bombers and fighters, not unarmed reconnaissance assets.[95] As a result, states on the receiving end may be more prone to take escalatory actions against an armed drone than against an unarmed one. Yet, states on the receiving end of drone missions may still initiate escalatory action regardless of whether a drone is armed or unarmed. Military decisionmakers may be unable to distinguish armed from unarmed drones. Many remotely piloted aircraft are multiple-role platforms capable of conducting reconnaissance and strike missions – often simultaneously. While radars and other detection systems should be able to distinguish between manned and unmanned aircraft, they may be unable to distinguish whether an aircraft is armed or the purpose of its mission.[96] Over time, the distinction between armed and unarmed drones will likely become less salient as states acquire increasingly advanced multirole drones capable of conducting a range of missions.

Further, actors may not always take action against a rival's remotely operated assets. A broader set of international factors, domestic political conditions, and the preferences of leaders involved with each potential incident ultimately shape whether states will take aggressive,

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[95] Daniel Lamothe, "Pentagon's Latest, Fiery Show of Force against North Korea Includes F-35s and B-1B Bombers," *The Washington Post*, August 31, 2017.

[96] Air defense officials should be able to distinguish the signatures of different types of aircraft. For instance, the radar and electronic signature of a remotely piloted RQ-4 differs from that of the U-2 reconnaissance aircraft, a manned aircraft. Aircraft, like the U.S. Air Force's next generation bomber, that are optionally manned and can be operated with or without a pilot onboard complicates this identification process.

defensive measures. Holding all of these factors equal, however, actors will take more aggressive action against drones than manned platforms. The logic underlying the amplified aggression hypothesis should also apply beyond purely defensive actions. If actors believe that taking strikes on unmanned assets is unlikely to trigger a significant response, they may be willing to initiate aggressive action against these platforms in a variety of circumstances. For example, a state might target a rival's drones operating in international airspace or on the high seas – an act that would generally not be considered defensive under international law. A targeted state might, however, view this type of offensive attack as more threatening than a narrow defensive attack of a drone. Attacks on the drones in international airspace and waters may increase the risk of subsequent escalation, yet less than a similar attack on a manned asset.

Stabilizing Mechanism 2: Overcoming Information Asymmetries

International relations scholars widely agree that conflicts erupt when states disagree or misperceive their relative strength vis-à-vis a rival.[97] States initiate the use of force when they believe an adversary lacks the capability or will to put up a fight, or when they perceive the stakes involved to outweigh the expected costs of fighting. They come to negotiated settlements once actual expectations about the consequences of fighting are revealed – often through combat. In theory, states can avoid fighting altogether and proceed directly to a peaceful settlement if both sides know their rival's true capabilities and intentions. This, however, is far easier said than done. States have incentives to mask and misrepresent their willingness and ability to fight in order to protect their future bargaining position.[98]

[97] Geoffrey Blainey, *The Causes of War*, Third Edition (New York: Free Press, 1988), 122; Fearon, "Rationalist Explanations for War."

[98] Fearon, "Rationalist Explanations for War."

Technologies that help overcome information asymmetries concerning states' capabilities and resolve can enable escalation control in three primary ways: revealing that a potential rival has no hostile intent or capability; providing information that reveals the adversary has a military advantage, deterring action by the threat of denial; and by providing information that allows actors to target rivals in a more precise manner. Technology can therefore promote transparency in a way that *tempers and/or tailors* the use of force. However, at times transparency can generate incentives for the use of force, something I explain below.

Drones provide an excellent means of collecting information on a potential rival's capabilities and even its intentions. Platforms like the U.S. Air Force's RQ-4 Global Hawk high altitude remotely piloted aircraft can simultaneously collect geospatial intelligence (imagery that can pinpoint the disposition of forces and shed light on a rival's military capabilities) and signals intelligence (intercepts of communications and electronic emissions that can yield insight on a rival's plans and operations).[99] To be sure, states typically possess a host of intelligence collection capabilities to collect this sort of information including spies, satellites, and manned reconnaissance aircraft and ships.[100] Drones, however, can overcome several limitations associated with other intelligence collection systems.[101] For instance, drones may be able to operate below cloud cover that can prevent some satellites from gathering imagery of targets.[102] In addition, many

[99] U.S. Air Force, "RQ-4 Global Hawk Fact Sheet," AF.mil, October 27, 2014, http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/104516/rq-4-global-hawk.aspx.

[100] Mark M. Lowenthal, *Intelligence: From Secrets to Policy*, Seventh edition (Los Angeles, California: CQ Press, 2016).

[101] For discussion of intelligence planning and operations, see U.S. Department of Defense, *Joint Publication 2-01, Joint and National Intelligence Support to Military Operations* (Washington, D.C., 2017).

[102] The overflight of satellites over another country's sovereign territory is firmly solidified under customary international law so should involve less political risk than the penetration of a drone into another state's airspace – which constitutes a violation of international law. Satellites that collect electro-optical imagery are generally unable penetrate cloud cover.

drones can also loiter over and track targets for periods far longer than their manned counterparts or satellites. Unlike these "transient observers," which have difficulty monitoring and tacking targets, the persistence of drones allows decisionmakers to track mobile targets and military leaders or monitor facilities like missile sites or command and control centers for evidence of changes in operational status.[103]

More importantly, drones may allow for continued intelligence collection in high-risk areas. These high-risk areas are often precisely where the need to overcome information asymmetries is most important for helping to control escalation. High risk areas may be where the most important information about a state's capabilities and intentions are located, but also present the highest costs of entry due to the risk of hostile action.[104] Although adversaries might be more prone to shoot down a drone than a manned asset, intelligence collection need not be permanently degraded. While the downing of a drone may temporarily hamper or halt intelligence gathering, the option to restart drone operations may exist even after an adversary takes hostile action. This contrasts with attacks on manned platforms, which have historically led to the suspension of reconnaissance operations, attacks on drones do not involve the loss of friendly personnel.[105]

States may subsequently be more willing to continue drone reconnaissance missions after a shootdown. Indeed, some scholars have suggested that the lower costs associated with drone losses provide a "sustainability" that is absent after attacks on manned platforms.[106] While military

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[103] Biddle, *Military Power*, 54.

[104] I am grateful to Sherry Zaks for making this observation.

[105] The United States, for instance, halted reconnaissance overflights of the Soviet Union after the downing of the U-2 piloted by Francis Gary Powers. In contrast, the United States continued drone overflights of China despite suffering several aircraft losses.

[106] Amy Zegart, "Cheap Fights, Credible Threats: The Future of Armed Drones and Coercion," *Journal of Strategic Studies* Online First Look (February 2018): 1–41.

planners argue that the loss of a remotely piloted aircraft "isn't costless," they are often viewed as more expendable than manned ones.[107] The sustainability of intelligence gathering can also be increased by enhancing the survivability of drones in contested environments. The U.S. military, for instance, developed the RQ-170, a low-observable remotely piloted reconnaissance aircraft that was reportedly used to penetrate deep into well-defended Pakistani airspace during the Osama Bin Laden raid and to spy on Iran's nuclear program.[108]

If drones provide decisionmakers with intelligence that overcomes information asymmetries, they may help temper escalatory dynamics. On one hand, drones might reveal that a potential rival harbors no hostile intent or limited military capability. If a rival harbors no ill will or is not preparing for an attack, intelligence may lessen fears of aggression and eliminate the need for preemptive military action. This reasoning played a role in the Eisenhower administration's attempts to establish an Open Skies program during the height of the Cold War.[109] The program called for the United States and Soviet Union to overtly fly reconnaissance aircraft through each other's airspace as a transparency-promoting confidence building measure. The hope was that

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[107] Interview with U.S. Air Force Colonel (Former MQ-1 Squadron Commander), Ramstein Air Base, Germany, 1 June 2016; Interview with U.S. Air Force Lieutenant Colonel (Reconnaissance Pilot/ISR Planner), Ramstein Air Base, Germany, 3 June 2016.

[108] "RQ-170 Sentinel Fact Sheet" (U.S. Air Force, December 10, 2009), https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104547/rq-170-sentinel/; Greg Miller, "CIA Flew Stealth Drones into Pakistan to Monitor Bin Laden House," *The Washington Post*, May 17, 2011, https://www.washingtonpost.com/world/national-security/cia-flew-stealth-drones-into-pakistan-to-monitor-bin-laden-house/2011/05/13/AF5dW55G_story.html?utm_term=.6575f3aa3a3f; Ed Darack, "The Drone That Stalked Bin Laden," *Air & Space Magazine*, April 2016.

[109] Peter Jones, *Open Skies: Transparency, Confidence-Building, and the End of the Cold War* (Stanford, California: Stanford University Press, 2014), 9–18. Some scholars suggest that Open Skies was intended to contain and defeat the Soviet Union, rather than promoting transparency as a confidence-building mechanism, James J. Marquardt, "Transparency and Security Competition: Open Skies and America's Cold War Statecraft, 1948–1960," *Journal of Cold War Studies* 9, no. 1 (January 1, 2007): 55–87.

transparency would reduce information asymmetries between the rival superpowers and prevent surprise attacks.[110]

On the other hand, drone-gathered intelligence might reveal that an adversary is more capable than initially thought. This could result in what deterrence expert Glenn Snyder termed "deterrence by denial."[111] Under this logic, the revelation that a rival has greater relative military capabilities or will to fight changes the cost-benefit calculus for conflict. A potential attacker should be deterred from taking action if the defender can raise the cost of fighting to the point that victory cannot be achieved without suffering high costs.[112]

> ***Tempered Targeting (H_{4A}):*** *All else equal, states are more likely to deploy drones than inhabited assets on reconnaissance missions, providing information that reduces the likelihood of large-scale military operations.*

In some cases, drone-gathered intelligence might not temper conflict dynamics, but instead make targeting more tailored or precise. This assumes, however, that intelligence is analyzed accurately, something that rivals may try to make difficult through the use of denial and deception techniques. Although militaries have long had the ability to launch accurate strikes – using tools like precision guided munitions or special operations forces – drones have helped refine the targeting process. One of the key challenges of military operations is target acquisition.[113] Commanders must locate and track targets before striking them with munitions. This can be

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[110] The original Eisenhower era plan never materialized, but a similar program went into effect after the Cold War. See, Dan Lindley, "Cooperative Airborne Monitoring: Opening the Skies to Promote Peace, Protect the Environment, and Cope with Natural Disasters," *Contemporary Security Policy* 27, no. 2 (August 2006): 325–43.

[111] Horowitz, Kreps, and Fuhrmann, "Separating Fact from Fiction in the Debate over Drone Proliferation."

[112] Glenn H Snyder, "Deterrence by Denial and Punishment" (Princeton, N.J.: Woodrow Wilson School of Public and International Affairs, January 2, 1959), 3–8.

[113] Caitlin Talmadge, "Would China Go Nuclear? Assessing the Risk of Chinese Nuclear Escalation in a Conventional War with the United States," *International Security* 41, no. 4 (Spring 2017): 50–92.

difficult when state and non-state actors adopt what Stephen Biddle calls the "modern system" – an approach to warfighting that involves concealing and camouflaging troop movements and employing highly maneuverable forces.[114] Drones may help overcome this challenge. Coupling persistent, accurate intelligence with enhanced strike capabilities enables decisionmakers to use force more discriminately. More accurate intelligence can reduce the likelihood of flawed targeting that can result in unnecessary destruction. Or, it can help commanders employ their forces more efficiently and precisely. For instance, drones might be used as an alternative to a large ground operation to eliminate an adversary leader, or a mobile target.

> ***Tailored Targeting (H_{4B}):*** *All else equal, states are more likely to deploy drones than inhabited assets on reconnaissance missions, providing information that makes targeting more precise and discriminate.*

Remaining Restrained?

Although drones can enable more tailored targeting or allow for more restrained retaliation than attacks on manned assets, there are circumstances where drones may not have escalation ameliorating effects. Repeated attacks on drones, destruction of drone-related infrastructure that is tied to broader command and control networks, and drone-launched strikes that a targeted actor perceives as posing an existential threat may all lead to crisis escalation.

First, what happens when an adversary attacks multiple drones – either simultaneously or over time? Can these repeated attacks cross a threshold or ratchet up pressure that triggers a less restrained response? No actor enjoys losing military assets, regardless of whether they are inhabited or remotely operated. Even though losing a drone does not involve the loss of life and the associated political consequences, it is not costless and can leave an actor without the capacity to conduct military operations. Losing multiple drones can exacerbate these issues. Even so,

[114] Biddle, *Military Power*.

having multiple drone losses is still more conducive to a restrained response than the loss of multiple manned assets. Regardless of how many drones are lost, the number of killed or captured crew members remains at zero. Under the logic of restrained retaliation, actors will, at worst, adopt a tit-for-tat response to repeated drone shootdowns.[115] Demand for escalation may be further dampened as the length of time between incidents increases.

A second way that drones may contribute to escalation is by making it easier for states to carry out strikes on adversary targets. Unfortunately, the same type of transparency that helps to temper or tailor targeting may not always contribute to stability. As one leading scholar of transparency in international relations argues, "transparency is not an unmitigated good."[116] Another scholar suggests "information is good on average, but can be good, bad, or neutral in any particular instance."[117] Drone gathered intelligence might provide decisionmakers with information that leads them to initiate attacks they otherwise would not have. Intelligence, for instance, might reveal that an adversary has crossed a red line that triggers military action. Or, drones might collect intelligence that allows a state to launch preemptive strikes or to adopt a counter-force nuclear strategy. Launching a first strike or targeting a rival's nuclear arsenal demands vast amounts of intelligence: stationary and mobile targets must be located and tracked

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[115] Axelrod, *The Evolution of Cooperation*.

[116] Kristin M. Lord, *The Perils and Promise of Global Transparency: Why the Information Revolution May Not Lead to Security, Democracy, or Peace* (Albany, NY: SUNY Press, 2007), 3.

[117] Kenneth Schultz, "Domestic Political Competition and Transparency in International Crises: The Good, the Bad, and the Ugly," in *Power and Conflict in the Age of Transparency*, ed. Bernard I. Finel and Kristin M. Lord (New York: Palgrave, 2000), 61.

and command and control networks monitored.[118] Drones can play an important role in the intelligence infrastructure required to launch this type of destabilizing operation.[119]

Increasing the frequency of strikes can increase the number of instances in which a targeted state could take retaliatory action – complete with legal justification to use military force in self-defense. Attacks on a state's infrastructure or citizenry might spur public demands for retaliation – with little thought given to whether inhabited or remotely operated systems launched the strikes. Retaliation may be particularly likely if strikes cause significant civilian casualties or destroy critical infrastructure – like command and control nodes and leadership – that play a key role in national defense.[120]

A third way that drone operations can contribute to escalation is through inadvertent actions. Thus far, escalation has been treated as a strategic process that results from the calculated decisions of statesmen and military officials. History, however, tells us that chance events, misperception, and accidents often dictate whether a crisis escalates or fizzles out.[121] The Cold War was rife with unplanned events that could have – and sometimes did – set off escalatory spirals. At the height of the Cuban Missile Crisis, for instance, a direct confrontation between U.S. and Soviet forces almost erupted when Soviet fighter jets were dispatched to intercept a U.S. Air Force U-2 reconnaissance plane that had unintentionally penetrated deep into Soviet airspace

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[118] Long and Green, "Stalking the Secure Second Strike"; Lieber and Press, "The New Era of Counterforce"; Talmadge, "Would China Go Nuclear?"

[119] Long and Green, "Stalking the Secure Second Strike," 60–62.

[120] Targeting in modern operations often focuses on precisely these sorts of targets. Although a subject of academic debate, proponents of strategic airpower believe that striking centers of gravity such as military command facilities allows a state to quickly degrade a rival's warfighting capability without first having to confront fielded military forces. For more on this debate see, Pape, *Bombing to Win*.

[121] Scott D. Sagan, "The Perils of Proliferation: Organization Theory, Deterrence Theory, and the Spread of Nuclear Weapons," *International Security* 18, no. 4 (1994): 66–107; Scott D. Sagan, *The Limits of Safety* (Princeton, NJ: Princeton University Press, 1995).

during an air sampling mission.[122] Defense analysts have also expressed concern that attacks on dual-use military infrastructure – like communication satellites and military command and control facilities – that support both conventional and nuclear operations could be perceived as the start of a preemptive nuclear strike, even if a rival's intentions are more limited. This misperception could lead targeted states to initiate significant – and even potentially nuclear – retaliation in response.[123]

The nature and organization of drone operations raise similar concerns of inadvertent escalation. First, the purpose and intentions behind drone missions may be misperceived. Drones are capable of carrying out a variety of missions ranging from peacetime intelligence gathering to airstrikes in combat settings. Since states often assume the worst of their adversaries, leaders might assume that a rival's drone operations pose a more significant threat than they actually do.[124] As a result – and because of the lower perceived risk of escalation associated with targeting drones – military decisionmakers may be less cautious about ascribing hostile intent to their rival's drones, potentially leading them to take hostile action. In the worst case, decisionmakers could assume that a rival's drone operations signal the start of a broader offensive mission, triggering a destabilizing preemptive strike. Second, attacks on a drone system may be misperceived as more escalatory than the attacking state intended. Most remote warfighting technologies, like drones, are complex systems with several interconnected nodes. In the case of drones, for instance, this network includes not only a remotely piloted aircraft, but also a geographically distributed command facilities, intelligence analysis centers, and communications nodes. Striking one of these

[122] Michael Dobbs, *One Minute to Midnight: Kennedy, Khrushchev, and Castro on the Brink of Nuclear War* (New York: Vintage, 2009), 269–70.

[123] Posen, *Inadvertent Escalation*; James M. Acton, "Escalation through Entanglement: How the Vulnerability of Command-and-Control Systems Raises the Risks of an Inadvertent Nuclear War," *International Security* 43, no. 1 (August 1, 2018): 56–99.

[124] Jervis, *Perception and Misperception in International Politics*.

nodes might be viewed as a more significant attack that (unintentionally) crosses an escalation threshold, triggering a significant response from the rival. Similar risks, however, exist even without the introduction of remotely operated assets.[125]

The Multiple Actors Shaping Escalation Dynamics

As described earlier, weapons do not make war. Instead, decisions about the use of force are the result of choices made by civilian and military decisionmakers, who frequently take into account the preferences of the domestic public. For drones to increase the frequency with which military forces are deployed, but decrease the likelihood of broader escalation, members of all three groups must believe in the tenets that underpin technology-enabled escalation control theory. This does not mean that preferences of civilian decisionmakers, military leaders, and the public must be perfectly aligned. Indeed, disagreement over policy preferences can easily exist among members of each group. The theory, however, is based largely on the preference for reducing the risk of casualties and the cost of war – principles that should be broadly shared.[126]

One body of literature suggests that members of the public can influence the policies that government decisionmakers adopt – in both democratic and non-democratic settings.[127] Leaders are accountable to their supporters, and implementing policies that are incongruent with

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[125] Barry Posen, "The Security Dilemma and Ethnic Conflict," *Survival* 35, no. 1 (1993): 27–47; James M. Acton, "Escalation through Entanglement: How the Vulnerability of Command-and-Control Systems Raises the Risks of an Inadvertent Nuclear War," *International Security* 43, no. 1 (August 1, 2018): 56–99.

[126] A variety of studies show that military officers, civilian leaders, and members of the public often have different perceptions toward the use of force. See, Richard Betts, *Soldiers, Statesmen, and Cold War Crises*, Second Edition (New York: Columbia University Press, 1991); Eliot A. Cohen, *Supreme Command: Soldiers, Statesmen, and Leadership in Wartime* (New York: Anchor, 2003); Alex Mintz, Steven B. Redd, and Arnold Vedlitz, "Can We Generalize from Student Experiments to the Real World in Political Science, Military Affairs, and International Relations?," *The Journal of Conflict Resolution* 50, no. 5 (2006): 757–76.

[127] Ole Rudolf Holsti, *Public Opinion and American Foreign Policy* (Ann Arbor: University of Michigan Press, 1997); Reiter and Stam, *Democracies at War*; Weeks, *Dictators at War and Peace*; Sirin and Koch, "Dictators and Death"; Joshua Busby et al., "Multilateralism and the Use of Force: Experimental Evidence on the Views of Foreign Policy Elites," *Foreign Policy Analysis* Online First (March 2019).

constituent preferences can lead to political consequences: elected officials can be retrospectively punished by being voted out of office, while leaders in non-democratic settings can be sanctioned by the coalition that guarantees their grasp on power.[128] Foreign policy, in particular, appears to be an important issue area for the public in both democratic states[129] and autocratic ones.[130] Because of the importance of foreign policy to the selectorate, government leaders often enact policies that are congruent with public preferences.[131]

While some scholars have argued that governments are relatively impervious to constituent opinion, the actions of policymakers across time and space tell a different story.[132] Instead of ignoring the public, government officials appear to dedicate significant time and resources to monitoring the opinions of the average citizen. President George W. Bush established the White House Office of Strategic Initiatives to track public opinion polls, and President Donald Trump often appears responsive to the preferences of his political base.[133] Given the costs associated with monitoring public opinion and the ability of the domestic public to constrain policy

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[128] Morris P. Fiorina, *Retrospective Voting in American National Elections* (New Haven: Yale University Press, 1981); Bruce Bueno de Mesquita et al., "Political Institutions, Policy Choice and the Survival of Leaders," *British Journal of Political Science* 32, no. 4 (October 2002): 559–90; Weeks, "Autocratic Audience Costs"; Henk E. Goemans, Kristian Skrede Gleditsch, and Giacomo Chiozza, "Introducing Archigos: A Dataset of Political Leaders," *Journal of Peace Research* 46, no. 2 (March 2009): 269–83.

[129] John H. Aldrich, John L. Sullivan, and Eugene Borgida, "Foreign Affairs and Issue Voting: Do Presidential Candidates Waltz Before a Blind Audience?," *The American Political Science Review* 83, no. 1 (March 1989): 123–41.

[130] Jessica Chen Weiss, *Powerful Patriots: Nationalist Protest in China's Foreign Relations* (New York: Oxford University Press, 2014).

[131] Benjamin I. Page and Robert Y. Shapiro, "Effects of Public Opinion on Policy," *The American Political Science Review* 77, no. 1 (1983): 175–90.

[132] Christopher H. Achen and Larry M. Bartels, *Democracy for Realists: Why Elections Do Not Produce Responsive Government*, Revised ed. (Princeton, NJ: Princeton University Press, 2017).

[133] Kathryn Dunn Tenpas, "Words vs. Deeds: President George W. Bush and Polling," *Brookings Review* 21, no. 3 (2003), https://www.brookings.edu/articles/words-vs-deeds-president-george-w-bush-and-polling/.

implementation, leaders almost certainly at least consider constituent preferences prior to making major foreign policy decisions.

In addition to public opinion, military decisionmakers also shape state behavior. At the strategic level, military practitioners advise senior civilian leaders on national security policy and military operations. Their guidance, which is generally based on extensive operational expertise, can inform the policies that a state ultimately adopts. [134] Even at the tactical and operational levels, the actions of military officers can have far reaching consequences that shape strategic interaction between states. A decision by a mid-grade officer to shoot down an adversary aircraft, for instance, can lead to the ratcheting up of tensions between states. At the height of the Cuban Missile Crisis, for instance, a Soviet Air Defense officer deployed in Cuba made the decision to shoot down a U.S. Air Force U-2 reconnaissance aircraft overflying the island, without the approval of his superiors in Moscow. This decision, made by a single military officer operating at the tactical level, led to deliberations at the highest levels of the U.S. government on how to respond.[135] Although military officers are only one component of much broader national security bureaucracies, their advice and actions can have significant implications on the international security environment.

While decisionmakers and members of the public may hold preferences regarding when and how to employ drones and whether to take actions against a rival's drones, several factors shape if and how these preferences are translated into action. First, decisionmakers face political

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[134] Betts, *Soldiers, Statesmen, and Cold War Crises*; H. R. McMaster, *Dereliction of Duty: Johnson, McNamara, the Joint Chiefs of Staff, and the Lies That Led to Vietnam* (New York: Harper Perennial, 1998); Elizabeth N. Saunders, "Leaders, Advisers, and the Political Origins of Elite Support for War," *Journal of Conflict Resolution* 62, no. 10 (November 2018): 2118–49.

[135] Dobbs, *One Minute to Midnight*, 230–53.

constraints. Politically, decisionmakers may be concerned about the domestic political consequences of their actions. For instance, will deploying drones trigger domestic condemnation of a leader's foreign policies? The U.S. intelligence community's use of armed drones for targeted counter terrorism operations, for instance has garnered criticism from members of the American public. Decisionmakers may also be constrained by international norms and laws. For example, a nation might seek to launch drones into a rival's airspace or attack a competitor's drones in international airspace. Doing so, however, would – under most circumstances – violate international law and potentially generate adverse political consequences. This of course is not to say that decisionmakers will avoid initiating action using drones, but that they must consider the potential consequences before taking action. Indeed, as I explore in the conclusion chapter, drone use may redefine the international norms and customary international law related to the use of force.

Decisionmakers and the public must also contend with operational constraints. Although there may be broad support for taking military action, a state may simply lack the military capability to do so. For instance, a state might not have the air defense systems to down an intruding drone. Or, initiating military activity in a new theater might result in assets being shifted from another theater, potentially decreasing the state's warfighting capability in the original theater. States may also have difficulty obtaining basing or overflight access for drones and other remotely operated systems, in part because their operating characteristics are a new concept to partner nation officials.[136] Consequently, decisionmakers may be precluded from using drones, even if they seek to.

[136] Interview with US Air Force airspace planner, Ramstein Air Base, Germany, 2 June 2016.

SUMMARIZING TECHNOLOGY-ENABLED ESCALATION CONTROL

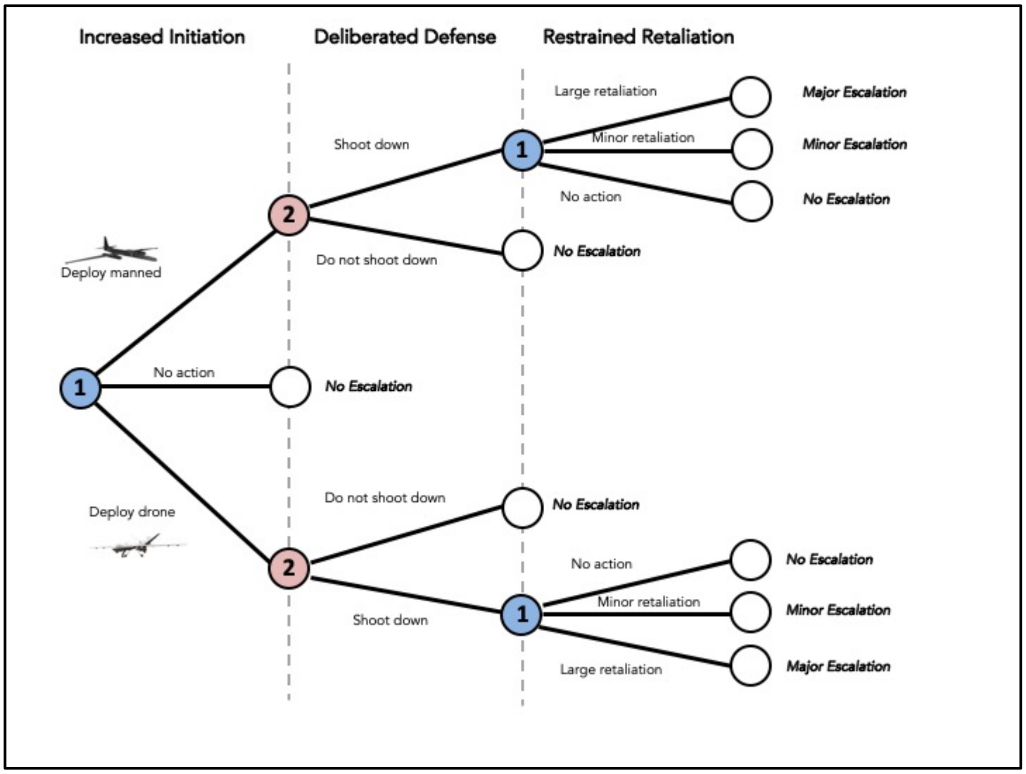
Table 2.1: Summary of Hypotheses

(H_1): Increased Initiation	*All else equal, states are more likely to launch military operations when drones can substitute for manned assets or ground forces.*
(H_2): Restrained Retaliation	*Actors will take more restrained retaliation after the loss of a drone to enemy activity than to the loss of a manned asset.*
(H_3): Amplified Aggression	*Actors will take more aggressive action against remotely operated assets (drones) than against manned assets because they anticipate a less aggressive adversary reaction.*
(H_{4A}): Tempered Targeting	*All else equal, states are more likely to deploy drones than inhabited assets on reconnaissance missions, providing information that reduces the likelihood of large-scale operations.*
(H_{4B}): Tailored Targeting	*All else equal, states are more likely to deploy drones than inhabited assets on reconnaissance missions, providing information that makes targeting more precise and discriminate.*

I summarize key elements of technology-enabled escalation control theory in Figure 1. The decision tree captures the increased initiation, amplified aggression, and restrained retaliation hypotheses as decision points – or nodes – in a multi-stage game featuring inhabited and remotely piloted aircraft.[137] It illustrates that the availability of drones expands a leader's policy menu, increases the likelihood that a state will deploy military forces, and reduces the likelihood of escalation relative to the deployment of manned platforms. Drones make it easier for leaders to initiate crises, increasing the likelihood that they launch military operations in cases they would not have in the absence of drones. At the same time, escalation should be less likely conditional on the deployment of a drone rather than a manned asset.

[137] I am grateful to Rex Brynen for using a similar game tree to describe an earlier iteration of this project. See, https://paxsims.wordpress.com/2019/01/11/lin-greenberg-drones-escalation-and-experimental-wargames/.

Figure 2.1: Technology-Enabled Escalation Control as a Decision Tree



At the first decision node, State 1 decides whether to launch an operation. Decisionmakers select from an increased menu of policy options that includes taking no action, deploying a manned aircraft, or deploying a remotely piloted aircraft. Under the *increased initiation* logic, I suggest that on this notional mission, leaders will be more likely to deploy a drone than a manned aircraft or taking no action. If State 1 chooses not to deploy an asset, the game ends with no escalation. If, however, State 1 launches a manned aircraft or drone, State 2 must then decide how to respond.

When confronted with a potentially threatening aircraft, State 2 selects from a set of options that ranges from doing nothing to shooting down the aircraft. I simplify the strategy set in the stylized game to include only shooting down the aircraft and not shooting down the aircraft. According to the *amplified aggression* logic, there is a higher probability an adversary will shoot down a drone than a manned asset. If State 2 chooses not to down the aircraft, the game ends with no further escalation. If, however, State 2 downs the aircraft, State 1 must then decide how to respond.

In response to an attack on a drone, State 1 can then take a variety of responses. I simplify those response strategies into three categories: large retaliation, minor retaliation, or no action. If State 1 does not respond to the shootdown, the game ends with no further escalation. Yet large or minor retaliation can lead to major or minor escalation, respectively. According to the *restrained retaliation* logic, states are more likely to take large acts of retaliation than minor retaliation or no action when a manned asset is lost to enemy activity. In comparison, decisionmakers are more likely to take no action or minor retaliation than large retaliation in response to the shootdown of a drone. The stylized game illustrates how drones can affect escalation dynamics. In an actual contingency, several factors – including the threat environment and the risk tolerance of particular decisionmakers – may shape the probabilities with which these decisions play out. In the next chapter, I introduce a multi-method research design to test the theory, and then present the empirical findings in chapters 4 through 7.

Chapter 3

Research Design

Studying the effect of new technology on interstate relations is a challenging endeavor, chiefly because the data on emerging military systems is scant. Because of their relative newness, emerging technologies have a limited operational history. Moreover, real world data that do exist often remain classified and hidden from researchers. In other words, the shorter operational history of emerging systems simply provides fewer cases to observe and analyze, and much of the documentary evidence associated with these systems remains locked in secret networks or archives. Indeed, militaries have incentives to mask information about their newest or most sensitive technologies to maintain an edge over rivals. As a result, research on emerging military technologies often abstracts from a limited number of cases, making it difficult to develop more generalizable inferences.

Relying solely on observations of real-world deployments can therefore pose several challenges to research. First, when states publicize details on the development and employment of these systems, they often do so in a carefully calculated manner. States, for instance, may not release information about the operational failures or combat losses of these systems. This selective release of information can leave researchers with incomplete information with which to make assessments.[138] Second, observational evidence does not allow researchers to observe the

[138] The United States Government, for instance, kept information about its nuclear submarine and stealth aircraft programs under tight wraps for decades. Scholars interested in studying how these systems affected military operations, battlefield outcomes, and decision-making were hard pressed to do so until information about was declassified. For examples of this sort of work see Jasper Welch, "Assessing the Value of Stealthy Aircraft and Cruise Missiles," *International Security* 14, no. 2 (1989): 47–63; Sherry Sontag, Christopher Drew, and Annette

counterfactual condition where the new technology is not present in a given instance. More formally, researchers face the fundamental problem of causal inference: they cannot see how a specific event or crisis plays out both with and without the new technology.[139] Experimental approaches – in which researchers aim to simulate, or exploit, decision settings while varying the presence of a variable of interest – can overcome the fundamental problem of causal inference. However, experiments often prompt concerns about the external validity of their findings.

To overcome these research challenges and to provide a richer and more theoretically driven analysis to test technology-enabled escalation control theory, I employ a mixed methods research design that features three distinct methodological approaches: original survey experiments, experimental manipulations embedded in wargames played by military professionals, and case studies of U.S. drone use during the Cold War and Israel's use of drones from 1967 to the present.[140] The survey experiments and wargames generate data intended to overcome the scarce publicly available data about situations where drone use is considered, albeit in a simulated operating environment. To move beyond hypothetical scenarios in the experimental components of the research design, the case studies draw from more than 80 interviews of national security practitioners and policymakers, together with archival materials – including some

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Lawrence Drew, *Blind Man's Bluff: The Untold Story Of American Submarine Espionage* (New York: PublicAffairs, 1998).

[139] For more on the potential outcomes framework and the fundamental problem of causal inference, see Paul W. Holland, "Statistics and Causal Inference," *Journal of the American Statistical Association* 81, no. 396 (1986): 945–60; Donald B. Rubin, "Causal Inference Using Potential Outcomes," *Journal of the American Statistical Association* 100, no. 469 (March 2005): 322–31.

[140] For discussion of multi-methods research approaches see, David Collier and Colin Elman, "Qualitative and Multimethod Research: Organizations, Publications, and Reflections on Integration," in *The Oxford Handbook on Political Methodology* (New York: Oxford University Press, 2010), 779–95; Jeb Barnes and Nicholas Weller, "Case Studies and Analytic Transparency in Causal-Oriented Mixed-Methods Research," *PS: Political Science & Politics* 50, no. 4 (October 2017): 1019–22.

declassified specifically for this project, and analysis of media reports and works of historians to provide the broader context needed for robust qualitative theory testing.

These three components of the research design are important for two reasons. First, each methodological approach probes whether and how drones influence the preferences of different actors toward escalation. Second, the different approaches produce different types of data, yielding a more complete understanding of the effect of drones on escalation dynamics and stability. Survey experiments fielded on public samples in the United States and expert American military samples allow for precise measurement of the causal effect of drones on the escalation preferences of the general population and military decisionmakers. The wargames capture interaction between American military professionals and generate rich qualitative data that shed light on the mechanisms underlying technology-enabled escalation control – data that is not produced when respondents complete surveys fielded via the internet. The case studies enable analysis of elite decision-making by civilian and military leaders in a real world setting.

By triangulating data from each component of the multi-dimensional research design, I layer quantitative and qualitative data that allow me to identify both the effect of drones on escalation dynamics and the mechanisms that shape these effects.[141] The remainder of this chapter describes the rationale and implementation of each element of the research design and discusses the trade-offs associated with each methodological approach.

EXPERIMENTAL APPROACHES

As a first cut at testing technology-enabled escalation control theory, I use a variety of original experiments. Experimental approaches, which have become increasingly common in

[141] On triangulation see, Sidney Tarrow, "Bridging the Quantitative-Qualitative Divide in Political Science," *The American Political Science Review* 89, no. 2 (1995): 473–74.

international relations research, are valuable in that they allow researchers to precisely control the variables to which subjects are exposed.[142] Researchers can subsequently measure the effects of these variables on specific outcomes of interest. So long as experimental subjects are randomly assigned to control and treatment conditions that are identical other than presence or absence of treatment, the population of each of the groups is, in expectation, identical. As a result, any differences in the outcomes that exist between treatment and control groups can be attributed solely to the researcher's manipulation of treatment. In other words, experiments overcome the fundamental problem of causal inference described earlier and allow researchers to measure the average treatment effect of a variable of interest. This precise causal inference enables more effective theory testing, particularly in situations where observational data is scarce or unavailable.[143]

In chapters four and five I use both survey experiments and experimental manipulations embedded in military wargames to test technology-enabled escalation control. The survey experiments ask respondents for their opinions on various crisis scenarios – including the hostile shootdown of a friendly reconnaissance aircraft, the initial use of force against a rival, and the penetration of friendly airspace by a rival's attack aircraft. In these experiments, I randomly vary whether drones or manned assets are involved. Fielding the experiments on both expert and public

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[142] Some well known examples of experimental research in international relations are, Michael Tomz, "Domestic Audience Costs in International Relations: An Experimental Approach," *International Organization* 61, no. 4 (2007): 821–40; Joshua D. Kertzer, *Resolve in International Politics* (Princeton, NJ: Princeton University Press, 2016); Michaela Mattes and Jessica L. P. Weeks, "Hawks, Doves, and Peace: An Experimental Approach," *American Journal of Political Science* 63, no. 1 (2019): 53–66.

[143] For a more in-depth discussion of experimental approaches in political science, see: Rebecca B. Morton and Kenneth C. Williams, "Experimentation in Political Science," in *The Oxford Handbook of Political Methodology*, ed. Janet M. Box-Steffensmeier, Henry E. Brady, and David Collier, 1st Ed. (Oxford: Oxford University Press, 2010), 339–56; Alan S Gerber and Donald P Green, *Field Experiments: Design, Analysis, and Interpretation* (New York: W. W. Norton, 2012).

samples allows me to compare how drones affect preferences on escalation and the use of force among different actors within a state – specifically military officials and the public.

Because survey experiments are imperfect representations of reality, I design and field a series of wargames that feature interstate crises similar to those in the survey experiments. Like the survey instrument, I vary whether wargaming teams are exposed to crises featuring drones or manned aircraft. The wargames, however, allow for interaction between national security practitioners in a way not possible with a computer delivered survey, shedding light on group dynamics. While wargames do not fully capture reality, they help to overcome some of the limitations of survey experimental research and provide insight into crisis decision-making.

Survey Experiments

Examining how drones shape the individual level preferences of the public and military decisionmakers toward the use of force is an important step in understanding how these systems affect the likelihood of conflict onset and escalation. Given that the intent of this project is to understand how technology affects *state* behavior, why begin empirical analysis and hypothesis testing at the micro level? First, government policies are informed – at least in part – by public opinion, which represents an aggregation of individual level preferences.[144] Leaders who hope to maintain support of their constituents may choose whether to use and escalate force in a way that aligns with their constituents' preferences. Because of this, researchers should care about whether drones shape how individuals perceive the conditions under which military action or escalation is warranted.

[144] The degree to which public opinion drives policy is a matter of scholarly debate. One proponent of the argument that public opinion matters is Holsti, *Public Opinion and American Foreign Policy*.

Second, individual level beliefs and experiences can shape the decisions of national security practitioners. Indeed, a growing number of studies argue that elites make decisions based, in part, on their individual level biases and experiences.[145] Third, free response questions in experiments with a unit of analysis at the individual level allow researchers to collect data on the mechanisms that underlie policy preferences. In other words, why do participants hold the views they espouse? Fielding the survey instrument on different segments of the population and in multiple states allows for comparison of these individual-level mechanisms across the civilian military divide and in different national contexts.

While scholars have adopted a range of experimental techniques including experiments held in laboratories, in field settings, and those that result from naturally occurring randomization, recent international relations projects have relied largely on experiments embedded within surveys.[146] In a typical survey experiment, respondents are first randomly assigned to experimental conditions. They are then presented with a vignette; these scenarios are near-identical across treatment conditions, however, researchers manipulate variables of interest between each group. After reading the vignette, respondents are asked for their opinions and preferences related to the scenario, allowing researchers to measure the causal effect of manipulating variables of interest. Most surveys also collect additional data on respondent characteristics, soliciting information on covariates such as age, gender, race, income, education levels, or political views. These data allow researchers to study heterogeneous treatment effects – variation in the effect of a variable of

[145] Michael C. Horowitz, Allan C. Stam, and Cali M. Ellis, *Why Leaders Fight* (New York: Cambridge University Press, 2015); Michael C. Horowitz and Matthew Fuhrmann, "Studying Leaders and Military Conflict: Conceptual Framework and Research Agenda," *Journal of Conflict Resolution* 62, no. 10 (November 2018): 2072–86; Saunders, "Leaders, Advisers, and the Political Origins of Elite Support for War"; Cathy Xuanxuan Wu and Scott Wolford, "Leaders, States, and Reputations," *Journal of Conflict Resolution* 62, no. 10 (November 1, 2018): 2087–2117.

[146] For an overview of experimental research in international relations, see Susan D. Hyde, "Experiments in International Relations: Lab, Survey, and Field," *Annual Review of Political Science* 18, no. 1 (2015): 403–24.

interest given respondent characteristics.[147] This analysis enables more nuanced assessments of the conditions under which treatments have the greatest effect on outcomes of interest.

Survey experiments are especially useful in international relations research where manipulating the factors associated with war and peace is both unethical and impractical. Instead of engineering conflicts between states, researchers field surveys with embedded experiments that ask questions about hypothetical crises, wars, or foreign policies to respondents recruited by polling firms or online services. Although highly practical, these experiments are not without limitations. Most significantly, scholars have questioned the external validity of findings from survey experiments, challenging whether inferences drawn in experimental settings hold true in the real world. Participants in experimental samples may behave differently than the broader public either because they are not a representative sample of the population, or because survey experiments simply do not come close to simulating an actual crisis situation.[148]

Despite these limitations, survey experiments are a useful tool for assessing the effect of military technology on the likelihood of conflict onset and escalation. Experimental data helps substitute for limited observational data. Most existing studies draw primarily from anecdotal observations, making it difficult to rigorously assess whether and how technologies like drones shape a state's propensity to conduct or escalate military operations.[149] Further, most public opinion data on drones and the use of force focus on their employment in contentious counter-terrorism operations in which armed drones are used to target suspected terrorists.[150] Use of drones

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[147] Gerber and Green, *Field Experiments*, 289–317.

[148] Jack Snyder and Erica Borghard, "The Cost of Empty Threats: A Penny, Not a Pound," *The American Political Science Review* 105, no. 3 (August 2011): 437–56; Hyde, "Experiments in International Relations," 407.

[149] Horowitz, Kreps, and Fuhrmann, "Separating Fact from Fiction in the Debate over Drone Proliferation."

[150] For a summary of public opinion polling toward drone strikes see, Sarah Kreps, "Flying under the Radar: A Study of Public Attitudes towards Unmanned Aerial Vehicles," *Research & Politics* 1, no. 1 (April 1, 2014): 4–7;

in this context involves a complex set of moral, practical, and legal issues that makes it difficult to assess support for drones in other political or operational contexts. Survey experiments permit researchers to create the environments in which they seek to assess drone use.

Survey experiments also have several analytic benefits. First, survey experiments in international relations are grounded in the plausible assumption that experimental subjects will apply conceptual and cognitive processes in a manner similar to non-experimental, real world actors.[151] In other words, researchers can still gain valuable insights into respondent preferences toward the use of force from survey experiments. In particular, respondents in expert samples may express opinions toward the use of force that mirror the preferences that would shape their decision-making during actual crises. Second, the individual level responses gathered during the survey experiments allow me to assess the alignment of preferences between respondents from different backgrounds and countries. This enables me to examine whether the preferences of military personnel and the general public toward the use of force are congruent, and to test the generalizability of technology-enabled escalation control beyond the United States. Finally, an experimental approach allows me to solicit individual level micro-foundations – factors that "explain outcomes at the aggregate level via dynamics at a lower level" – to more satisfyingly examine *why* drones affect preferences toward escalation and the use of force.[152]

For studies that examine public preferences regarding drone use in contexts other than counterinsurgency and counter-terrorism, see James Igoe Walsh and Marcus Schulzke, *The Ethics of Drone Strikes: Does Reducing the Cost of Conflict Encourage War?* (Carlisle Barracks, PA: United States Army War College Press, 2015), http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubID=1289; Jacquelyn Schneider and Julia Macdonald, *U.S. Public Support for Drone Strikes: When Do Americans Prefer Unmanned over Manned Platforms* (Washington, D.C.: Center for New American Security, 2016).

[151] Thomas C. Schelling, "Experimental Games and Bargaining Theory," *World Politics* 14, no. 1 (1961): 55; Matthew S. Levendusky and Michael C. Horowitz, "When Backing Down Is the Right Decision: Partisanship, New Information, and Audience Costs," *The Journal of Politics* 74, no. 2 (2012): 328.

[152] Joshua D. Kertzer, "Microfoundations in International Relations," *Conflict Management and Peace Science* 34, no. 1 (January 1, 2017): 83.

Survey Design and Implementation

To test technology-enabled escalation control theory, I field four separate experiments on respondents recruited using Amazon's Mechanical Turk (MTurk) online labor market and three experiments on an expert sample of U.S. military officers. I also field a non-experimental scenario-based vignette on the military sample. The design of each experiment – which I describe in greater detail below – varies whether remote warfighting technologies or manned forces are employed, enabling me to identify the causal effect of remote systems on preferences toward the use of force**.**

The first and second public experiments assess whether the availability of drones affects public support for the initial deployment of military forces. The experiments describe a scenario in which the United States might be asked to deploy military force against a rival state, and ask respondents whether they would support such a mission. The third and fourth experiments examine whether the use of remote warfighting technologies affects public preferences toward military escalation. In the third experiment, respondents are presented with the shootdown of a friendly military aircraft. Respondents in the fourth experiment are asked how they would respond to the penetration of an enemy aircraft into friendly airspace.[153] The military scenarios are similar, although I also field a non-experimental survey question that asks participants to select either a manned or remotely piloted aircraft to conduct a potentially high-risk mission. I solicit two types of data in both the public and military samples. First, I solicit preferences toward military action using a Likert scale. Second, I use free response questions to identify the reasons underlying respondent preferences. These data allow me probe the *increased initiation*, *amplified aggression*, and *restrained retaliation* hypotheses outlined in the previous chapter.

[153] To prevent priming, the survey software randomizes the order in which respondents receive the experimental vignettes.

The scenarios are intended to be realistic and represent events that have played out in the post-Cold War era: strikes on a rival's military facilities, the shootdown of a friendly reconnaissance aircraft, and responding to the penetration of a hostile aircraft into friendly airspace. Although the average respondent in the public samples may not have spent much time considering these sorts of events prior to exposure to the survey instrument, the scenarios are highly plausible. To provide further specificity and context to respondents, each vignette includes details about the circumstances surrounding the hypothetical crisis, the type of U.S. military forces involved, and information about the hypothetical rival. The vignettes, however, do not specifically name the rival country. Although this would enhance the context specificity of the scenario, it also risks introducing confounding variables if respondents express preferences toward the use of force based on preconceived notions and biases of a specific state or government rather than solely on the specific variables of interest. It is impossible, however, to entirely eliminate the possibility that respondents will assume that the fictional rival represents a specific real world actor.

The survey experiments involving public samples were fielded in August 2017 and October 2018 on three groups. During the primary fielding (August 2017), the survey instrument was fielded on 1,609 adults from across the United States. I fielded a set of follow-up experiments involving public samples in October 2018 on 300 adults from the United States. Respondents were recruited using Amazon Mechanical Turk (MTurk) and randomly assigned into treatment groups using Qualtrics, the software platform used to implement the survey. Social scientists have increasingly turned to online convenience samples recruited through MTurk as a means of gathering data more quickly and inexpensively than traditional survey methods. While more representative than traditional convenience samples (like university undergraduates), MTurk samples generally lack the representativeness of national probability samples.[154] The primary U.S. MTurk sample for this experiment was relatively similar to a national sample, but underrepresented women, blacks, and Hispanics, overrepresented Asians, was more educated, less wealthy, and unsurprisingly, overrepresented younger Americans.[155]

Although respondents from MTurk are less representative than national probability samples, their distribution throughout the United States is roughly representative and their urban versus rural distribution is similar to a nationally stratified sample.[156] Recent studies have used subjects recruited with MTurk in the United States to replicate results from several social science experiments on risk perception, and obtained results similar to those from nationally-representative samples.[157] These findings suggest that cognitive processes of MTurk respondents – at least within the United States – are similar to those of the broader population. Because of this, MTurk samples have been used to conduct several recent international relations experiments.[158]

The expert sample consists of 98 commissioned U.S. military officers and defense department civilians. Respondents include mid and senior grade officers attending professional military education. To be sure, the sample is not fully representative of the Pentagon's officer

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[154] Adam J. Berinsky, Gregory A. Huber, and Gabriel S. Lenz, "Evaluating Online Labor Markets for Experimental Research: Amazon.com's Mechanical Turk," *Political Analysis* 20, no. 3 (July 1, 2012): 351–68; Joseph K. Goodman, Cynthia E. Cryder, and Amar Cheema, "Data Collection in a Flat World: The Strengths and Weaknesses of Mechanical Turk Samples," *Journal of Behavioral Decision Making* 26, no. 3 (July 1, 2013): 213–24.

[155] Appendix G includes a comparison of the experimental U.S. public sample to a nationally representative sample.

[156] Berinsky, Huber, and Lenz, "Evaluating Online Labor Markets for Experimental Research"; Connor Huff and Dustin Tingley, "'Who Are These People?' Evaluating the Demographic Characteristics and Political Preferences of MTurk Survey Respondents," *Research & Politics* 2, no. 3 (September 1, 2015).

[157] Berinsky, Huber, and Lenz, "Evaluating Online Labor Markets for Experimental Research."

[158] Stephen Chaudoin, "Promises or Policies? An Experimental Analysis of International Agreements and Audience Reactions," *International Organization* 68, no. 1 (January 2014): 235–56; Jack S. Levy et al., "Backing Out or Backing In? Commitment and Consistency in Audience Costs Theory," *American Journal of Political Science* 59, no. 4 (2015): 988–1001.

corps. Because I recruited participants through the Air Force's Air Command and Staff College (ACSC) and Air War College (AWC), the sample overrepresents Air Force officers and officers selected for intermediate or senior professional military education (PME). On one hand, this may raise questions of the external validity of findings. Past studies have shown that officers from different branches exhibit varying levels of hawkishness.[159] Air Force officers may, therefore, hold different preferences toward escalation than officers from the other services.

This overrepresentation of Air Force officers, however, is not necessarily problematic. First, Air Force officers are most likely to face crises involving remotely piloted aircraft like those put forth in the survey instrument. Second, PME graduates are likely to be the officers who would be charged with making decisions if the events in the experimental vignettes played out in the real world. In residence PME schools like ACSC and AWC are selectively manned programs that only a fraction of the total officer force attends.[160] Officers who graduate from intermediate and senior PME are then generally selected for more advanced command, leadership, and planning roles, meaning that the respondents in the experimental sample are likely the officers who would be in critical decision-making roles during an actual contingency. To be sure, these practitioners would likely be constrained by rules of engagement and policies enacted by more senior military officers and civilian officials. This limits how much we can abstract from the survey findings.

Experimental Wargames: Wargames as a Research Tool

While the survey experiments allow for precise causal inference, survey instruments force subjects to make decisions without interacting with other national security practitioners, to choose

[159] Betts, *Soldiers, Statesmen, and Cold War Crises*, 239–47.

[160] In 2018, for instance, the selection rate for in-residence senior developmental education (Air War College) was approximately 10-percent. E-mail exchange with Air Force officer, 21 January 2019.

from a finite set of strategies, and do not simulate the stressors of contingency operations planning. To create a more realistic testing ground for my argument, I employ a research method that has not been widely employed in the social sciences – experimental manipulations embedded in military wargames.[161] Wargames are "simulation[s] of selected aspects of a military operation…[that] provide decision making experience, or decision making information that is applicable to real world situations" without the risk of real-world consequences if things go awry.[162] Despite the negligible costs of losing a simulated war, participants generally take wargames seriously as players are generally national security professionals who may one day participate in real world operations that closely resemble those they previously wargamed. To be sure, the negligible costs of "losing" a wargame may lead participants to accept more risk than during an actual contingency. Yet, participants often draw from the same assumptions and experiences during both wargames and real world operations. Indeed, one Prussian Chief of General Staff touting the virtues of wargaming exclaimed, "It's not a game at all, it's a training for

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[161] The U.S. military has conducted wargames where "two or more versions are run allowing comparison between games." For more on these structured comparisons see, Elizabeth Bartels, "Games as Structured Comparisons," Conference Paper presented at International Stuides Association Conference 2018, San Francisco, CA, 7-8. Some political scientists have relied on wargames, but they often draw from convenience samples or do not involve face-to-face interaction between participants. For a study that fields wargames on a convenience sample of university students, see Dominic D.P Johnson et al., "Overconfidence in Wargames: Experimental Evidence on Expectations, Aggression, Gender and Testosterone," *Proceedings of the Royal Society: Biological Sciences* 273, no. 1600 (October 7, 2006): 2513–20. For a study that involves exposing military officers to a computer-based experiment, see Alex Mintz, Steven B. Redd, and Arnold Vedlitz, "Can We Generalize from Student Experiments to the Real World in Political Science, Military Affairs, and International Relations?," *The Journal of Conflict Resolution* 50, no. 5 (2006): 757–76.

[162] Peter P. Perla, *The Art of Wargaming: A Guide for Professionals and Hobbyists* (Annapolis, MD: US Naval Institute Press, 1990), 7. Despite their name, wargames simulate not only combat operations but a range of peacetime and crisis scenarios. Contemporary wargaming encompasses a range of activities that span from hobbyist games to complex computerized simulations and political-military wargames that involve hundreds of senior civilian and uniformed decisionmakers, each with a specific training or planning purpose. Political-military wargames allow civilian and uniformed decisionmakers to work through strategic issues such as theater-level conflicts, tabletop exercises provide leaders an opportunity to rehearse crisis management and interagency coordination, while tactical wargames enhance the proficiency of military forces in handling specific contingencies.

war."[163] Since wargames require participants to employ many of the same thought processes and decision-making criteria as actual contingencies, they represent an important – and thus far underused tool – in the study of international relations.

Drawing from best practices of experimental research, I compare a set of nearly identical, simultaneous wargames – a set of control games in which a variable of interest does not appear, and a set of treatment games in which it does. Because these wargames vary only the factor of interest and hold constant all other factors like the scenario, type of participants, and timing of the games, they help isolate the effect of the factor of interest. More traditional, "non-experimental" games often fail to hold these potentially confounding variables constant, meaning that decision-making might be influenced by environmental factors or considerations other than the factor of interest. In some cases, traditional wargames are repeated on an iterative basis with the introduction of modified scenarios that feature different weapon systems or threat conditions. This approach, however, does not allow researchers to effectively study the effect of changing conditions because participants and the real-world strategic environment can change considerably between wargame iterations. To be sure, controlling for certain environmental and participant factors in wargames can be difficult, making it difficult to fully rule out the effects of covariates.[164] Running multiple simultaneous "control" and "treatment" wargames can, however, identify trends in decision-making behavior.

Just as wargames allow militaries to evaluate strategy and tactics, they also offer researchers an opportunity to explore questions on decision-making, international security and

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[163] Garry Brewer and Martin Shubik, *The War Game: A Critique of Military Problem Solving* (Cambridge, MA: Harvard University Press, 1979), 45.

[164] Elizabeth Bartels, "Games as Structured Comparisons: A Discussion of Methods" (International Studies Association Conference, San Francisco, CA, 2018).

foreign policy. Three characteristics make wargames an attractive data generating process. First, wargames enable significant researcher control over hypothetical crisis scenarios. Wargame designers manipulate the political or military circumstances of the crisis that participants face – something impossible to do in the real world for obvious practical and ethical reasons. [165] Wargames also typically offer far more detailed information than other approaches such as survey experiments, which often provide only minimal description of crisis conditions. Manipulating these details allows researchers to study how specific factors – such as variation in weapons technology or adversary actions – shape decision-making.

Second, wargames account for some common validity concerns associated with experimental social science research. International relations scholars often recruit easily accessible convenience samples, such as university students, who are unlikely to behave in the same way as actual military and civilian leaders. [166] In contrast, wargame participants generally have significant technical expertise with the role they are asked to assume. During wargames, players can draw from the same type of expertise and background that they would apply during an actual contingency. Wargames also place these participants in collaborative environments that better mirror real world decision-making settings than survey experiments, where participation is normally at the individual level. This interaction and the excitement once absorbed in the scenario sparks the development of plans and policy decisions. Thomas Schelling, an enthusiastic advocate of wargaming, once argued that collaborative nature of games is valuable because, "one thing a

[165] North Atlantic Treaty Organization (NATO), *BI-SC Collective Training and Exercise Directive 075-003* (Belgium, 2013); UK Ministry of Defence, *Wargaming Handbook* (Swindon, UK: Development, Concepts, and Doctrine Centre, 2017), 7.

[166] Mintz, Redd, and Vedlitz, "Can We Generalize from Student Experiments to the Real World in Political Science, Military Affairs, and International Relations?"; Hyde, "Experiments in International Relations," 407.

person cannot do, no matter how rigorous his analysis or heroic his imagination, is to draw up a list of things that would never occur to him."[167] Finally, unlike most survey experiments, the wargames do not provide a limited set of options. Instead, participants can design their own response options. To be sure, these wargames still involve a convenience sample in conditions that do not perfectly mirror reality, but they still offer a better representation of the kinds of people who would offering military guidance during an actual crisis.

Third, wargames generate two types of data: a set of final outcomes and a rich narrative that reveals how participants settle on decisions. The final decisions of wargaming teams, which take the form of specific military plans, reveal how leaders might act in a given situation. Indeed, wargames often foretell how actual operations unfold. For instance, the German blitzkrieg campaigns that Germany launched in Europe and Africa were first played out in wargames during the interwar period.[168] Similarly, U.S. anti-submarine operations during World War Two closely mirrored those wargamed years earlier at the Naval War College.[169] In addition to the outcomes, the discussions and debates between wargame participants helps identify the assumptions and logics used in developing decisions. This provides detailed narratives that allow researchers to trace decision-making and to more closely probe the mechanisms that shape decisions.

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[167] Thomas C. Schelling, "The Role of Wargames and Exercises," in *Managing Nuclear Operations*, ed. Ashton Carter, John D. Steinburner, and Charles A. Zraket (Washington, D.C: Brookings Institution Press, 1987), 436.

[168] Milan Vego, "German War Gaming," *Naval War College Review* 65, no. 4 (Autumn 2012): 130; UK Ministry of Defence, *Wargaming Handbook*, 26. Wargames were of particular importance in Germany due to stipulations of the Versailles Treaty which limited access to real world exercises and training.

[169] Brewer and Shubik, *The War Game*, 48.

Like any tool, wargaming has its limitations. First, wargames are only approximations of reality and involve simplifications or compressed timelines.[170] However, by requiring interaction between participants with operational experience and inducing stress through enforced time constraints, wargames better simulate reality than other experimental approaches. Second, wargames are not predictive. Wargames can reveal that a certain action is plausible, but cannot definitively predict the course of actual contingencies given the role of chance and the decisions of specific policymakers.[171] To overcome this, wargames can be repeated with different participants to identify trends in decision-making.[172] These trends are still enlightening even though, as some professional wargamers correctly contend, wargames do not allow researchers to make causal claims.[173] Finally, critics may suggest that wargames are prone to groupthink in which participants simply adopt the preferences of senior personnel. This actually adds to the validity of the approach as junior personnel often exhibit deference to superiors in actual crisis settings.[174]

Despite the promise of wargames as tools for academic research, few social scientists have adopted the approach.[175] The most promising work uses wargames as an archival source to pull

[170] Francis J. McHugh, *Fundamentals of War Gaming*, 3rd ed. (Newport, RI: US Naval War College, 1966); Philip Sabin, *Simulating War: Studying Conflict through Simulation Games* (London: Bloomsbury Academic, 2014), 5.

[171] UK Ministry of Defence, *Wargaming Handbook*, 12–13.

[172] UK Ministry of Defence, 13.

[173] Bartels, "Games as Structured Comparisons: A Discussion of Methods."

[174] Recent research suggests that player background can have a significant effect on wargame outcomes, see Elizabeth M. Bartels et al., *Do Differing Analyses Change the Decision?: Using a Game to Assess Whether Differing Analytic Approaches Improve Decisionmaking* (Santa Monica, CA: RAND Corporation, 2019), https://www.rand.org/pubs/research_reports/RR2735.html.

[175] Some historians have promoted wargames as a means of gaining additional insight into past conflicts. See, Stephen P. Glick and L. Ian Charters, "War, Games, and Military History," *Journal of Contemporary History* 18, no. 4 (1983): 567–82; Scholars have also fielded wargames on convenience samples without military experience. See, Dominic D.P

back the curtain on political and military decision-making. Reid Pauly examines declassified reports from Cold War-era wargames for evidence of the nuclear taboo.[176] Studies of this sort offer valuable insight into how interactions between senior national security policymakers shape the use of force, but relying on declassified wargame data poses two limitations. First, researchers generally play no role in planning and executing past wargames, making it difficult to design experimental manipulations. In the few cases where scholars have exercised control over wargaming conditions, they have generally not varied treatments in an experimental manner. For instance, one project exposed all participants to identical scenarios, without assigning participants to distinct experimental groups.[177] Without separate treatment and control groups, it is difficult to assess the effect of specific factors on decision-making. Indeed, exposing all respondents to the same treatments can prime participants and affect their decision-making. More recent work has introduced experimental manipulations into wargames, but does so using an internet-based environment in which participants are not necessarily national security practitioners and do not experience face-to-face interactions.[178]

Second, governments selectively declassify wargame reports – typically after the passage of extended periods of time. This limited amount of openly available information can leave researchers with little data, particularly if they are studying recent innovations in military technology. Even when material is publicly released, researchers may only have access to selected wargames or heavily redacted materials. As a result, researchers are forced to draw inferences from

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Johnson et al., "Overconfidence in Wargames: Experimental Evidence on Expectations, Aggression, Gender and Testosterone," *Proceedings of the Royal Society: Biological Sciences* 273, no. 1600 (October 7, 2006): 2513–20.

[176] Pauly, "Would U.S. Leaders Push the Button?"

[177] Schneider, "Cyber Attacks on Critical Infrastructure."

[178] Reddie et al., "Next-Generation Wargames."

incomplete information. Records that remain classified could offer alternative explanations or disprove a researcher's hypotheses. Nonetheless, this work has advanced our understanding of substantive topics and highlighted the viability of wargaming as a data source for academic research.

Wargame Design and Implementation

To test the *increased initiation*, *restrained retaliation* and *amplified aggression* hypotheses, I designed and fielded a series of seminar wargames with embedded experimental manipulations.[179] Seminar games are one-sided wargames where small groups work collaboratively to complete a specific task.[180] The one-sided nature of seminar games allows the game to focus on eliciting expert judgments on crisis decision-making rather than on adjudicating outcomes between a friendly "blue team" and an adversary "red team," a process that can introduce researcher bias.[181] Participants included current and former military personnel who had served in the U.S. Army, Navy, Air Force, Marine Corps, or as Department of Defense civilians.[182] Participants were randomly assigned to three to five member wargaming teams that represented U.S. military planning cells (block randomized by military rank) and simultaneously assigned to a

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[179] I fielded the wargames at the Harvard Kennedy School of Government and the Massachusetts Institute of Technology Lincoln Laboratories in November 2017. The locations were selected because of the high concentration of individuals with military experience who were willing to participate in an academic study. Participants received no compensation for participation. The project was approved by the Columbia University Institutional Review Board (IRB-AAR6211) and reviewed by the US Air Force Human Subjects Protection Office (DOD HRPO FSG20170044H).

[180] UK Ministry of Defence, *Wargaming Handbook*, 39.

[181] Richard E. Darilek et al., *Issues and Insights from the Army Technology Seminar Game* (Washington, D.C.: RAND Corporation, 2001), 2, https://www.rand.org/pubs/monograph_reports/MR1299.html. Rather than assigning participants to an adversary "red team", adversary actions are dictated in the researcher-designed vignettes. Additionally, eliminating the need to assign participants to a red team, doubled the number of one-sided wargames I was able to run.

[182] Participants were recruited through veteran's groups and included a total of 28 individuals. Appendix B provides additional demographic information.

treatment schedule.[183] Randomization ensured each team received a mix of senior officers, junior officers, and non-commissioned personnel, and more importantly, created teams that are, in expectation, identical prior to receiving experimental treatment.[184]

These relatively small teams do not perfectly mirror actual operational planning teams, which can be larger, more senior, and consist of members with certain career specialties (For instance, an air operations planning team might consist primarily of pilots and intelligence officers). The wargaming teams do, however, capture several important elements of actual military teams. First, they included participants representing multiple ranks and, reflecting hierarchical military organizations, generally included fewer senior personnel than junior personnel. Second, because all participants had military training, they shared a baseline understanding of military capabilities and understood how factors such as risk and the law of armed conflict factor into military planning. Finally, 50-percent of participants had operational expertise with air defense or drone operations. These participants helped answer questions about air operations, serving the same function as subject matter experts in actual military organizations.

The wargame scenario involved an interstate crisis between the fictional Central Asian states of Katunia and Dakastan.[185] Dakastan is a U.S. ally engaged in a territorial dispute with its

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[183] Participants were first coded as field grade officers (U.S. military pay grades O-4 through O-6: Major/Lieutenant Commander, Lieutenant Colonel/Commander, Colonel/Captain), company grade officers (U.S. military pay grades O-1 through O-3: Second Lieutenant/Ensign, First Lieutenant/Lieutenant Junior Grade, Captain/Lieutenant) or non-commissioned (this category included all enlisted personnel including officer trainees who were not yet commissioned). Participants were then block randomized using the Randomizr package in R. To preserve the random assignment of participants to teams, I did not shift participants to balance the size of teams when participants failed to show up at the wargame (i.e. attrited) or when unexpected participants arrived. During one iteration of the wargame, four participants who had not previously registered arrived at the gaming session. Because registered participants had already been block randomized, I assigned the four new participants to their own gaming team. This gaming team had a composition that was similar to the randomized teams in terms of rank and service distribution. Participants received their team assignments upon arrival at the wargame.

[184] Gerber and Green, *Field Experiments*, 30–31.

[185] After consulting with wargaming experts, I opted to use fictional states so that participants were less constrained in their decision-making and discussions. Using actual states could cause participants to limit their comments for fear

autocratic neighbor Katunia over a resource rich border region. Dakastan, which hosts a U.S. airbase, is increasingly subjected to attacks by Katunian-backed forces.[186] During the wargame, participants were exposed to three crisis vignettes. The vignettes, which were provided in hard copy, describe incidents that occur during the crisis. The *response to intrusion* vignette is intended to test *amplified aggression*. It features a threatening Katunian military aircraft flying toward the U.S. air base in Dakastan and asks participants to develop a plan to respond to the intruding plane. Some wargaming teams received a vignette that features an inhabited adversary aircraft, while other teams received a vignette that is identical, except the intruder is a remotely piloted drone. The *response to shootdown* vignette tests *restrained retaliation*. The scenario involves the downing of a U.S. reconnaissance aircraft and asks participants to develop a plan that responds to the aircraft loss. Again, I vary whether the plane is inhabited or remotely piloted.

The *initial deployment* and *show of force* vignettes are designed to explore the *increased initiation* hypothesis. In these scenarios, participants decide whether to launch a manned aircraft or a remotely piloted one either to gather intelligence on a rival's military installations or as a show of force after a rival tests a long-range missile. Neither of these vignettes are experimental, but are intended to assess what type of assets military decisionmakers choose to employ on these potentially risky missions. While the vignettes focus on seemingly tactical acts of battlefield escalation, they speak to broader escalatory dynamics. Tactical escalation can spiral into regional escalation and the same logics that inform tactical escalation may inform conflict dynamics at a more strategic level.

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of revealing sensitive or classified information about contingency and operations plans. Several days before the wargame, participants received preparatory material that described the hypothetical interstate crisis that they would encounter during the wargame.

[186] Appendix A includes the complete road to war and wargaming vignettes.

A team of rapporteurs with backgrounds in international relations or military operations facilitated each wargame and documented wargame proceedings.[187] All teams first received the initial deployment vignette. The treatment schedule then varied which vignette was presented first to account for any priming of participants.[188] Finally, all teams received the show of force vignette. Participants were told that two to three months had passed between the rounds. Teams had 30 minutes to work through each scenario, helping to simulate the time-constrained decision-making cycles common in real-world contingencies.[189] As participants worked through each vignette, rapporteurs took detailed notes documenting the deliberations and discussions of each team. Rapporteurs observed group dynamics, recorded a chronology of when decisions were made, took notes on disagreements between team members, and logged each team's response plan in the scenarios. Rapporteurs paid particular attention to participants' word choice and argumentation.[190] At the end of each 30-minute gaming period, participants presented their plan to the rapporteur. Although the response plans in each scenario are important, the rapporteurs' observations of the decision-making process allow me to more thoroughly assess the mechanisms associated with technology-enabled escalation control theory.

A few challenges with data collection and analysis are worth noting. First, wargame participants were aware they were under observation and may have behaved differently than if they were not being observed.[191] Military personnel, however, are accustomed to having others

[187] Rapporteurs included individuals with graduate level international relations and/or at least four years of military experience. Rapporteurs closely reviewed all wargame materials, assisted with the development of note-taking procedures, and reviewed their notes with the principal investigator after the wargame.

[188] Appendix B includes the treatment schedule.

[189] Wargames run by the U.S. military and other organizations routinely feature compressed decision-making periods in which each "round" of the board game might represent several hours or days.

[190] For more on applying ethnographic methods to political science see, Lisa Wedeen, "Reflections on Ethnographic Work in Political Science," *Annual Review of Political Science* 13, no. 1 (2010): 255–72.

[191] Schelling, "Experimental Games and Bargaining Theory," 61.

present when making decisions, thus minimizing the effect on participant behavior. Second, rapporteur field notes inherently involve selection and interpretation: observers' background and individual experiences lead them to write down certain observations and frame these observations in certain ways, omitting other potential observations.[192] To account for this, I compare field notes from all of the rapporteurs, and find several similarities that appear across wargaming teams. In addition to their wargame notes, the analysis also incorporates data from rapporteur-led group interviews during which all teams were asked the same questions. Recording direct interview responses requires less interpretative discretion than documenting wargame observations.

CASE STUDIES

The survey experiments and wargames provide valuable insight into the effect of drones on conflict dynamics, but do so using scripted, hypothetical scenarios. While these approaches shed light on how and why drones can temper escalation dynamics, there are legitimate questions to the external validity and generalizability of findings based on hypothetical scenarios.[193] To complement the experimental approaches, I draw from two sets of nested case studies that explore drone use by the United States and Israel.[194] I draw data from archival materials, recently declassified military documents, interviews, and the works of historians to probe each of the mechanisms associated with technology-enabled escalation control in a real world context.

Case studies are an ideal complement to the experiments and wargames for several reasons. Most importantly, case studies enable a detailed analysis of drone development and deployments.

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[192] Clifford Geertz, *The Interpretation Of Cultures* (New York: Basic Books, 1977); Robert M. Emerson, Rachel I. Fretz, and Linda L. Shaw, *Writing Ethnographic Fieldnotes, Second Edition*, 2d Edition (Chicago: University Of Chicago Press, 2011), 13.

[193] Hyde, "Experiments in International Relations."

[194] For another study that employs a nested case study design see, Carson, *Secret Wars*.

Given the relative paucity of openly available data on drone operations, large-N approaches are not well suited to assessing the effect of drones on conflict onset and escalation.[195] Further, the context dependent nature of escalation demands close attention to case specific details. Understanding why and how socio-technical artifacts like drones shape conflict dynamics requires careful examination of the decision-making process surrounding decisions on the use of force – a task that is best accomplished by studying archival materials such as minutes of National Security Council meetings. The richness of qualitative data from these sources sheds light on internal debates and uncovers evidence on causal mechanisms.[196]

In addition, case studies allow researchers to examine political decisions both within and across states. Studying whether drones have similar effects in multiple operational and political contexts helps examine the limits and generalizability of technology-enabled escalation control theory. Finally, case studies help provide the "general conceptual models" needed to help inform policymaking.[197] Although the findings of the experiments and wargames provide useful insights with policy-relevant implications, policymakers can often more readily absorb evidence from actual historical contexts.[198]

I select the United States and Israel as cases to study the effects of drones on conflict dynamics for several reasons. First, the United States and Israel are among the most active drone users. Since the advent of military drone use, these two states have employed drones in a variety

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[195] John Gerring, "What Is a Case Study and What Is It Good For?," *The American Political Science Review* 98, no. 2 (May 2004): 341–54; Alexander L. George and Andrew Bennett, *Case Studies and Theory Development in the Social Sciences* (Cambridge, MA: The MIT Press, 2005).

[196] Gerring, "What Is a Case Study and What Is It Good For?," 348–49.

[197] George and Bennett, *Case Studies and Theory Development in the Social Sciences*, 270.

[198] Alexander L. George, *Bridging the Gap: Theory and Practice in Foreign Policy* (Washington, D.C.: United States Institute of Peace Press, 1993).

of operational contexts ranging from reconnaissance to armed strikes. This provides several cases with which to test technology-enabled escalation control. Second, both states have long histories of drone use. The United States launched its first military drones against an adversary during World War II, and the Israelis did so in the mid-1960s. This long period of use allows for variation along several dimensions including the strength and type of adversary threat over time, changing domestic political context, and the evolving relative capabilities of manned assets vis-à-vis drones. This variation allows me to probe how drones affect decision-making and escalation in multiple environmental contexts. Third, although Israel and the United States are both democracies, they have vastly different domestic politics, national security bureaucracies, and exist in different threat environments. Examining two countries allows for cross-national comparison and probes the generalizability of technology-enabled escalation control in different operational contexts.

In both the United States and Israeli case studies, I explore both the development of drones and the effects their use has on conflict dynamics. Studying the origins of the drone programs in each state sheds light on the motivations for the development of weapon systems that remove friendly troops from the battlefield. Documentary evidence and interviews of military planners suggest that both Israel and the United States developed drone capabilities primarily to reduce risk to their own personnel.[199] I then examine a series of crises where the United States and Israel deployed or considered the deployment of drones. I map how deployment decisions were made, identify the factors that drove these decisions, and assess how states reacted to the losses of remotely piloted aircraft. I compare these crises to crises in which manned aircraft are deployed or

[199] As I discuss in greater detail in the case studies, other factors that contributed to the development of remotely piloted aircraft capabilities included the need to conduct more politically sensitive operations in denied territory (i.e. missions that violated the sovereignty of a rival) and, later, to develop systems capable of operating for longer durations than manned assets on "dull, dirty, or dangerous" missions.

lost, to help identify whether and how drones affect conflict dynamics and to probe the hypotheses laid out in chapter two. I focus particularly on crisis situations for both theoretical and practical reasons. For theory, interstate crises place decisionmakers in a position where they must choose how to employ instruments of power against a rival. As international relations scholars Glenn Snyder and Paul Diesing note, "a crisis distills many of the elements that make up the essence of politics in the international system."[200] From a practical standpoint, there is typically more documentary and historical evidence on crisis situations to draw from for analysis.

To conduct this analysis, I rely on process tracing within each crisis. Process tracing examines a chronological series of events for observable evidence of causal mechanisms, allowing researchers to make inferences about competing hypotheses or explanations.[201] A key characteristic of process tracing is that the timing and sequencing of events is critical to making inferences about causal relationships. Chronology alone, however, is insufficient for effective process tracing; researchers must look for evidence that confirms that temporally prior events actually shaped subsequent decisions.[202] Additionally, process tracing must take into account the normative and international context surrounding decision-making.[203] For instance, statements or writings by policymakers should reveal the role that technological progression and the international environment played in driving their decisions.

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[200] Glenn H. Snyder and Paul Diesing, *Conflict Among Nations: Bargaining, Decision Making, and System Structure in International Crises* (Princeton, N.J.: Princeton University Press, 1978), 4.

[201] Andrew Bennett and Jeffrey T. Checkel, eds., *Process Tracing: From Metaphor to Analytic Tool* (Cambridge: Cambridge University Press, 2014), 6; Derek Beach and Rasmus Brun Pedersen, *Process-Tracing Methods: Foundations and Guidelines* (Ann Arbor, MI: University of Michigan Press, 2013), 2–5.

[202] Beach and Pedersen, *Process-Tracing Methods*, 120–43.

[203] Bennett and Checkel, *Process Tracing*, 23.

Together, each of the three methodological approaches helps explore the preferences and decisions of different actors whose opinions or actions can shape whether a crisis escalates. This mixed method approach yields two important benefits. First, it allows me to compare the preferences and reactions of senior civilian decisionmakers, the American public, and military practitioners. This sheds light on how drones influence decisions among each of these groups. Second, the approach allows me to triangulate findings from historical cases and hypothetical, experimental scenarios. This allows me to compensate for the inherent limitations of each methodological approach.

Chapter 4

Increasing Initiation

In June 2017, Pakistan Air Force fighter jets downed an Iranian drone that had penetrated "deep inside Pakistani airspace" on an intelligence-gathering mission.[1] The June overflight was just one of several Iranian drone incursions into Pakistan that year.[2] Prior to these incidents, Iran rarely violated Pakistan's airspace, despite having hundreds of manned aircraft capable of conducting reconnaissance missions.[3] Throughout the 2010s, however, Iran had expanded its arsenal of remotely piloted aircraft, indigenously developing reconnaissance and attack drones. This growing drone fleet may have enabled Tehran to initiate military intelligence operations against neighboring Pakistan that it was unwilling to launch using manned platforms.

Scholarly theories tell us that this should be expected. Technologies that decrease the risks and costs of military operations should logically increase the likelihood of conflict. These logics assume that decisionmakers are rational actors that seek to maximize the payoffs of employing military force. The payoff for obtaining an objective increases as the cost of obtaining it decreases, assuming the objective has a fixed value. While armed groups have long tried to reduce the costs and risks of military operations, drones have slashed these costs. Drones allow actors to project power without putting friendly personnel in harm's way, and often cost far less to acquire and

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[1] Siddiqui, "Iranian Drone Shot down by PAF, Confirms FO."

[2] Dewan, "Why Are Iran's Drones Crossing into Pakistani Airspace?"

[3] Shezad Baloch, "Iranian Helicopter Violates Pakistan Airspace," *The Express Tribune*, November 14, 2013, https://tribune.com.pk/story/631799/iranian-helicopter-violates-pakistan-airspace/; "Chapter Seven: Middle East and North Africa," in *The Military Balance* (London: International Institute for Strategic Studies, 2019), 340–44.

operate than manned counterparts. Under the *increased initiation* hypothesis introduced in Chapter 2, these reduced costs make actors more likely to launch military operations when drones can substitute for manned assets or ground forces.

To test the increased initiation hypothesis, I draw data from two original survey experiments and a wargame. Each of these empirical tests presents participants with a hypothetical, but plausible, situation in which the United States might be asked to use force. The empirical tests, which I detail below, help answer two questions. First, do drones lead decisionmakers to initiate military operations they otherwise would not? Second, what factors do national security practitioners and members of the American public consider when deciding whether and how to initiate military operations in the midst of a crisis?

The first survey experiment explores whether military officers and members of the public would launch an operation against a rogue state, varying whether the mission is to be carried out using a drone, manned aircraft, or ground forces. I then field a second survey experiment on members of the public that measures approval for military operations, again varying the type of forces involved in the mission. Unlike the first experiment, the second experiment measures approval levels for a mission rather than a binary "launch" or "do not launch." The second experiment also varies the likelihood of operational success to assess how the expectations of battlefield success shape support for military deployments.

I couple these survey experiments with a wargame in which national security practitioners consider whether to use a manned platform or a drone to initiate the use of military force. To be clear, these survey experiments and wargames with military participants offer valuable insights into crisis decision-making, however, many decisions on escalation during actual crises are made at far higher echelons by senior officers or civilian officials. These policymakers may establish strategies, draft rules of engagement, or issue orders that limits the menu of options that military commanders at the operational or tactical levels. These experiments and wargame findings are, however, still useful in several ways. First, military officers at these lower echelons may make choices, including what platforms to deploy on missions, that may constrain or drive policy. For instance, a staff officer's decision to substitute a remotely piloted reconnaissance aircraft for a manned one might have significant implications on the trajectory of a crisis if a rival intercepts or downs the aircraft. Second, the participants in the experiments and wargames may one day advise senior policymakers, or be policymakers themselves. Their preferences, beliefs, and past experiences may subsequently shape how they act in these future roles.[4] The experiments do not test the increased initiation mechanism on civilian decisionmakers, but their role is explored using case studies in chapters 6 and 7.

If the increased initiation hypothesis is valid, military decisionmakers should be more likely to launch missions when they can use remotely operated systems rather than placing friendly personnel and expensive platforms in harm's way. At the same time, civilians should express greater levels of support for drone deployments than deployments of friendly personnel, assuming that all other factors – such as effectiveness and risk – are constant. To be sure, members of the public might not have a direct say in dictating whether a government initiates the use of military force. Yet, public opinion is often a cue to policymakers eager to evade negative political consequences for their decisions. As a result, decisionmakers may avoid the sorts of missions that are likely to generate low levels of public approval.

The tests find support for the increased initiation hypothesis and shed light on the micro-level foundations that lead military officers and the general public to more readily support

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[4] Horowitz, Stam, and Ellis, *Why Leaders Fight*, chaps. 3–4.

initiating operations using drones than those launched with manned platforms or ground forces. Further, the experiments reveal that military decisionmakers and members of the public share a preference for drones when all other factors surrounding a crisis situation are held constant. This inclination is shaped in part by the reduced risk to friendly forces that drones provide. The experiments, however, also highlight that the availability of drones alone is not a sufficient condition to increase the frequency with which military force is used. Both military decisionmakers and members of the public consider other factors when deciding whether to initiate (or support the initiation) of military operations during crises. Indeed, operational context – specifically the likelihood of mission success – also shapes support for initiating the use of force. For instance, the public is more supportive of deploying manned aircraft or ground forces that offer a high likelihood of battlefield success than remotely piloted drones that offer a lower likelihood of success. This suggests the operational context matters in these decisions on the use of force and escalation.

EVIDENCE FROM SURVEY EXPERIMENTS

Increased Initiation Experiment 1: To Launch, or Not to Launch?

As a first cut at testing the increased initiation hypothesis, I field a survey experiment that studies whether the availability of drones increases the likelihood that military decisionmakers and civilians will call for the initiation of military operations. The survey is fielded on an expert sample of military officers (n=78) and an online public sample of adults in the United States (n=303).[5] In the crisis vignette, respondents are told that, “Credible intelligence reports indicate that a rival state

[5] Military staff and students were recruited at the U.S. Air Force’s Air War College and Air Command and Staff College in October 2018 (Appendix F includes the survey instrument). The public sample was recruited through Amazon Mechanical Turk in January 2019; respondents completed the survey using Qualtrics (Appendix E includes the survey instrument).

has started developing chemical weapons. The rival state has previously threatened to use chemical weapons against its neighbors." The survey instrument features the development of a banned class of weapons to highlight the rival's actions violate international law, and describes the rival's past threats to emphasize potential hostile intent.[6] These elements of the vignette are intended to reduce the likelihood that respondents question whether the use military force against the rival state is justified or permissible under international law.

Respondents are then randomly assigned to one of three treatment conditions. One group is told, "The United States plans to deploy special operations forces to destroy the rival state's chemical weapons production facility." Another group is told the United States plans to deploy "manned bomber aircraft", and a third is informed that the United States plans to deploy "remotely piloted aircraft."[7] This manipulation captures variation in the level of exposure of friendly personnel to potential adversary action. Ground forces and drones represent the highest and lowest levels of exposure, respectively. To control for risk and mission effectiveness, all groups are told, "There is a 50-percent chance the adversary will attack" the U.S. forces (or bomber aircraft or RPAs) during the mission" and that "There is a moderate likelihood the mission will succeed." Military respondents are told that they are assigned as "a planner in the operations division of this geographic combatant command" and are asked whether they would advise the director of operations to launch the operation. Members of the public sample are asked, "Do you think the

[6] The Chemical Weapons Convention prohibits the development, production, stockpiling and use of chemical weapons by states parties.

[7] Balance tables and ordinary least squares models that regress assignment to treatment on a host of covariates find no statistically significant relationship between covariates and assignment to treatment. Because random assignment to treatment was achieved, the average change in support for launching a mission across the treatment can be attributed to the treatment (i.e. type of forces employed). See Appendix H, Sections 3.1-3.2.

United States should launch this operation?" Respondents choose either "launch operation" or "do not launch operation."

Military respondents are, on average, likely to initiate an operation when informed a drone will be used and unlikely to initiate an operation if it will be carried out using ground forces or a manned bomber (See Table 4.1). Support for launching the mission is highest when a drone will be used (63-pecent of respondents would initiate operations), and lowest when ground forces will be used (just 8-percent of respondents would initiate operations). These initial findings provide tentative support for the increased initiation hypothesis, although confidence intervals are large due to the small sample size. Despite the large confidence intervals, treatment (i.e. assignment to either the ground force, manned bomber, or RPA condition) has a statistically significant effect on initiating the use of force.[8] The findings suggest military decisionmakers are more likely to initiate military operations during crises when they have drones than when drones are not an option on the policy menu.

Table 4.1: Support for Initiating Military Operations (Experiment 1, Military Sample)

Military Sample		
Type of Forces	**Launch Mission**	**Do Not Launch Mission**
Ground Forces (n=25)	8% (1.4-27.5) n=2	92% (72.5-98.6) n=23
Manned Bomber (n=26)	30.8% (15.1-51.9) n=8	69.2% (48.1-84.9) n=18
Remotely Piloted Aircraft (n=27)	63% (42.5-79.9) n=17	37% (20.0-57.5) n=10

[8] In the ground forces and RPA conditions, assignment to treatment is statistically significant to the $p<.01$ level. In the manned bomber condition, treatment is statistically significant to the $p<.1$ level. Covariates including service, military rank, gender, and experience with RPA, aviation, or air defense operations have no statistically significant effects. See Appendix H, Section 3.1 for the ordinary least squares models used for significance testing.

When facing the same scenario, civilian respondents are more supportive of initiating military operations than their military counterparts (See Table 4.2). Civilian respondents are, on average, more likely to initiate military operations than to not launch military operations – regardless of the type of forces employed. Indeed, assignment to different treatment conditions (i.e. type of force employed) has no statistically significant effect on the likelihood of supporting the initiation of military operations.[9] Most covariates, including gender, age, race, education level, and income have no statistically significant effect on approval for initiating military operations. Respondents who report more conservative political ideologies (on a 1 to 5 scale, ranging from very liberal to very conservative) are more likely to support initiating the operation (β=-0.063, $p<.05$).[10] This conservative preference for conflict initiation aligns with studies and public opinion polling that find conservatives are, on average, more hawkish in the foreign policy arena.[11] Interestingly, veterans are more likely to support initiating the operation than non-veterans (β=-0.220, $p<.01$). This runs counter to the less hawkish posture adopted by respondents in the military sample. One possible explanation for this incongruity is that respondents in the military sample are all commissioned officers, while the 49 veterans in the public sample include individuals who served in enlisted ranks.[12] More senior commissioned personnel may be less likely to initiate the

[9] Assignment to treatment has no statistically significant effect. See Appendix H, Section 3.2 for the ordinary least squares models used for significance testing of treatment and the covariates described throughout this paragraph.

[10] The dependent variable for initiation is coded 1 for "launch operation" and 2 for "do not launch operation." A negative coefficient therefore indicates support for launching the operation.

[11] Gelpi, Feaver, and Reifler, *Paying the Human Costs of War*, 67–124; Scott D. Sagan and Benjamin A. Valentino, "Revisiting Hiroshima in Iran: What Americans Really Think about Using Nuclear Weapons and Killing Noncombatants," *International Security* 42, no. 1 (Summer 2017): 62.

[12] The survey instrument did not ask respondents whether they served as officers or enlisted personnel. Education level, however, serves as a useful proxy since a bachelor's degree is a requirement to become a commissioned officer in the United States. Many of the veterans in the public sample reported that their highest level of education was below a bachelor's degree.

use of military force because they would face greater political repercussions for failed military action than veterans who are no longer serving.

Table 4.2: Support for Initiating Military Operations (Experiment 1, Public Sample)

Public Sample		
Type of Forces	**Launch Mission**	**Do Not Launch Mission**
Ground Forces (n=102)	60.8% (50.6-70.2) n=62	39.2% (29.8-49.4) n=40
Manned Bomber (n=96)	52.1% (41.7-62.3) n=50	47.9% (37.7-58.3) n=46
Remotely Piloted Aircraft (n=105)	57.1% (47.1-66.6) n=60	42.9% (33.3-52.9) n=45

I turn to qualitative data collected as part of the survey instrument to more closely explore why drones increase support for initiating operations among military decisionmakers, but not among members of the U.S. public. After respondents specify whether they would launch operations, the survey instrument asks them to "write a sentence or two telling us why [they] disapproved or approved of the plan to handle the situation." I code the free responses into one of six justification categories: the mission poses no/low risk to U.S. forces, the mission provides security, the mission is the best solution (with no additional information specifying why the mission was the best solution), the mission is too risky and poses little chance of success, that force should not be used in the situation, or that there was insufficient information to make a decision/had no opinion. This analysis is valuable because the increased initiation hypothesis (along with most existing theories on public support for the use of force) rest upon micro-level assumptions, particularly individuals' risk aversion and desire for battlefield success.

Table 4.3: Qualitative Justifications (Experiment 1, Military Sample)

Justification	**Ground Forces**	**Manned Bomber**	**Remotely Piloted Aircraft**
No/Low risk to U.S. forces	0% (n=0)	0% (n=0)	33.3% (n=9)
Provides Security	8% (n=2)	26.9% (n=7)	29.6% (n=8)
Best Solution	0% (n=0)	0% (n=0)	0% (n=0)
Too risky/Low chance of success	60% (n=15)	38.5% (n=10)	18.5% (n=5)
Opposed to armed conflict	4% (n=1)	11.5% (n=3)	3.7% (n=1)
Insufficient Information/No Opinion /Unintelligible	28% (n=7)	23.1% (n=6)	14.8% (n=4)

As Table 4.3 illustrates, military respondents' decisions were informed in large part by perceptions of risk to U.S. forces and the likelihood of mission success. A third of the military respondents assigned to the RPA treatment condition, for instance, believed that deploying a drone posed no or little risk to U.S. forces. One U.S. Air Force major commented, "We stand to risk no loss of life by sending an RPA (at least until the enemy state responds) but stand to gain by potentially saving the lives of the neighboring [countries]." Another respondent believed "RPAs are expendable to achieve a national interest." Drones were sometimes seen as a desirable and low-risk first choice option that could be augmented by other forces if they failed to accomplish the mission. One U.S. Air Force lieutenant colonel, who previously worked with RPAs, for instance, noted that, "If this mission fails the [director of operations] retains the ability to engage this facility with other assets (cruise missiles/manned aircraft)."

Military respondents assigned to the manned bomber and ground force conditions generally believed the operation involved too much risk or that the likelihood of success was too low. One officer assigned to the ground forces condition commented the "risk isn't worth the reward." Many respondents wanted a greater likelihood of success before committing to deploying ground forces or manned aircraft. Some military respondents assigned to the manned bomber and ground forces conditions suggested they would have supported initiating operations had they been carried out by a drone. For example, one Air Force major who opposed launching an operation using a manned bomber commented, “The operation can be delayed or a different asset could be utilized (RPA or stand-off weapons such as a cruise missile).” Some respondents, however, were willing to send pilots into harm’s way to prevent the use of chemical weapons despite the risk of incurring casualties. One officer who supported initiating operations using a manned bomber commented, “the risk of loss of one aircraft/crew for mission success for the defense of innocent lives is worth the cost risk.” The majority of respondents in the manned and ground force conditions, however, opted to avoid these risks by not initiating military operations.

Risk, however, was not the sole factor driving the decision on whether to initiate military operations. Some respondents were concerned whether drones had the capabilities required to destroy the chemical weapons facility. One Marine Corps officer questioned the choice of drones. “Why RPAs?” he asked. “We may have other assets that have less likelihood of being targeted and could be more effective.” An Air Force lieutenant colonel similarly argued, “an attack by RPAs will not guarantee destruction of the facility.” Other respondents feared that a failed mission could pose greater risks for the United States, regardless of the type of asset used to carry out the mission. One Air Force officer thought “the enemy’s reaction to a failed attempted mission could be more dangerous than the current situation.” Another lieutenant colonel expressed similar concerns, “A lack of success could trigger the use of chemical weapons the mission was intended to prevent.” For these respondents, the potential for second or third order consequences outweighed the reduced risk that drones offered.

The higher likelihood of initiating operations in drone treatment stemmed in large part from the perception that drones offered a lower risk means of carrying out military options. At the same time, however, more than a third of respondents in the drone treatment condition still chose not initiate military operations. This suggests that risk alone does not drive decision-making by all military officers. The fear of an unsuccessful mission, possessing insufficient information about the vignette, and concerns about whether strikes were necessary all shaped decision-making among military officers. As a result, even with the reduced risk to friendly forces that drones offer, military officers did not always support initiating military operations.

Within the public sample, Table 4.4 illustrates that respondent preferences were driven in large part by a belief that initiating military action provides security for the United States and its allies. Within each of the three treatment groups, "provides security" is the most commonly cited explanation for preferences toward the use of force. Respondents citing the need to provide security often described how the United States needed to take action to protect lives or to uphold international law. One respondent, for example, commented that the "Use of chemical weapons is wrong by international law. The US, being a leader in international affairs, should take the initial steps to mitigate their chances of using chemical weapons." Another respondent argued that he "would approve this operation because the reward outweighs the risk….[If] this chemical facility was to be able to produce the chemical weapons, the damage that they could cause in the long run could be catastrophic." These responses suggest that many members of the public believe intervention is required in crises where a rival threatens the use of a banned class of weapons.

Table 4.4: Qualitative Justifications (Experiment 1, Public Sample)

Justification	**Ground Forces**	**Manned Bomber**	**Remotely Piloted Aircraft**
No/Low risk to US Forces	1% (n=1)	0% (n=0)	9.5% (n=10)
Provides Security	52% (n=53)	40.6% (n=39)	35.2 % (n=37)
Best Solution	1% (n=1)	3.1% (n=3)	3.8% (n=4)
Too risky/Low chance of success	20.6% (n=21)	24% (n=23)	26% (n=27)
Opposed to armed conflict	14.7% (n=15)	18.8% (n=18)	15.2% (n=16)
Insufficient Information/No Opinion /Unintelligible	10.8% (n=11)	13.5% (n=13)	10.5% (n=11)

Like their military counterparts, many respondents were also concerned that the chances of success were too low to justify deploying forces. This made up the second most cited justification in each of the treatment conditions. Unlike the military respondents, however, the type of forces involved did not appear to affect whether respondents perceived the mission as too risky. One respondent in the RPA treatment condition commented, "The situation as described sounds dire and requires some action. However, the response described has too high of a possible failure rate to warrant moving ahead. I think another solution with a higher chance of success needs to be developed." Another respondent in the ground forces treatment condition said he would "prefer a greater chance of the mission succeeding before recommending the attack." Other respondents were, like some military officers, worried that an attack could set off an escalatory spiral. One respondent asserted that "we need to make sure the bombing cannot set off the chemical weapons," while another was concerned that a rival state might "really attack us" in response to a strike on the chemical weapons facility.

Some members of the public sample also factored risk considerations into their decision-making logic. Respondents were, on average, more likely to view a drone mission as low risk than a mission carried out by ground forces or manned aircraft. As one respondent noted, "they are remote piloted aircraft so no people will be harmed." Another commented, "I approve of the mission because of the use of drones[,] the risk to life is low." Some members of the public sample also suggested that they would have approved of the mission had it been carried out by a remotely piloted aircraft. One respondent who was told the mission would be carried out using a manned bomber explained his opposition to the mission: "The human risk on our part is too great for our rate of success. Unmanned aircraft should be used for this."

The different levels of support between the military and civilian samples raises questions about the increased initiation hypothesis. Although the hypothesis appears to explain behavior by military professionals, it does not seem to explain the behavior of respondents in the public sample. At the surface the findings align with past studies that suggest civilians often advocate for more hawkish positions than their military counterparts.[13] But, why might members of the public sample seem to care little about the type of asset involved? It is possible that respondents in the public sample have a strong preference for countering the proliferation and use of chemical weapons. Indeed, many respondents suggested that some sort of action was necessary to defend international security or uphold international law. Or, they might lack the technical and military knowledge to assess the risks associated with each different types of operations. To be sure, the survey instrument in the public sample lacks validity since members of the public would generally never be asked whether to initiate military operations.[14] As a result of the relatively unrealistic nature of

[13] Betts, *Soldiers, Statesmen, and Cold War Crises*.

[14] Past studies have suggested that members of the public hold different preferences than their military counterparts. Thus, researchers should be cautious when using public samples to study questions that apply in the real world to military decisionmakers. See, Mintz, Redd, and Vedlitz, "Can We Generalize from Student Experiments to the Real World in Political Science, Military Affairs, and International Relations?," 769.

the question prompt, respondents may not have been positioned to fully think through the risks and benefits of the operation in the scenario. Indeed, military officers will face the consequences of a failed mission, whereas their civilian counterparts do not.[15] It is also possible that some respondents demonstrated social desirability bias when entering the response. In other words, some respondents may have wanted to avoid being perceived as callous or careless for ignoring a situation where chemical weapons were being developed and potentially used.

Even though the public appears no more supportive of initiating military operations with drones than with other types of military force, caution is needed before discounting the increased initiation hypothesis. First, the factors described above may limit the generalizations we can draw from the public sample. Second, the public is not the sole, or even dominant, voice in a state's national-security decision-making process. Although public opinion can inform decisions, actual policies and actions are selected and implemented by civilian and military officials. Because of the limited applicability of the survey instrument to public respondents, I field a second survey on a public sample with a modified – and more realistic – outcome variable.

Increased Initiation Experiment 2: Public Support for Initiation

This second survey experiment, which was fielded on a separate sample of 1,609 adults in the United States, presents respondents with the same hypothetical mission to destroy a rival's chemical weapons laboratory that was described in the first vignette. This experiment, however, is different in two important ways. First, this experiment measures a different outcome of interest to test the increased initiation hypothesis to address some of the external validity concerns outlined above. Rather than asking respondents whether they would launch or not launch the operation as in the first experiment, this survey instrument asks respondents for their "opinion of the

[15] Mintz, Redd, and Vedlitz, 769.

government's plan to handle the situation." Respondents provide their opinion using a five-point Likert scale ranging from "strongly disapprove" to "strongly approve." For members of the public, this is perhaps a more realistic and appropriate dependent variable. Members of the public are generally not asked whether they would launch a military operation, but do frequently express their approval or disapproval of foreign policy.[16] Therefore, this reframing of the dependent variable might allow for a more accurate measurement of public support toward initiating military operations.

Second, I attempt to assess the extent to which the likelihood of mission effectiveness shapes public support for military operations by varying whether the mission has a "high" or "low" likelihood of success.[17] This results in a 2 x 3 factorial design (Table 4.5).[18]

Table 4.5: Treatment Table (Experiment 2, Public Sample)

	Ground Forces	*Manned Aircraft*	*Drone Aircraft*
Success: Low Likelihood	*n*=274	*n*=261	*n*=269
Success: High Likelihood	*n*=268	*n*=266	*n*=271

Note: *n* represents the number of respondents randomly assigned to each experimental condition.

If respondents view drones as a less risky alternative to manned assets, they should be more approving of operations that deploy drones than those that involve manned bombers or ground forces. This should be true across both the high and low likelihood of success conditions. However,

[16] Holsti, *Public Opinion and American Foreign Policy*.

[17] The smaller size of the military sample precluded this additional manipulation.

[18] Appendix D includes full text of the survey instrument.

because Americans prefer successful military operations to unsuccessful ones, mean levels of support should be higher in the high likelihood of success treatment conditions.

To examine the public's preferences, I first compare the mean approval ratings across each of the six experimental conditions.[19] As Table 4.6 and Figure 4.1 show, public approval for initiating military operations is, on average, the highest when drones are employed on a mission with a high likelihood of success (μ=3.91) and lowest when ground forces are deployed on a mission with a low likelihood of success (μ=2.24). Within both the high likelihood of success and low likelihood of success conditions, public support is, on average, highest for drone deployments and lowest for ground force deployments. Mean public support for initiating military operations using inhabited aircraft falls between the mean levels of support for ground force and drone deployments in both the high and low likelihood of success conditions. These findings are in line with those of the military sample in the first experiment. To present the findings in a manner which more closely resemble those from the first experiment, Table 4.7 includes percentages of respondents who approve or disapprove of the operation in each treatment condition.

[19] Before assessing the effects of treatment, I use a series of ordinary least squares models to verify that the assignment of subjects into the six experimental conditions was random. Using ordinary least squares models, I predict assignment into the treatment groups as a function of covariates including age, gender, education level, income, political ideology, race, and veteran status. The models suggest that respondents were indeed randomly assigned to experimental conditions. Thus, any differences in outcomes of interest between the experimental groups can be attributed to the treatment they receive in the survey instrument. I also conduct a manipulation check that asks respondents to identify how the military operation would be carried out (i.e. ground forces, manned bomber, or drones) to ensure respondents received and internalized the intended treatment. Across each of treatment groups, at least 96-percent of respondents correctly recalled the treatment to which they were exposed. Appendix H, Section 3.3 includes regression results for these balance tests.

Table 4.6: Mean Approval for Deploying Forces by Force Type (Experiment 2, Public Sample)

Type of Military Force	**Low Likelihood of Success** *Mean Approval Rating*[1]	**High Likelihood of Success** *Mean Approval Rating*[1]
Ground Forces	2.24 (.06)	3.29 (.07)
Manned Aircraft	2.44 (.07)	3.53 (.07)
Drone Aircraft	2.87 (.07)	3.91 (.06)

1. Approval is measured on a five-point scale, where 1 is "strongly disapprove" and 5 is "strongly approve". Standard errors in parentheses. The effect of experimental conditions on approval ratings is significant at the p<.001 level.

Figure 4.1: Mean Approval for Deploying Forces by Force Type (Public Sample)

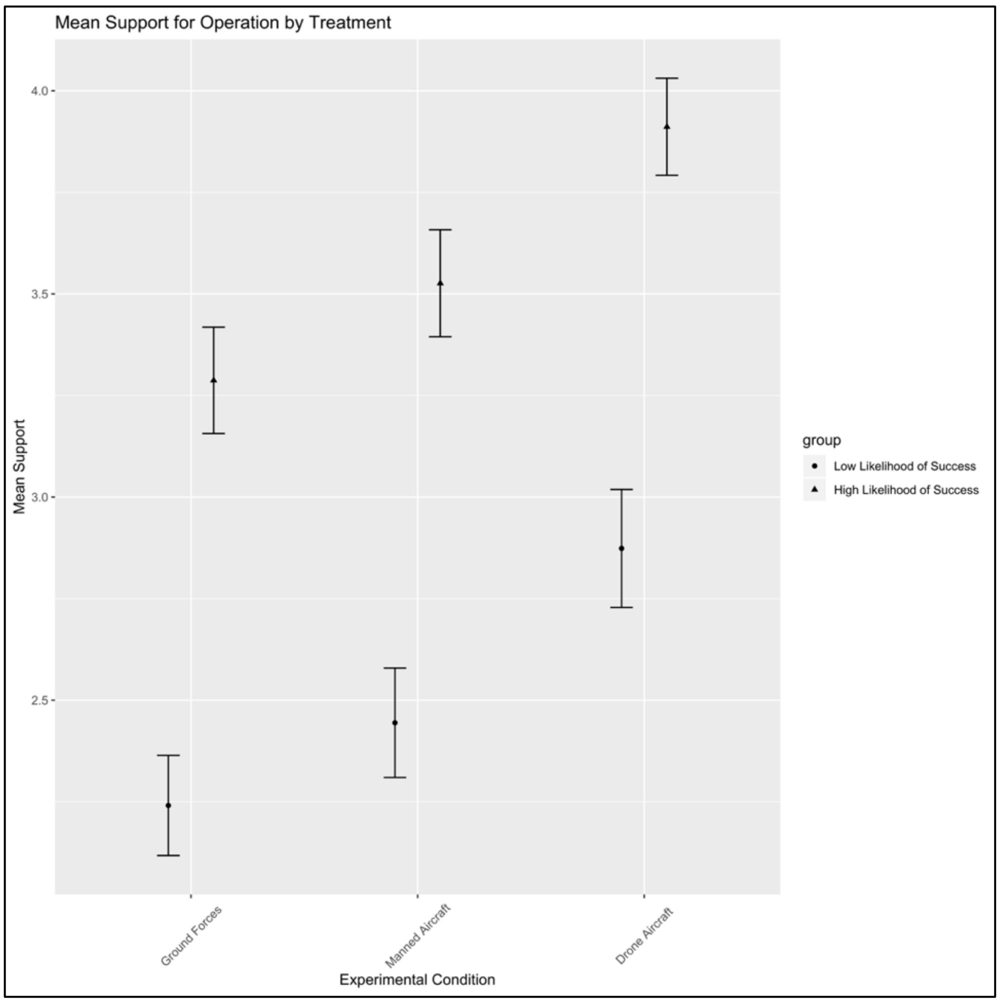

Table 4.7: Approval for Deploying Forces by Force Type, Proportion (Experiment 2, Public Sample) [20]

	Low Likelihood of Success		High Likelihood of Success	
Type of Military Force	**Approve**	**Disapprove**	**Approve**	**Disapprove**
Ground Forces	15.6%	72.3%	53%	28.4%
Manned Aircraft	20.3%	69%	61.3%	22.3%
Drone Aircraft	40.1%	50.6%	77.1%	12.2%

Although respondents are more supportive of initiating operations involving drones, these effects are dwarfed by the effect of the likelihood of mission success treatment. For instance, the mean public approval level for a drone operation is approximately 19-percent higher than the mean approval level for a ground force deployment when the likelihood of mission success is high. In comparison, mean approval for a drone deployment under high conditions of success are 36-percent higher than a drone deployment under low conditions of mission success. These findings support Gelpi, Feaver, and Reifler's argument that American public support for war is shaped more by the likelihood of military success factors than by considerations about casualty and risk aversion.[21]

To examine these findings more systematically, I employ a set of ordinary least squares models to test whether findings are statistically significant and to assess whether there are heterogeneous treatment effects depending on respondent characteristics. Unlike the public sample in the first experiment, both the type of forces involved and the likelihood of operational success have statistically significant effects on support for operations. Covariates including gender, race, education level, income level, and veteran status have no statistically significant effect on support

[20] Respondents who either "strongly disapprove" or "disapprove" of the actions are considered to "Disapprove." Respondents who either "strongly approve" or "approve" of the actions are considered to "Approve"

[21] Gelpi, Feaver, and Reifler, *Paying the Human Costs of War*, 1-22.

for the military operation. Political ideology (on a five-point scale from very liberal to very conservative) has a positive and statistically significant effect on support for the military operation. This effect, however, disappears when ideology is interacted with treatment.[22]

Respondents who have more interventionist foreign policy leanings are, unsurprisingly, more likely to support military operations against the chemical weapons lab (using ground forces, manned aircraft, or drones) than respondents with less interventionist views on foreign policy, so long as there is a high likelihood of success.[23] Interestingly, interventionist respondents are, on average, likely to exhibit similar levels of support for operations carried out by ground forces or drones. These findings suggest that interventionist respondents are simply prone to support any form of military operation that eliminates a potential threat to international stability, with little regard for risk to military personnel. Across the full sample, however, support for operations conducted by drones remains higher than operations conducted by ground forces or manned aircraft, providing support for the increased initiation hypothesis.

To unpack why members of the public are, conditional on likelihood of success, more supportive of a military strike conducted by drones than an operation carried out by ground forces or manned bombers, I turn again to qualitative data. I use the same approach employed in the first experiment and ask respondents to provide a free text response explaining their approval of the proposed actions. These responses are then manually coded into one of six categories.[24]

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[22] Appendix H, Section 3.3 includes regression tables for these tests.

[23] To measure preferences toward intervention, the survey instrument asked respondents to rate (using a five-point scale from Strongly Disagree to Strongly Agree) their agreement with the statement "The United States needs to play an active role in solving conflicts around the world." Although respondents reported their attitude toward intervention post-treatment, an OLS model that regresses interventionism on treatment condition finds no statistically significant relationship. This suggest that treatment does not affect respondents' preferences on intervention. See Appendix H.

[24] I am grateful to Edmund Brose for his assistance in coding these data. A second individual coded 100 randomly selected responses and achieved an 85 percent agreement rate with the primary coder.

The results (Table 4.8) suggest that higher levels of public support for operations conducted by drones is grounded in the perception that drones present less risk to friendly forces than using manned aircraft or ground forces. Indeed, among respondents in the "drone/high likelihood of success" treatment condition, over a third justified their support for the mission by citing low levels of risk to U.S. forces. In comparison, only 1.5-percent of respondents in the "ground forces/high likelihood of success" treatment condition viewed the operation as low risk. The findings are similar when respondents are told that there is a low likelihood the mission will succeed. In the "drone/low likelihood of success" treatment group, 15.6-percent of respondents support the operation because they perceive it to involve no or low risk, while only 2.2-percent in the "ground/low likelihood of success" treatment and 0.8-percent in the "manned aircraft/low likelihood of success" treatment base their support on the low risk incurred.

Table 4.8: Qualitative Justifications by Treatment (Experiment 2, Public Sample)

Justification	**Ground Forces** *Low Likelihood*	**Manned Aircraft** *Low Likelihood*	**Drone Aircraft** *Low Likelihood*	**Ground Forces** *High Likelihood*	**Manned Aircraft** *High Likelihood*	**Drone Aircraft** *High Likelihood*
Low or No Risk to US Forces	2.2 n=6	0.8 n=2	15.6 n=42	1.5 n=4	2.6 n=7	34.3 n=93
Improves National Security/International Stability	10.6 n=29	13.8 n=36	14.9 n=40	36.2 n=97	44.4 n=118	26.2 n=71
Best Solution	5.8 n=16	6.1 n=16	6.7 n=18	12.7 n=34	13.9 n=37	11.4 n=31
Too Risky/ Low Chance of Success	51.5 n=141	57.9 n=151	42.4 n=114	11.6 n=31	7.5 n=20	3.7 n=10
Opposed to Conflict	16.4 n=45	10.7 n=28	8.9 n=24	18.3 n=49	16.2 n=43	10.3 n=28
Insufficient Information/No Preference	13.5 n=37	10.7 n=28	11.5 n=31	19.8 n=53	15.4 n=41	14.0 n=38

In the low likelihood conditions, respondents generally justified low levels of support by describing how the mission was too risky and had too low of a chance of success. This mirrored the responses of the respondents in the military sample. Similar to the respondents in the first experiment, several respondents assigned to the ground force and manned aircraft treatment conditions suggested they would have been more supportive had drones been used in lieu of manned assets. For instance, one respondent assigned to the manned aircraft/low likelihood of success condition said, “I do not approve because I would rather see a drone go in vs. a manned plane where more people could potentially die.” This suggests that some members of the general public now view drones as a low risk option on the menu of potential military instruments.

Summary of Experimental Findings

The survey experiments offer support for the increased initiation hypothesis. Military officers are, on average, more likely to initiate military operations during crises when they have access to drones than they are when they must rely on ground forces or manned aircraft. Underpinning this preference is a perception that drones allow actors to carry out military operations with lower levels of risk to friendly forces. Military officers, however, also consider other factors such as the necessity of a given mission and a mission’s likelihood of success before initiating operations. This means that drones are likely to increase the initiation of military operations when all other factors associated with a military operation (i.e. likelihood of success) are held constant. In the real world, however, crises vary. This can lead to variation in force requirements to respond appropriately. As a result, decisionmakers may need to balance the trade-offs between capabilities, effectiveness, and risk when making decisions on if and how to initiate military operations. Members of the public seem to hold similar preferences toward the use of force, voicing greater approval for operations carried out by drones than deployments of manned aircraft or ground forces. The perceived likelihood of mission success, however, has a far larger effect on approval levels for missions than the type of asset involved.

EVIDENCE FROM WARGAMES

The survey experiments provide support for the increased initiation hypothesis and suggest that drones increase support for the initiation of military operations among the U.S. public and U.S. military officers. Yet, as chapter 3 notes, actual military decisions are not made by officers completing surveys in isolation. To gain richer insights into how the availability of drones shapes the frequency with which military operations are initiated during crises, I turn to the wargame featuring the hypothetical states of Katunia and Dakastan that was introduced in chapter 3.

The tabletop wargame asked participants to assume the role of U.S. Air Force planners responsible for Central Asia. Participants are informed that Dakastan received intelligence reporting that Katunia's military was training personnel to carry out terrorist attacks on Dakastani oil infrastructure and the air base used by U.S. forces. The suspected training camp is just on the Katunian side of the contested border. Participants are also told that Katunia has increased the intensity of its military exercises and deployed short-range air defense systems near the contested region. The Katunian president announced that any Dakastani or U.S. military aircraft or personnel that approach the contested area are subject to "emergency defensive actions" by Katunian forces. Given these potential threats to both Dakastan and U.S. forces in Dakastan, participants are asked to plan an intelligence gathering mission over the contested border region. Specifically, they are asked to select between two aircraft – the unarmed manned MC-12 Liberty and the unarmed remotely piloted MQ-1 Predator – to fly a reconnaissance mission along the border to collect imagery of the site. Participants are informed they are limited to these two aircraft due to resource constraints and that both aircraft have similar intelligence collection capabilities. On the surface, the lack of variation in the capabilities of the manned aircraft and drone may appear to present decisionmakers without a tradeoff. By holding capabilities constant, however, the wargames allow us to evaluate whether national practitioners view the lack of a crew on board as the primary advantage of remotely piloted aircraft over manned ones, or if decisionmakers also take into account other factors.

Unlike the other wargames described in chapter 5 and the survey experiments above, this particular wargame vignette does not include experimental manipulations. Rather than varying whether teams initiate operations using manned forces or a remotely piloted aircraft, the wargame vignette presents military decisionmakers with a choice that often occurs in the real world: choosing between a drone and a manned aircraft for a given mission. In addition, the wargame presents participants with a different scenario than the survey experiments. Rather than being asked to consider a kinetic strike that violates a rival's sovereignty and destroys a physical target (as in the survey experiments), wargame participants are asked to consider a reconnaissance mission that involves no violation of the rival's sovereignty and causes no physical destruction of the rival state's infrastructure.

To be sure, the set up described above – which requires participants to select one of two assets – does not allow for a direct test of whether drones increase the initiation of military operations during crisis. It does, however, shed light on how national security practitioners view and discuss the tradeoffs between manned and remotely operated systems. This approach helps to highlight the decision-making logics that underpin the increased initiation hypothesis. If the increased initiation hypothesis is valid, decisionmakers should deploy remote warfighting systems at a higher rate than manned assets. Underlying these decisions should be a desire to minimize the risk to human life and the associated risk of being forced to escalate if a servicemember is killed.

Of the seven wargaming teams, six (86%) chose to deploy the MQ-1 Predator RPA as the sole means of collecting intelligence. These teams based their decisions primarily on the assumption that RPA operations involved no risk to U.S. personnel. The team that opted for a manned aircraft paired a manned MC-12 with an MQ-1 Predator because they believed an adversary was less likely to shootdown a manned MC-12 than an RPA.

Table 4.9: Initial Deployment of Force, Wargame Team Outcomes

	Team 1	Team 2	Team 3	Team 4	Team 5	Team 6	Team 7	
Risk/Escalation								%
Minimize Risk of US Casualties	X	X	X	X	X	X	X	100%
Take steps to minimize risk to drone		X				X		28.6%
Reveals US Capabilities/Tech Loss Risk		X				X		28.6%
Adversary Reaction								
More Likely to Shoot Down Drone	X		X			X	X	57.1%
Capabilities								
Discussion of Capabilities vs. Risk			X	X	X			42.9%
Outcome	Drone	Drone	Manned + Drone	Drone	Drone	Drone	Drone	*Drone* 85.7%

The wargame revealed that military decisionmakers are more likely to deploy drones than similarly capable manned assets into harm's way. Indeed, participants in three of the seven teams (42.9%) suggested that the use of RPAs was an obvious choice. One Air Force aviator asked, "What's missing here? Why *wouldn't* you collect in an [unmanned] MQ-1?"[25] Another Air Force officer questioned, "why even bother with the [manned] MC-12?"[26] Underlying these reactions

[25] Participant HB2 (U.S. Air Force Officer), 17 November 2017.

[26] Participant HA4 (U.S. Air Force Officer), 17 November 2017.

was a strong desire to avoid the death or capture of friendly personnel. All seven teams, including the team that selected a manned aircraft for the mission, believed drones presented lower levels of risk to friendly forces than manned assets.

When making their decisions, the teams generally first considered the threat posed by adversary air defense forces. Most teams described primary risk to reconnaissance operations was the loss of friendly forces, but one team tried to more precisely define risk as the loss of lives, equipment, and the financial investment in highly trained aircrew personnel.[27] In line with this conception of risk, participants generally sought to minimize the potential of losing personnel. One naval officer captured the sentiment of many participants when advocating for a drone deployment: "Don't risk a life, send unmanned."[28] Another participant – a retired colonel who previously commanded air defense artillery units – declared to his teammates that a "drone allows [for] no captured or killed pilot."[29] But what specific factors led to this degree of risk aversion?

Some participants were particularly concerned that the downing of a manned aircraft would lead to a situation where captured American personnel could be used as a political bargaining chip. For instance, one participant with extensive experience in the special operations community explained, "If I lose a [remotely piloted aircraft], there are no prisoners of war. The MC-12 Liberty has U.S. personnel. I don't want our troops to be paraded in front of the television. I don't want a Gary Powers incident, and I don't want the adversary to be able to embarrass us."[30] In contrast to concerns about personnel loses, many participants expressed a relatively indifferent attitude

[27] Participant HA3 (U.S. Marine Corps Non-Commissioned Officer), 17 November 2017.

[28] Participant HA1 (U.S. Naval Officer), 17 November 2017.

[29] Participant LA4 (U.S. Army Officer), 17 November 2017.

[30] Participant LD2 (U.S. Army Senior Non-Commissioned Officer), 17 November 2017.

toward the loss of a drone. For instance, one military pilot emphasized the lack of a loss of human life by alluding to the practice of sending letters to next of kin following the on-duty death of a service member. He jokingly remarked, "who do you write a letter to if a drone is shot down?"[31] Another participant suggested that a remotely piloted Predator could be used as "bait to test adversary reactions."[32]

Other participants were concerned about the risks associated with actions that could follow an adversary's downing of a manned U.S. military aircraft. First, two of the seven (28.6%) teams discussed the risky search and rescue missions that would likely be deployed after the loss of a manned aircraft. One officer commented, "the survivors of a shoot down would incur rescue mission costs."[33] Another member of the same team – an Air Force officer who helped coordinate search and rescue missions in Afghanistan – agreed with this assessment, and explained how the loss of a manned aircraft "exposes others to risk" during rescue operations.[34] Deploying a RPA eliminated the possibility that additional personnel and assets would need to be dispatched on a high-risk rescue or recovery mission.

Second, some wargame participants were concerned the death or capture of American crewmembers could escalate the crisis with Katunia. While participants in most teams discussed the risks associated with losing personnel in general terms without specifying the risks or costs associated with personnel losses, two teams (28.6%) explicitly considered the heightened potential

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[31] Participant HD2 (U.S. Army Officer), 17 November 2017.

[32] Participant LB2 (U.S. Army Non-Commissioned Officer), 17 November 2017.

[33] Participant HA1 (U.S. Naval Officer), 17 November 2017.

[34] Participant HA4 (U.S. Air Force Officer), 17 November 2017.

for crisis escalation if a manned asset were lost.[35] One Air Force F-16 pilot remarked, "political consequences matter and manned assets are dangerous."[36] One of the pilot's teammates agreed, stating that the "risk of escalation is higher with manned [aircraft]."[37] In an effort to avoid this sort of escalation, a member of another team advocating for drone use commented that it is "important not to create an incident by not having a pilot shot down."[38]

The risk of losing friendly forces, however, was not the sole focus of discussions during the wargame. One of the seven teams (14.3%) dived into a conversation about escalation control by debating whether drones offered a more covert means of conducting reconnaissance operations. According to this team, the downing of a drone not only avoided the loss of friendly personnel byt also helped avoid retaliatory escalation by being more plausibly deniable than the loss of a manned aircraft. By reducing the likelihood that the downed drone could be attributed to the United States, participant believed Katunia would be less inclined to retaliate with force. One participant suggested that, "if we use unmanned, we can deny U.S. involvement" and that drones "increase deniability to a greater extent than manned [aircraft].[39] Another participant on the team agreed, acknowledging "drones are more covert."[40] Another Air Force officer commented that a drone offered "deniability" if it was shot down, helping to avoid an upward spiral in tensions.[41] The team

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[35] Participant HC2 (U.S. Army Officer), 17 November 2017

[36] Participant HC2 (U.S. Air Force Officer), 17 November 2017

[37] Participant HC1 (U.S. Army Officer), 17 November 2017

[38] Participant LD1 (U.S. Army Non-Commissioned Officer), 17 November 2017.

[39] Participant HB1 (U.S. Army Officer), 17 November 2017.

[40] Participant HB2 (U.S. Army Officer), 17 November 2017.

[41] Participant HB4 (U.S. Air Force Officer), 17 November 2017.

briefly considered whether using a manned aircraft painted in a civilian paint scheme would offer a similar degree of deniability, but later realized this sort of covert operation went beyond the scope of the wargame scenario and potentially violated the law of armed conflict. The team's perception that drones provide deniability lends support to the notion that drones expand a state's policy menu in a way that allows operations that are less confrontational than the deployment of manned assets.

As in the survey experiments, participants also considered asset capabilities. Even though participants were told that the remotely piloted MQ-1 Predator and the traditionally manned MC-12 Liberty had similar intelligence collection capabilities, three of the teams (42.9%) examined other aircraft characteristics such as speed, range, and detectability by adversary radars during their decision-making deliberations. For instance, some participants noted that the manned MC-12 flies faster than the Predator, but participants generally agreed that endurance mattered more for the mission at hand. One Air Force aviator commented that the ability of a drone to remain on-station above a target and to maintain a "persistent stare at a specific spot" made it better suited than a manned aircraft that lacked endurance.[42] Even when aircraft characteristics were discussed, these factors were largely overshadowed by concerns about reducing the risk to human life, suggesting that decisionmakers view drones as a low-risk means of carrying out military operations.

Despite the reduced risk associated with a drone deployment, teams voiced several concerns about sending remotely piloted aircraft into harm's way – in line with the amplified aggression hypothesis. First, some participants believed that Katunian forces might be more inclined to shoot down a drone than a manned aircraft. One officer viewed this as posing a "much

[42] Participant HB2 (U.S. Air Force Officer), 17 November 2017.

higher risk of escalation[.]"[43] In response, another member of the team suggested that should Katunia shoot down a drone, "we will likely let it slide," commenting that the United States took little action after Iran reportedly downed an advanced U.S. RQ-170 drone in 2011 – providing support for the restrained retaliation hypothesis.[44] Second, some participants feared the shootdown of a drone could lead sensitive technology to fall into the hands of adversaries.[45] These risks were seen as lower than the risk of losing personnel, but three of the teams still contemplated plans to mitigate risk to the drones that were deployed to the Dakastan-Katunia border. One team briefly considered escorting the RPAs with fighter jets, but decided this would be too escalatory. Another team tried to minimize the amount of time the drone would be in harm's way. A third team, developed a detailed risk mitigation strategy in which the drone approached from a direction that avoided Katunian air defense sites, operated at a relatively high altitude, and varied the times of day when the mission would fly. This team made a deliberate decision to reduce the risk to the drone, despite the likely degradation of intelligence by collecting imagery from further away from the target of interest.[46] The decisions of these teams provide support for the increased initiation hypothesis, but also highlight that drones are not necessarily seen an expendable asset that can be deployed with little forethought.

The sole team that opted to deploy the manned MC-12 coupled the manned deployment with the deployment of a remotely piloted Predator. The team believed an inhabited aircraft offered better intelligence gathering capabilities and was less likely to be shot down than a remotely piloted

[43] Participant HD2 (U.S. Army Officer), 17 November 2017.

[44] Participant HD4 (Department of Defense Civilian), 17 November 2017.

[45] Participant LC4 (U.S. Army Officer), 17 November 2017.

[46] Participant LC4 (U.S. Army Officer), 17 November 2017.

aircraft. The team began their discussion in a manner similar to the teams that deployed remotely piloted aircraft. Participants described how manned deployments involved higher risk and appeared ready to settle on the deployment of a remotely piloted Predator. Indeed, one team member asked, "Any reason to use Liberty?"[47] Another questioned whether there was any "advantage to manned aircraft?"[48] The direction of the conversation shifted when a Special Forces veteran posited that "manned has better awareness than a limited sensor. Pilots have situational awareness that drones don't have."[49] Some participants appeared to become more risk acceptant after being told that inhabited aircraft might provide better operational awareness. One Army non-commissioned officer commented, "No one signs up for risk free. Calculated risk is what we do."[50]

Participants in this team soon began highlighting other perceived benefits of using manned aircraft. Specifically, participants suggested that adversaries "might be more reticent to shoot down a manned aircraft" and that an "adversary will see lower regret for firing on a drone."[51] Building on the belief that an adversary was less likely to target a manned aircraft, the participant suggested, "If [we're] going to use manned, now is the time to do it," given that the crisis was in a relatively early stage and risk levels were perceived to be low.[52] The team eventually settled on deploying a drone as the primary intelligence collection asset, but also proposed an alternate plan of flying both a manned and remotely piloted aircraft in order to maximize intelligence collection.

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[47] Participant LD1(U.S. Army Non-Commissioned Officer), 17 November 2017.

[48] Participant LD3 (U.S. Army Officer), 17 November 2017.

[49] Participant LD2 (U.S. Army Senior Non-Commissioned Officer), 17 November 2017.

[50] Participant LD1 (U.S. Army Non-Commissioned Officer), 17 November 2017.

[51] Participant LD2 (U.S. Army Senior Non-Commissioned Officer) and Participant LD4 (U.S. Navy Petty Officer), 17 November 2017.

[52] Participant LD2 (U.S. Army Senior Non-Commissioned Officer), 17 November 2017.

Summary of Wargame Findings

The wargame findings generally align with those from the survey experiments, but demonstrated two noteworthy decision-making dynamics. First, despite the lower operational risk in the wargame scenario than in the survey experiment scenario (i.e. reconnaissance in friendly airspace versus a strike in a rival state's territory), participants still opted to initiate military operations using drones instead of manned assets. The wargame discussions reveal that this preference for drones is driven in large part by the lack of friendly crewmember on board. Removing friendly forces from front lines not only reduces the risk of personnel losses, but also allows states to deny involvement in drone operations. Both of these mechanisms provide an off-ramp to escalation that military decisionmakers take into account when making decisions on whether to initiate military operations.

Second, the wargame outcomes highlight how interaction between decisionmakers can influence national security policymaking. Unlike the survey experiments which are completed in isolation, the wargame allowed for discussion between national security practitioners. Participants were able to draw upon the subject matter expertise of their teammates – which in some cases shifted decisions. For instance, the team that decided to deploy both manned and unmanned aircraft shifted their decision from a purely drone mission after a single participant expressed his belief that manned aircraft offered better situational awareness of the operational environment than a drone aircraft. In a real-world setting, a single practitioner – perhaps a senior officer or subject matter expert – could have a similar influence on shaping policy outcomes.

CONCLUSION

The survey experiments and wargame provide significant support the increased-initiation hypothesis. The findings also align with existing theoretical and empirical studies that argue that drones – and other technologies that lower the cost and risk of military operations – allow states to more frequently initiate military operations.[53] The qualitative data gathered using the survey instruments and during wargaming sessions suggest that decisionmakers considered a host of related factors – including risk to friendly forces, likelihood of mission success, platform capabilities, and risk of escalation – when deciding whether to initiate or support the use of military operations during crises. The lower risk to friendly forces, however, generally made drones a preferred option. Unsurprisingly, neither military decisionmakers nor members of the public explicitly referenced the greater expected utility that drones offered relative to manned assets or ground forces. Many survey respondents and wargaming respondents, did however, describe how drones reduced the potential dangers and human costs of military operations – suggesting that technologies that remove warfighters from harm's way actually do shift the decision-making calculus on the use of force.

The empirical tests presented in this chapter also address questions left unanswered by many previous studies on the effect that drones have on the initiation of military force. Specifically, how do drones affect decision-making by national security practitioners on the use of force? Most existing research on the effects of drones on conflict dynamics draws data from public samples, without exploring the preferences of military professionals who actually make decisions on the use of force.[54] The assumption in these analyses is that increased support for drone operations among the public decreases political barriers to the use of force. In turn, policymakers are more

[53] Kaag and Kreps, *Drone Warfare*; Walsh and Schulzke, *The Ethics of Drone Strikes: Does Reducing the Cost of Conflict Encourage War?*; Schneider and Macdonald, *U.S. Public Support for Drone Strikes: When Do Americans Prefer Unmanned over Manned Platforms*.

[54] One notable exception is Julia Macdonald and Jacquelyn Schneider, "Battlefield Responses to New Technologies: Views from the Ground on Unmanned Aircraft," *Security Studies* (Forthcoming). Macdonald and Schneider examine the preferences of tactical level military joint terminal attack controllers during ongoing combat operations, rather than more strategic questions concerning the initiation of military operations.

prone to initiate military operations. These studies offer important insights as public opinion can cue foreign policy decisions. Yet, as chapter 2 lays out, military and civilian intelligence professionals also play a key role in decisions on the use of force: they provide civilian leaders with policy options and, as described earlier, may make tactical choices with strategic ramifications.

The experiments demonstrate that both military officers and members of the public generally prefer drone operations to those conducted by manned assets or ground forces. But there are important limitations to the increased initiation hypothesis. The hypothesis expects states to initiate military operations that they might not otherwise launch without access to drones only when all other features of the crisis scenario and potential military response are constant. That is, drones must have the same chance of carrying out a mission as other military approaches. If these factors vary, which is apt to happen in the real world, decisionmakers will be forced to make tradeoffs. Indeed, the findings here suggest that members of the public are more willing to deploy friendly troops into harm's way on a mission that will be successful than a drone into a mission that is likely to fail. Still, the findings demonstrate that drones expand the policy menu for decisionmakers and allow them to initiate military operations they would otherwise avoid.

What implications might these findings have on actual decisions surrounding the use of force? One important set of questions deals with how policymakers and national security decisionmakers will balance the tradeoff between effectiveness, risk to friendly forces, and financial costs. To what extent will civilian policymakers consider the opinions and preferences of the public? The public appears more supportive of deploying manned aircraft or ground forces that will successfully accomplish a mission than dispatching a drone, even if a manned deployment incurs greater risks and costs. Do civilian foreign policy elites hold the same preferences as members of the public? Or, would policymakers – with their greater experience in national security affairs than the average survey respondent – be willing to support drone operations that are marginally less effective than manned or ground operations in an effort to avoid friendly force casualties and the associated political costs. The willingness to make this tradeoff would likely depend on the stakes associated with the mission. Leaders should logically be more likely to accept greater risk for missions with higher stakes. While the surveys and wargames do not test these questions and implications directly, I probe some of these issues in the case studies in chapters 6 and 7. I also explore some of the questions highlighted above in the dissertation's concluding chapter.

The findings presented in this chapter also do not explore what happens once drones are deployed. Specifically, do drones can help control escalation dynamics once they are deployed in a crisis setting? To study how drones shape the trajectory of a crises after their initial deployment, the next chapter presents findings from several additional survey experiments and experimental manipulations embedded in wargames to test whether drones can mitigate escalatory spirals.

Chapter 5

Controlling Escalation

The June 2017 intrusion of an Iranian drone into Pakistan's airspace suggests states might more frequently initiate military operations when their arsenals include drones. But what can events like the Iranian drone incursion teach us about escalation control? On one hand, Pakistan quickly intercepted and downed the intruding drone – something it had avoided during the few earlier incidents where manned Iranian aircraft penetrated Pakistani airspace.[55] At the same time, the downing of the drone did not trigger any escalation. Indeed, the Iranian government made no public comment about the loss of their drone.[56] In stark contrast, Iranian officials publicly threatened to launch military strikes on Pakistani territory after Pakistan-based militants attacked Iranian security forces just one month earlier in May 2017.[57] The Iran-Pakistan incident suggests that deployments involving drones are less likely to escalate into broader conflicts than those that place friendly personnel in harm's way.

The behavior of the Pakistani and Iranian governments is largely consistent with the *restrained retaliation* and *amplified aggression* logics introduced in chapter two. The restrained retaliation hypothesis posits that an actor's response following an attack on its drones will be less

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55 Siddiqui, "Iranian Drone Shot down by PAF, Confirms FO"; Baloch, "Iranian Helicopter Violates Pakistan Airspace."

56 Madeeha Anwar and Mehdi Jedinia, "Will Downing of Tehran Drone Hurt Pakistan-Iran Relations Further?," *Voice of America*, June 24, 2017, https://www.voanews.com/a/will-downing-tehran-drone-hurt-pakistan-iran-relations-further/3914553.html.

57 Anwar and Jedinia. Pakistan and Iran eventually formed a joint commission to secure borders and control militant activity.

intense and escalatory than a response to an attack on manned assets or ground forces. Because attacks on remote warfighting systems generally do not endanger friendly personnel and because drones are typically less costly than their manned equivalents, military decisionmakers may see less need to carry out retaliatory strikes aimed at degrading a rival's capabilities. At the same time, attacks on unmanned assets are less likely to trigger the types of emotions – like anger – that can drive retaliatory behavior. Beyond national security practitioners, members of the public may be less likely to support retaliation when only machines, and not women and men in uniform, are lost. Public opinion may subsequently shape the decisions of elected government officials.

If military decisionmakers mirror their preferences onto a rival, and believe a rival will restrain retaliation following attacks on drones, they may be more likely *amplify aggression* by taking more forceful action against intruding drones than against manned platforms. This logic might explain why Pakistan targeted Iranian drones, but not manned Iranian aircraft, that penetrated into its airspace. Even though the availability of drones may allow states to more frequently initiate military operations and take action against intruding aircraft, these actions need not lead to escalatory spirals. Instead, decisionmakers may restrain retaliation after a confrontation involving a drone, providing an opportunity to deescalate otherwise tense confrontations.

As in chapter 4, I use a series of survey experiments and wargames to test the restrained retaliation and amplified aggression hypotheses, and to probe whether the use of drones helps temper escalation during interstate crises. The survey experiments allow me to quantitatively measure escalation along a vertical scale and to compare the preferences of military professionals to those of members of the general public. The wargames provide rich qualitative data that shed light on the assumptions and decision-making processes of military officers. The survey experiments and wargames expose participants to an intrusion scenario and a shootdown scenario.

The intrusion vignette asks participants how they would respond to an armed adversary aircraft that penetrates friendly airspace, while the shootdown scenario examines what type of retaliation respondents call for after a rival shoots down an unarmed reconnaissance aircraft. Using the same approach as in the previous chapter, I vary whether the aircraft involved in each of these scenarios is a manned aircraft or drone.

The experiments and wargames find support for both the restrained retaliation and amplified aggression hypotheses. Military officers and members of the public are more likely to initiate or advocate for aggressive responses after the loss of a manned aircraft, citing the need to protect American pilots or to avenge their death. These reactions are more escalatory than those that follow attacks on remotely piloted drones. While the death of a friendly pilot dominated wargaming discussions and free form responses in the survey experiment, the data yield an interesting finding: even when a pilot is not killed in the shootdown of a manned aircraft, military officers and members of the public call for more escalatory responses than after an attack on a drone. This suggests respondents' behavior is driven not only by the death of American servicemember, but rather because they view drones and manned aircraft as fundamentally different types of military technologies.

The findings also provide support for the amplified aggression logic. Respondents were more apt to take aggressive actions against a rival's drones than their manned platforms, believing that an attack on the former was less likely to result in broader escalation. The deployment of drones in lieu of manned aircraft therefore seems to help control escalatory spirals.

EVIDENCE FROM SURVEY EXPERIMENTS

Testing Restrained Retaliation

The first set of experiments are designed to test the restrained retaliation hypothesis. They expose field grade military officers (n=78) to an attack on a U.S. reconnaissance aircraft operating in international airspace. Respondents are told, "A rival country shot down a manned U.S. Air Force U-2 reconnaissance aircraft (or remotely piloted U.S. Air Force Global Hawk reconnaissance drone) using a surface-to-air missile." To make it clear the rival country violated international law and carried out an act of aggression, the vignette describes how the aircraft was "on a routine mission and was operating in international airspace at the time of the shoot down."[58] The vignette then describes what happened to the American aircraft and crewmember. Respondents in the drone condition are told, "The Global Hawk drone was destroyed and there was no loss of U.S. life because no pilot is onboard the Global Hawk." Respondents in the manned aircraft condition are all told that the "U-2 was destroyed", but I vary what happens to the pilot: "the American pilot was killed", "adversary forces are currently holding the American pilot as a prisoner", or "U.S. forces rescued the American pilot shortly after the shoot down."[59] This variation allows me to explore the extent to which the death of an American pilot shapes retaliatory behavior. To measure preferences for retaliation, the survey instrument asks, "Which of the following U.S. actions would you be most supportive of in response to the shoot down?" Respondents select from five options: 1) no action; 2) formal diplomatic protest; 3) economic

[58] Under international law, state aircraft (which include military aircraft) can operate freely in international airspace, without interference from other states.

[59] Appendix F includes full text of the survey instrument. Appendix H, Section 2.1 includes statistical checks to ensure assignment to treatment was random. I also conducted manipulation checks to see whether respondents recognized treatment; over 90-percent of respondents in each condition passed the manipulation check.

sanctions against the rival country; 4) show of U.S. military force in vicinity of the rival country; or 5) limited airstrike against the missile site that downed the aircraft. These are coded along an ordinal 5-point scale where no action is the least escalatory action (1) and limited airstrikes is the most escalatory (5).[60]

Consistent with the restrained retaliation logic, military officers, on average, call for less escalatory acts of retaliation following an attack on a remotely piloted drone than on a manned aircraft (See Table 5.1). When a rival shoots down a drone, 36.9% of military respondents call for a military response (15.8% support a show of force and 21.1% support limited military strikes). In contrast, when a friendly pilot is killed in the rival's shootdown of a manned aircraft, 80.9% of military respondents support a military response (23.8% support a show of force and 57.1% support limited military strikes).

At the surface, these findings suggest that military officers support less escalatory retaliation when a pilot is not killed. If true, responses to the downing of manned aircraft without the death of a pilot (i.e. the pilot is captured or rescued) should be just as restrained as responses to the loss of a drone. Table 5.1 reveals that military respondents, on average, call for less escalatory retaliation when a manned aircraft is shot down without the loss of life than when a pilot is killed during a shootdown. However, these responses are, on average, not as restrained as the response to the downing of a drone. This suggests that military officers respond not only to the death of a friendly servicemember, but treat drones and inhabited aircraft as qualitatively different types of systems.

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[60] To be sure, there exist response options that are more escalatory than a tit-for-tat use of force. Given the literature suggesting that reprisals are often of a tit-for-tat nature, the survey instrument's most escalatory option is a limited airstrike on the missile site responsible for the shootdown. Future studies could include a more escalatory response option to assess whether respondents are willing to launch disproportionate acts of retaliation.

Table 5.1: Mean Response Level to Shootdown (Military Sample)

Type of Shootdown	Mean Response Level
Manned Aircraft, Pilot Killed	4.238 (.238)
Manned Aircraft, Pilot Captured	3.737 (.252)
Manned Aircraft, Pilot Rescued	3.865 (.254)
Drone (No pilot onboard)	3.106 (.295)

Retaliatory preferences are measured on a five-point scale, where 1 is "no action" and 5 is "a limited airstrike against the missile site that downed the aircraft." Standard errors in parentheses. The effect of experimental conditions on retaliatory preferences is significant at the $p<.01$ level for drone and manned/killed treatment, but there is no statistically significant difference in retaliatory preferences between the captured and rescued conditions.

Table 5.2: Response to Shootdown, Percentages (Military Sample)

Shoot Down Type	Do Nothing	Diplomatic Protest	Economic Sanctions	Show of Force	Limited Strikes
Manned Aircraft, Pilot Killed *n=21*	0% n=0	14.3% n=3	4.8% n=1	23.8% n=5	57.1% n=12
Manned Aircraft, Pilot Captured *n=19*	0% n=0	21.1% n=4	10.5% n=2	42.1% n=8	26.3% n=5
Manned Aircraft, Pilot Rescued *n=19*	0% n=0	15.8% n=3	31.6% n=6	21.1% n=4	31.6% n=6
Drone (No pilot onboard) *n=19*	5.3% n=1	36.8% n=7	21.1% n=4	15.8% n=3	21.1% n=4

Several factors may shape the divergent response to attacks on drones and manned systems in which crewmembers are not killed. First, military officers may perceive an attack on a manned system as signaling a rival's intent and capability to kill U.S. servicemembers. Even if an attack results in no loss of life, the rival has demonstrated its willingness to use force against friendly personnel. Such a move might cross a salience threshold that an attack on a remotely piloted drone does not. The lack of casualties in these attacks on manned assets may not be seen as the result of the rival's deliberate actions, but instead, as the result of chance – something beyond the rival's control. As a result, military personnel may be less restrained in their retaliatory moves. Second, the loss of a manned aircraft may be seen as generating greater financial costs for the deploying state. Although remotely piloted assets are by no means cheap, they often have a lower per unit cost than their manned counterparts.[61] The higher cost of losing a manned asset may lead personnel to take more escalatory action aimed at deterring the rival from taking additional, costly actions.

To unpack the factors that drive preferences toward retaliation, I turn to qualitative data collected from each respondent. As in the other survey experiments, I ask respondents to "write a sentence or two telling us why [they] chose [their] response." I then manually code these responses into one of seven typologies. Although the small size of the military sample limits the generalizations that can be drawn from this analysis, military officers are more likely to believe they need to demonstrate American resolve and protect American military operations after an attack on a manned platform results in the death of a pilot than in response to attacks on manned or drone aircraft that do not result in deaths. The responses also highlight many of the instrumental factors associated with the restrained retaliation hypothesis.

Table 5.3: Qualitative Justifications for Response to Shootdown (Military Sample)

Decision Logic	Manned, Killed	Manned, Captured	Manned, Rescued	Remotely Piloted Aircraft
Shoot down was low stakes	0% n=0	0% n=0	0% n=0	0% n=0
Proposed action does not risk US lives	0% n=0	0% n=0	0% n=0	0% n=0
Allows for action w/o significant use of force	20% n=4	21.1% n=4	36.8% n=7	26.3% n=5
Gradual response	10% n=2	26.3% n=5	10.5% n=2	15.8% n=3
Need to demonstrate resolve/protect interests	65% n=13	42.1% n=8	42.1% n=8	42.1% n=8
Best Solution	0% n=0	5.3% n=1	5.3% n=1	5.3% n=1
Insufficient Information/No Opinion	5% n=1	5.3% n=1	5.3% n=1	10.5% n=2

[61] The complex communication and support infrastructure supporting drone operations, can push up operating costs, even if unit costs remain low. For an assessment about the complexities and costs of systems like drones, see Gilli and Gilli, "The Diffusion of Drone Warfare?," January 2016.

Attacks on manned aircraft generally focused on the need to degrade rival capabilities, to protect future operations, or to punish the rival for violating international law. One Air Force major who supported airstrikes after the death of a pilot explained, “As a military member, my response is inclined to support the removal of any future threat by a kinetic reaction against the missile strike.” Another officer who supported a show of force in response to the death of an American pilot argued that a response was necessary to punish the rival for its aggression and violation of international law: “Shooting down and killing a pilot in international [airspace] should be dealt with severely because of its aggressive nature and challenge to established international law and norms.” Surprisingly, the qualitative responses focused primarily on instrumental factors and made few references to emotions as a driver of retaliation.

While many officers believed the death of a friendly pilot warranted a strong response, they also sought to minimize the risk of large-scale escalation. One respondent noted, a “limited airstrike is hardly limited when against sovereign…territory of a highly nationalistic regional power.” In explaining his support for a show of force, the respondent explained, “Economic sanctions are ‘easy’ and the competitor has likely accepted those costs…you have to show you do not accept their ‘sphere of influence’ attempt and…demonstrate power projection capability regardless of what they do.” Another respondent, an aviator, was more explicit about the risks of launching airstrikes in response to the death of a pilot: “The US conducting a limited airstrike on the enemy missile site would in fact violate that nation’s sovereignty and escalate the situation. A show of US military force in the vicinity of the country while remaining outside sovereign borders reinforces…that the US respects and is operating in accordance with international law and that the adversary is the nation who is in violation.”

Although attacks that killed an American pilot resulted in more escalatory retaliation than those that did not, military officers still often believed some response was necessary after attacks on drones and on manned aircraft that did not result in crewmember deaths. Indeed, one Air Force lieutenant colonel responding to the loss of a drone suggested that "whether it was an RPA or manned aircraft should be immaterial to the policy response. The loss of a life if it was manned would be far more tragic, but we should respond even if a pilot wasn't killed." There was, however, significant variation over the appropriate level of response in cases where the pilot was not killed or in response to an attack on a drone.

One Air Force aviator with drone experience invoked the logic of tit-for-tat responses, stating that a retaliatory airstrike "is an immediate proportionate action to the aggressor." On the most aggressive end of the spectrum some respondents called for airstrikes. These officers generally believed that strong military actions were needed to punish the rival and prevent future attacks, even if a pilot was not killed in the shootdown. One lieutenant colonel suggested that an attack on manned aircraft "requires a response to both punish the perpetrator and deter other states from similar actions." Another Air Force officer suggested that the strike should "take out the implement [that carried out] that attack to deter future strikes against similar missions" even if the pilot was captured by the rival. "Anything less would be an act of weakness and enable the rival power to continue being belligerent," noted another respondent.

While some military officers called for harsh retaliation even when no Americans were killed in the shootdown, loss of life appeared to be an important threshold for many respondents. One officer who supported a show of force in response to an attack on a drone explained that "retaliatory strikes would be more appropriate if US personnel were injured or killed." Indeed, many military respondents explicitly sought to avoid escalation when a drone was attacked or when there was no loss of life in a manned shootdown. In response to a drone shootdown, one lieutenant colonel called for diplomatic measures, arguing that "military retaliation is just going to escalate kinetic conflict and turn international support against you."

Others tried to identify responses that were – in Thomas Schelling's language – in the "same currency" as the initial transgression, while still mitigating the risks of provoking larger escalation. For instance, an Air Force major who supported a show of force after a U-2 pilot was captured explained, "though justified in the limited strike we must consider is war or limited war a cost we fully want to engage." Another officer who called for a show of force after the rescue of a downed pilot commented, "Economic sanctions are too loosely tied to the event, but an actual attack into another country would probably uncontrollably escalate the situation." Efforts to prevent escalation were understandably quite present in cases where the pilot was captured. One officer commented, "Despite the fact that economic sanctions are not targeting the source of the issue, at a minimum [they demonstrate] a level of punishment on the government. It also allows time for diplomatic dialogue…The end goal is the release of the American servicemember, an attack would likely not bring that end state about." Despite this variation, retaliation was, on average, less escalatory when a drone – rather than manned aircraft – was downed.

The experimental findings from the military sample find support for the restrained retaliation hypothesis and the instrumental logics that underpin it. Yet as chapter 2 describes, military decisionmakers at the tactical and operational levels are only one set of actors that can influence whether a crisis escalates. Indeed, the preferences of the public may be particularly important cues for policymakers in a scenario where a state is the victim of attack by another state. In these cases, policymakers may fear political consequences for failing to meet the demands of their constituents.

In February 2019, for instance Indian Prime Minister Narendra Modi faced significant public pressure to respond militarily to a terrorist attack on Indian troops carried out by a Pakistan-based terrorist organization. Having criticized his predecessor for being weak against terror and having pledged to wage war on Pakistani-backed terrorists as part of his reelection campaign, Modi launched airstrikes that attempted to target a suspected terror camp in Pakistan.[62] The strikes represented a significant escalation as it was the first time in five decades that Indian military aircraft had crossed into Pakistan's airspace to carry out a combat mission.[63] During the operation, Pakistan shot down an Indian fighter jet and captured its pilot. This event triggered additional pressure for Modi to take retaliation. As a result, India's National Security Advisor reportedly spoke to the head of Pakistan's Inter Services Intelligence and threatened to launch additional mission strikes on Pakistan.[64] Although Pakistan released the pilot before missile strikes could be carried out, India's actions and threats provides evidence to suggest that leaders are responsive to public demands for retaliation to attacks on their personnel.

[62] Whether India successfully struck a terrorist training camp is a matter of debate. Open source satellite imagery after the strikes revealed no significant damage, see Christopher Clary, "After Terrorist Attack in Kashmir, Will India Seek Vengeance or de-Escalation?," *The Washington Post*, February 25, 2019, https://www.washingtonpost.com/politics/2019/02/25/after-terrorists-attacked-kashmir-will-india-seek-vengeance-or-de-escalation/?utm_term=.5fc89f44406a.mage in the target area. Vaibhav Tiwari, "'Fire In My Heart...': PM Modi's Outrage On Pulwama Terror Attack," NDTV.com, February 17, 2019, https://www.ndtv.com/india-news/prime-minister-narendra-modis-outrage-on-pulwama-terror-attack-fire-in-my-heart-1994885; Maria Abi-Habib and Austin Ramzy, "Indian Jets Strike in Pakistan in Revenge for Kashmir Attack," *The New York Times*, February 25, 2019, https://www.nytimes.com/2019/02/25/world/asia/india-pakistan-kashmir-jets.html. Whether India successfully struck a terrorist training camp is a matter of debate. Open source satellite imagery after the strikes revealed no significant damage, see Marcus Hellyer, Nathan Ruser, and Aakriti Bachhawat, "India's Strike on Balakot: A Very Precise Miss?," The Strategist, March 27, 2019, https://www.aspistrategist.org.au/indias-strike-on-balakot-a-very-precise-miss/.

[63] Maria Abi-Habib, "After India's Strike on Pakistan, Both Sides Leave Room for De-Escalation," *The New York Times*, February 27, 2019, https://www.nytimes.com/2019/02/26/world/asia/india-pakistan-kashmir-airstrikes.html.

[64] Sanjeev Miglani and Drazen Jorgic, "India, Pakistan Threatened to Unleash Missiles at Each Other: Sources," *Reuters*, March 17, 2019, https://www.reuters.com/article/us-india-kashmir-crisis-insight-idUSKCN1QY03T.

To study whether the public calls for restrained retaliation after attacks on drones, I field a similar experiment on a public sample (n=1609). The vignette remains unchanged, but the larger sample allows me to add one additional experimental manipulation. Unlike the experiment fielded on the military sample, which holds the rival state's strength constant ("The adversary is a militarily strong regional power"), this survey varies whether the adversary is militarily "strong" or "weak." This additional information allows me to test whether and how relative power influences decisions on retaliation. Logically, respondents should be more likely to call for escalation against weaker adversaries than stronger ones, because their likelihood of success is higher. This results in the 2 x 4 factorial design depicted in Table 5.4, below.

Table 5.4: Treatment Table (Public Sample)

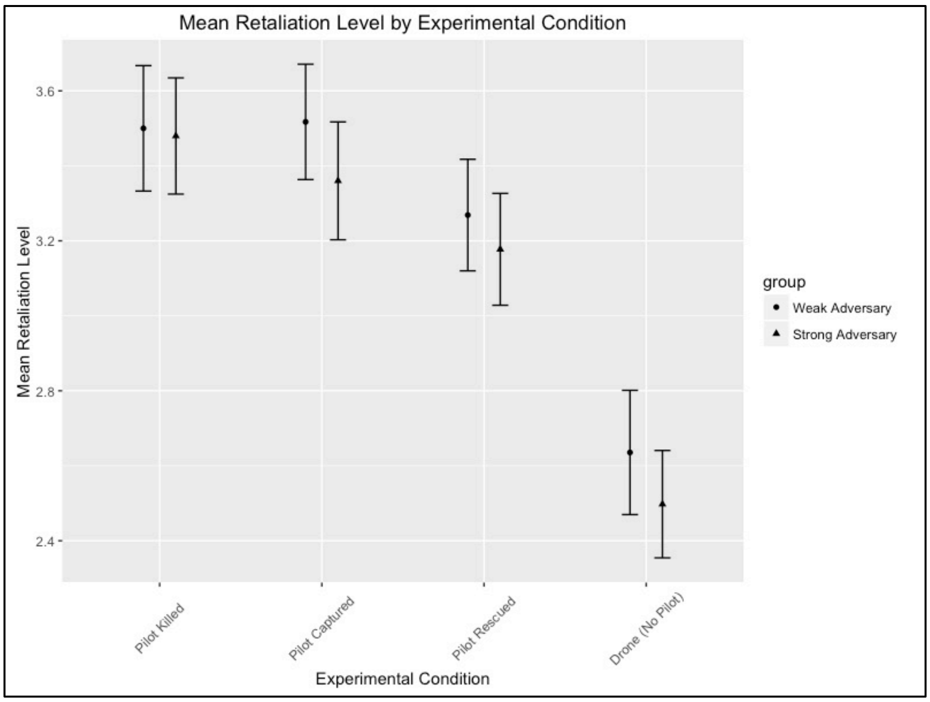
	Manned, Pilot Killed	*Manned, Pilot Captured*	*Manned, Pilot Rescued*	*Remotely Piloted Drone*
Weak Adversary	*n*=200	*n*=203	*n*=201	*n*=203
Strong Adversary	*n*=196	*n*=200	*n*=203	*n*=203

Note: *n* represents the number of respondents randomly assigned to each experimental condition in the U.S. public sample.

After verifying random assignment of subjects to experimental conditions and conducting a manipulation check, I compare the mean retaliation level across treatment conditions. Like their military counterparts, the public supports the most escalatory responses when an adversary attacks a manned aircraft and kills an American pilot. Preferences for retaliation among the public sample are most restrained when a strong adversary shoots down a drone (Table 5.5, Figure 5.1).

As with the military sample, the mean retaliation for an attack on a manned aircraft in which the pilot is rescued lies between that of an attack that kills the pilot and an attack on a drone. Interestingly, however, respondents, on average, support similarly aggressive responses after a weak rival captures a downed pilot than when the pilot is killed in the shootdown.[65] The experiment also finds that respondents are likely to support harsher retaliation against a weak regional power than against a strong regional power. These findings are not surprising, as respondents may fear that taking action against a strong regional power may be militarily riskier, incur more costs, and perhaps draw the United States into a broader conflict.

Figure 5.1: Mean Response to Shootdown by Treatment (Public Sample)



The similar mean level of escalation in the "manned aircraft/pilot killed, weak state" and "manned aircraft/pilot captured, weak state" conditions suggests members of the public might be punishing a weak rival for taking actions that *could* have resulted in the death of the pilot. Because the adversary is weak, respondents may believe that limited strikes are less likely to result in the broadening or intensification of a conflict in a way that threatens the United States. To be sure,

[65] There is no statistically significant difference between preferences for escalation between the "manned aircraft/pilot killed, weak state" and "manned aircraft/pilot captured, weak state" experimental conditions.

relatively few respondents ever call for the most escalatory response – strikes on the missile site that downed the aircraft – even when the pilot is killed. However, the percentage of respondents calling for a strike on the missile site is significantly lower when a drone – and not a manned aircraft - is attacked. These findings provide support for the restrained retaliation logic among members of the public.

Table 5.5: Mean Response to Shootdown (Public Sample)

Shootdown Type	**Weak Adversary** *Mean Retaliation Level*[1]	**Strong Adversary** *Mean Retaliation Level*[1]
Manned, Pilot Killed	3.50 (.00)	3.48 (.08)
Manned, Pilot Captured	3.52 (.08)	3.36 (.08)
Manned, Pilot Rescued	3.27 (.08)	3.18 (.08)
Drone	2.64 (.08)	2.50 (.07)

Retaliatory preferences are measured on a five-point scale. 1 is “no action” and 5 is “a limited airstrike against the missile site that downed the aircraft”. Standard errors in parentheses. The effect of experimental conditions is significant at the p<.001 level.

Table 5.6: Response to Shootdown, Percentage (Public Sample)

Shoot Down Type	**Do Nothing**	**Diplomatic Protest**	**Economic Sanctions**	**Show of Force**	**Limited Strikes**
Manned Aircraft, Pilot Killed, Weak *n=200*	4% n=8	18% n=36	32% n=64	16% n=32	30% n=60
Manned Aircraft, Pilot Killed, Strong *n=196*	1.5% n=3	20.4% n=40	30.1% n=59	24.5% n=48	23.5% n=46
Manned Aircraft, Pilot Captured, Weak *n=203*	3% n=6	17.7% n=36	27.1% n=55	29.1% n=59	23.2% n=47
Manned Aircraft, Pilot Captured, Strong *n=200*	3.5% n=7	23.5% n=47	25% n=50	29.5% n=59	18.5% n=37
Manned Aircraft, Pilot Rescued, Weak *n=201*	4% n=8	18.9% n=38	40.3% n=81	19.9% n=40	16.9% n=34
Manned Aircraft, Pilot Rescued, Strong *n=203*	4.9% n=10	21.7% n=44	38.9% n=79	19.7% n=40	14.8% n=30
Drone Weak *n=203*	17.2% n=35	35.5% n=72	23.6% n=48	13.8% n=28	9.9% n=20
Drone Strong *n=203*	12.8% n=26	46.8% n=95	24.6% n=50	9.4% n=19	6.4% n=13

I also examine data from the public sample for heterogeneous treatment effects.[66] Unsurprisingly, respondents with more conservative political leanings and those with more interventionist perceptions are more supportive or more escalatory acts of retaliation. Veteran status has no significant effect on support for retaliation.

To probe why respondents prefer more escalatory retaliation following an attack on a manned aircraft than on a remotely piloted drone, I again turn to analysis of responses to an open-ended question. The qualitative data suggest respondents overwhelmingly view attacks on drones as falling below the threshold needed to justify significant use of force in retaliation. As a result, respondents are, on average, less likely to believe the United States must demonstrate resolve or take actions to defend its national interests after the downing of a drone. Since less is at stake when a drone is lost, the population is satisfied with less aggressive responses, limiting the potential that an isolated incident will spill over into a broader conflict. These responses largely align with those in the military sample, suggesting that military personnel and civilians have similar beliefs regarding restrained retaliation.

Like the military respondents, many members of the public sample viewed an attack on a drone as not requiring a significant military response. One respondent, for instance, explained, "It was simply a drone being destroyed. If it was an aircraft carrying soldiers, that would be a different story. No action needed because no harm done beyond the loss of a drone." Another commented, "No Blood, No Foul" suggesting that the attack on a drone as a non-issue since no American military personnel were injured or killed.

[66] See Appendix H, Section 2.2 for analysis of heterogeneous treatment effects.

In contrast, one respondent noted that, “shooting down a [manned] spy plane over international waters is a clear act of aggression against my country. Anything short of a military show of force will show us as weak.” Another respondent commented, “Basically eye for an eye.” To be sure, not all respondents believed the death of an American pilot warranted a harsh response. Some respondents suggested the rival state was justified in shooting down the aircraft because “it posed a threat.” Others suggested hoped to avoid escalation. “One small incident does not need to escalate tensions,” argued one respondent. Arguments of this sort, however, were less common than calls for more aggressive responses.

As with the military sample respondents supported more aggressive retaliation to the downing of manned aircraft, but also sought to avoid taking actions they believed had the potential to trigger a regional conflict. One respondent who called for a show of force after an attack that killed the U.S. pilot explained, “they used weapons and killed one of our men[.] It’s important to show that we won’t be bullied. Still, I would refrain from actions that might lead to immediate war.”

Although the findings presented in Tables 5.5 and 5.6 show that respondents are less likely to support hostile action against strong actors, there is little discussion of relative state power in the free text responses. Some respondents suggest that military action against weak states are more likely to be successful. For example, one respondent argued, “They have our prisoners under their control and are weak. US military is strong and can get these guys back home.” Most references to power, however, often suggest that the United States should temper its responses when dealing a militarily weak rival. For instance, one respondent who recommended sanctions in response to an attack on manned aircraft (pilot rescued) commented, “The adversary is also weak militarily so I don't think they would think they could really take us on so if we do show military force, it may look like overkill." Another noted that, "There is nothing to be gained by a more drastic response" by carrying out military operations against a weak state that had downed an RPA. Thus, while strength of a rival actor plays a role in in informing preferences toward retaliation, the type of aircraft attack seems to carry more weight in influencing the formation of preferences.

Table 5.7: Qualitative Justifications for Response to Shootdown (Public Sample)

Decision Logic	Manned, Killed, Weak Rival	Manned, Killed, Strong Rival	Manned, Captured, Weak Rival	Manned, Captured, Strong Rival	Manned, Rescued, Weak Rival	Manned, Rescued, Strong Rival	Drone, Weak Rival	Drone, Strong Rival
Shoot down was low stakes	0.5% n=1	2% n=4	1% n=2	1.5% n=3	7.5% n=15	8.4% n=17	34.5% n=70	39.4% n=80
Proposed action does not risk US lives	1.5% n=3	2.6% n=5	4.9% n=10	5% n=10	1.5% n=3	2.5% n=5	1% n=2	2% n=4
Allows for action w/o significant use of force	40% n=80	40.8% n=80	30% n=61	31.5% n=63	41.3% n=83	41.9% n=85	25.6% n=52	28.6% n=58
Gradual response	5% n=10	3.6% n=7	8.9% n=18	10.5% n=21	5% n=10	4.9% n=10	4.4% n=9	3% n=6
Need to demonstrate resolve/protect interests	43% n=86	39.8% n=78	41.4% n=84	35.5% n=71	27.4% n=55	31.0% n=63	18.7% n=38	14.3% n=29
Best Solution	2% n=4	4.1% n=8	6.4% n=13	6% n=12	6% n=12	5.4% n=11	6.9% N=14	2.5% n=5
U.S. Reconnaissance Wrong	0.5% n=1	0.5% n=1	0.5% n=1	0% n=0	0.5% n=1	0.5% n=1	1.5% n=3	0% n=0
Insufficient Information/No Opinion	7.5% n=15	6.6% n=13	6.9% n=14	10% n=20	10.9% n=22	5.4% n=11	7.4% n=15	10.3% n=21

Testing Amplified Aggression

Military officers and members of the public appear to exercise more restrained retaliation when responding to attacks on drones than to attacks on manned assets. If decisionmakers mirror image their beliefs and preferences onto potential rivals, they might think their adversaries will also launch less escalatory retaliation after attacks on drones. As a result of this mirror imaging, national security decisionmakers tactical and operational levels may be more prone to attack their rival's drones than manned assets. More senior military officers who also hold these mirror-imaged beliefs may be more likely to establish rules of engagement or advise senior commanders and civilian leaders to take more aggressive responses to drones than to manned platforms.

To test this logic of amplified aggression, I field an experiment that presents civilian and military respondents with a situation in which they must decide how to respond to an armed attack aircraft that has penetrated friendly airspace. The survey instrument introduces a scenario in which, "Air surveillance radars have detected an adversary's [aircraft] approaching a coalition base in the Middle East. Over the past week, adversary aircraft have approached the base on five separate occasions. Today the [aircraft] has approached closer to the coalition base than previous flights. The aircraft has not responded to coalition radio calls." I vary whether the intruding aircraft is a "manned Su-25 attack aircraft" or a "remotely piloted Shahed 129 attack aircraft." Respondents are then asked what they believe is the "highest level of U.S. response appropriate in this situation." They choose from four increasingly escalatory options: 1) no action, 2) intercept with fighter jets, 3) warning shots, 4) down the aircraft (using fighter jets or surface-to-air missiles). Respondents are also given the opportunity to provide an open-ended response if their preferred action is not listed.

In line with the amplified aggression hypothesis, military officers, on average, take more aggressive actions against drones than against manned aircraft – even though both pose the same type and degree of threat in the crisis scenario.[67] As Table 5.8 shows, the mean response to a drone intrusion is nearly 0.9-points higher on a 5-point scale. Indeed, 51.3% of military decisionmakers facing an intruding drone believed shooting it down was the most escalatory response. In contrast, just 10.3% of military officers facing a manned intruder would have chosen to shoot down the aircraft. In other words, military officers were, on average, approximately five times more likely to down a drone than a manned aircraft (See Table 5.9).

[67] See Appendix H, Section 1.1 for balance tables, randomization checks, and regression analysis. Nearly all respondents passed a manipulation check. Within the manned condition 97.4-percent correctly identified the type of aircraft involved, and 94.8 percent within the drone condition correctly identified the aircraft type.

Table 5.8: Mean Response to Intruder (Military Sample)

Intruder Type	Mean Response Level
Manned	2.333 (.127)
Remotely Piloted Aircraft	3.205 (.173)

1. 1-5 scale. Standard errors in parentheses.

Table 5.9: Response to Intruder, Percentage (Military Sample)

Intruder Type	No Action	Intercept w/ Fighter Jets	Warning Shots	Shoot Down the Intruder	Other
Manned Aircraft *n=39*	0% n=0	82.1% n=32	5.1% n=2	10.3% n=4	2.6% n=1
Drone *n=39*	2.6% n=1	35.9% n=14	5.1% n=2	51.3% n=20	5.1% n=2

The divergent response to drones and manned intruders is puzzling. International law treats manned military aircraft and drones as equals, and states maintain the inherent right to self-defense. A violation of a state's sovereign airspace represents an unambiguous case where the use of force in self-defense is fully justified under international law. Further, the scenario presents drones and manned aircraft as equally threatening (e.g. they are unresponsive to radio calls, have overflown military installations, etc.). To more closely explore why military respondents supported more aggressive action against drones than against inhabited aircraft, I again turn to the free text responses that military officers provided. I code the responses into one of eight categories: 1) response action incurs no/low risk; 2) response action incurs high risk; 3) the adversary poses hostile intent/must defend against the adversary; 4) the adversary poses no/low threat; 5) response seeks gradual escalation; 6) response is the best solution (without any additional information); 7) there is insufficient information/unintelligible response; 8) respondent is opposed to the use of force.

While the small military sample limits the conclusions that can be drawn from analysis of the qualitative responses, there are a few notable trends. First, compared to respondents facing a manned intruder, respondents facing a drone were, on average, more likely to assume the intruder has hostile intent and poses a threat. One Air Force officer described the intruding drone as "a threat to coalition forces, especially if it is armed (though, if not armed still a threat for the intelligence it is collecting).” While many military respondents acknowledged that the manned aircraft had violated friendly airspace, they generally did not characterize a manned intruder as threatening in the same way as officers facing drones. Indeed, one officer suggested that the manned Su-25 attack aircraft might “be having radio problems.”

Perhaps because participants initially perceived manned intruders as less threatening than drones, they were, on average, more likely to seek gradual escalation when responding to an intruding manned attack aircraft than to a remotely piloted attack drone. Many explicitly stated a need to avoid escalation, but to simultaneously “Show resolve” or “Send a very clear message.” Several respondents believed that intercepts or warning shots helped avoid the risks of escalation, while demonstrating the United States was capable of responding to a violation of friendly airspace. For instance, one Air Force major noted an “Intercept is a show of force that demonstrates capacity to engage without escalating conflict.” Another major suggested, “without directly engaging the adversary, warning shots send a message to ‘back off.’” As a result, many respondents proposed incremental responses in which escalation or de-escalation was based on the behavior of the intruding aircraft. These plans generally involved intercepts and did not “require hostilities unless the adversary acts first.”

Although some respondents recommended gradual escalation against intruding drones, many military officers saw taking action against a drone as fundamentally different from taking action against a manned aircraft. One Air Force major explained that “shooting an RPA...down is destruction of equipment, and sends a message, but does so without loss of enemy life.” Another Air Force aviator suggested that shooting down the RPA was a non-escalatory means of deterring a rival from launching future incursions with manned or remotely piloted aircraft: “destroying this

RPA sends a clear message that hostile acts toward coalition troops will not be tolerated, without escalating the situation with an enemy [killed in action].” Because there was no risk of loss of life in downing a drone, tiered escalation was less likely when drones were involved.

Table 5.10: Qualitative Justifications for Response to Intruder (Military Sample)

Justification	**Manned Intruder**	**Remotely Piloted Intruder**
Action incurs no/low risk	12.8% (n=5)	10.3% (n=4)
Action incurs high risk	0% (n=0)	0% (n=0)
Adversary poses hostile intent/must defend	35.9% (n=14)	59% (n=23)
Adversary poses no/low threat	15.4% (n=6)	5.1% (n=2)
Seek gradual escalation	25.6% (n=10)	10.3% (n=4)
Best solution	2.6% (n=1)	0 (n=0)%
Insufficient information/No opinion/unintelligible	7.7% (n=3)	15.4% (n=6)
Opposed to use of force	0% (n=0)	0% (n=0)

Repeating the experiment on a public sample yields similar results and provides further support for the amplified aggression logic.[68] Like their military counterparts, members of the public were, on average, likely to support more escalatory responses to a drone intrusion than to a manned intrusion. There was, however, a smaller difference in mean responses between the drone and manned treatment conditions in the public sample (.4 points in the public sample vs. .9 in the military sample). Members of the public called for more aggressive responses to manned intrusions than their military counterparts and less aggressive responses to drone aircraft, however, the

[68] The sample consisted of 303 adults in the United States, recruited in January 2019 using Amazon Mechanical Turk. Results were statistically significant to the p=.001 level and greater than 90-percent of respondents passed a manipulation check (93.4% of those assigned to the manned condition and 90.8% of those assigned to the RPA condition). Further, respondents with interventionist leanings were more likely to support aggressive actions than those with less interventionist preferences. Appendix H, Section 1.2 includes the OLS models used to conduct the significance tests and analysis of heterogeneous treatment effects.

experimental design does not allow me to fully explain why military and civilian respondents held slightly different preferences.

Table 5.11: Mean Response to Intruder (Public Sample)

Intruder Type	Mean Response Level
Manned	2.517 (.069)
Remotely Piloted Aircraft	2.980 (.083)

Table 5.12: Response to Intruder, Percentage (Public Sample)

Intruder Type	No Action	Intercept w/ Fighter Jets	Warning Shots	Shoot Down the Intruder	Other
Manned Aircraft *n=151*	9.9% n=15	40.4% n=61	39.1% n=59	9.3% n=14	1.3% n=2
Drone *n=152*	10.5% n=16	19.7% n=30	32.2% n=49	36.2% n=55	1.3% n=2

An analysis of qualitative responses from the public sample also aligns with the military sample. As Table 5.13 illustrates, respondents in the manned intruder condition are, on average, less likely to assign hostile intent to a manned intruder. They also are more likely to seek gradual escalation than their counterparts facing an intruding remotely piloted drone. Like their military counterparts, civilian respondents voiced their preferences for avoiding escalation while still taking some action. One respondent noted that "intercepting [a manned aircraft] with fighter jets shows that we mean business without actually engaging in battle." Another suggested "We can't just ignore it…but we shouldn't go too far either and make a bad situation worse."

To be sure, many respondents sought to limit escalation even when a drone was involved. A few respondents suggested the drone could be ignored "as long as no one is getting hurt." Others believed that no response was necessary because the rival's previous penetrations of friendly airspace had not escalated. Most respondents seeking to minimize escalation, however, expressed preferences for tiered escalation. One respondent commented, "An intercept should tell them that what they are doing is not OK without causing any damage to their drone so it should not provoke an escalated response."

Taking action against a drone, however, appeared to fall at a lower threshold in the minds the public than actions an inhabited aircraft. One respondent who supported shooting down a drone explained, “If this was a manned aircraft, I would have said, fire warning shots and then see if the aircraft turned tail and fled the area. However, since this is a drone that could be spying on our troops and base before an imminent attack, I say shoot the drone down.” Thus, even though the drone and manned aircraft posed the same type of threat, respondents were more willing to take action against remotely piloted assets. As with the military respondents, underlying these preferences was the lack of a pilot onboard a drone. Respondents explained that “shooting them down does not cost anyone’s life but it gets the point across.” One respondent put it more bluntly, “There would be no loss of human life. Shoot it down.”

Table 5.13: Qualitative Justifications for Response to Intruder (Public Sample)

Decision Logic	Manned Intruder	Remotely Piloted Intruder
Action incurs no/low risk	14.7% (n=22)	15.8% (n=24)
Action incurs high risk	.7% (n=1)	0% (n=0)
Adversary poses hostile intent/must defend	30.7% (n=46)	37.5% (n=57)
Adversary poses no/low threat	8.7% (n=13)	10.5% (n=16)
Seek gradual escalation	22.7% (n=34)	15.1% (n=23)
Best solution	6% (n=9)	9.9% (n=15)
Insufficient information/No opinion/unintelligible	12% (n=18)	8.6% (n=13)
Opposed to use of force	4.7% (n=7)	2.6% (n=4)

EVIDENCE FROM EXPERIMENTAL WARGAMES

The survey experiments provide strong support for the restrained retaliation and amplified aggression underpinnings of technology-enabled escalation control. The quantitative survey data allow me to precisely measure the causal effect of drones on preferences toward escalation, while the qualitative data shed light on the assumptions that inform these preferences. Experimental wargames complement these findings by allowing me to test the restrained retaliation and amplified aggression hypotheses in a setting that offers a higher degree of external validity. The interaction between wargame participants not only creates simulates a more realistic decision-making environment, but should also provide greater insight into the assumptions and factors that inform the decision-making of national security practitioners.

Testing Restrained Retaliation

To test the *restrained retaliation* hypothesis, the wargame simulated an adversary attack on a U.S. military aircraft. Participants were told that Katunian forces used a surface-to-air missile (SAM) to shoot down an unarmed U.S. Air Force reconnaissance plane flying in Dakastani airspace. The aircraft crashes, with the wreckage landing in Katunian territory. Participants assigned to the four treatment games were told the downed aircraft was a MQ-1 Predator drone, while those in the three control games were told the aircraft was a manned MC-12 Liberty whose four-member American crew was killed. Teams were asked to develop a response plan.

If the restrained retaliation hypothesis is valid, military decisionmakers will carry out less escalatory acts of retaliation after an attack on a drone than an attack on a similar, but traditionally manned asset. Decisionmakers should either ignore the loss of a drone or propose less aggressive (i.e. non-military) responses after a drone is attacked. The wargame should also reveal the a decreased desire for instrumental or emotionally driven responses temper retaliation following a drone loss. Since attacks on drones do not take American lives, discussion about punishing rivals or defending American honor should be less pronounced or absent when a drone is lost. Table 5.14, below, summarizes the findings.

Table 5.14: Summary of Findings – Response to Shootdown Wargame

		Stakes too low to justify retaliation	U.S. Resolve at Stake	Retaliation Risks Escalation	Response should deter future attack	Diplomacy as First Step	Launch Military Strikes	Launch Recovery Operations	Technology at Risk	Final Plan
Drone Shot Down	**Team 2**	•		•		•			•	**Diplomacy, Modified Flight Paths, Request Wreckage** - Pursue diplomatic response via UN - Publicly demonstrate drone did not enter Katunia - Modify future flight paths (further from border) - Provide air defense equipment to Dakastan - Request return of wreckage
	Team 3		•	•	•				•	**Air Superiority Demonstration, Leave Wreckage** - Launch air superiority mission - Publicly demonstrate drone did not enter Katunia - Do not recover wreckage
	Team 6		•	•	•	•				**Diplomacy, Sanctions, Threats, Leave Wreckage** - Pursue diplomatic response via UN - Economic sanctions if air defense not withdrawn - Threaten armed retaliation for future attacks - Escort future drone missions - Do not recover wreckage
	Team 7	•			•	•				**Diplomacy, Increased Military Ops, Request Wreckage** - Issue diplomatic demarche - Increase alert status for U.S. forces in region - Immediately repeat drone missions - Request return of wreckage
Manned Shot Down	**Team 1**			•			•	•	•	**Strikes, Recovery Operation** - Airstrikes on aircraft hangars - Recover crew remains and wreckage
	Team 4		•				•	•	•	**Recovery Operation, Strike Threats to Operations** - Recover crew - Destroy wreckage - Strike threats that prevent recovery operation
	Team 5		•			•	•		•	**Strikes, Request Remains** - Airstrike on missile site that shot down aircraft - Request return of remains

Although all teams – regardless of experimental condition – exercised restraint in their responses, teams that lost drones avoided retaliating with military force. Underpinning this restrained retaliation was the lack of killed or captured personnel. Indeed, teams often explicitly joked about the fact that the drone had no humans onboard. "Where do you bury the survivors?" asked one participant.[69] "The good thing is that there is no pilot being dragged along," noted another. Another commented that the Katunians were "helping us out" in expediting the retirement of older drones.[70] The lighthearted attitude suggests that attacks on drones are not perceived as crossing significant escalatory thresholds. Indeed, one participant recalled, "Predators have been lost before. It's a mostly disposable asset."[71]

Since the downing of a drone was not seen as meeting a salience threshold that warranted a major response, plans avoided significant retaliation. None of the four teams that lost drones launched military strikes against Katunia, yet all believed some response was justified. Participants believed that failing to take any action could "give [Katunia] a win,"[72] put U.S. resolve "in question[,]"[73] or insufficiently "deter future activity."[74] Instead of punishment using military force, planning efforts emphasized political and military signaling aimed at preventing future attacks and painting Katunia as the aggressor.

[69] Participant LC4 (U.S. Army Officer), 17 November 2017.

[70] Participant HD4 (Department of Defense Civilian), 17 November 2017.

[71] Participant LC1 (U.S. Army Enlisted), 17 November 2017.

[72] Participant LD2 (U.S. Army Senior Non-Commissioned Officer), 17 November 2017.

[73] Participant HC3 (U.S. Army Enlisted), 17 November 2017.

[74] Participant HD3 (U.S. Army Enlisted), 17 November 2017.

To prevent future attacks, teams typically coupled diplomatic efforts with shifts in military operations. One team recommended that civilian leaders use United Nations channels to condemn the attack and moved flight paths for future missions further from the Katunian border. Another team also proposed a condemnation at the United Nations, but recommended a threat of economic sanctions if Katunia failed to withdraw anti-aircraft systems from the contested border region. This team also planned to escort future drone missions with fighter jets and threatened armed retaliation for future attacks. A third team proposed issuing a diplomatic demarche, while simultaneously increasing the alert posture of U.S. forces in the region and flying another reconnaissance mission. The military component of this plan was intended to demonstrate that the United States would not back down following an attack on a drone. The final team planned a purely military response by conducting a show of force mission designed to signal that Washington was capable of maintaining air superiority and destroying missile sites in the future.

Although the teams settled on relatively limited responses, more escalatory military options were not immediately discounted. One of these teams even came to a consensus to destroy the missile site that shot down the Predator, but subsequently backed down to a show of force mission, fearful that a strike could escalate the situation. One member of this team suggested that demonstrating Washington's ability to establish regional air superiority, but not launching strikes, was a "good way to…refuse to escalate."[75] In other teams, recommendations for armed retaliation were quelled before a plan was developed. One fighter pilot expressed concerns that airstrikes incurred a "high risk of casualties" among the Katunian population and could trigger broader regional escalation.[76] On another team, a recommendation for military retaliation was quickly met

[75] Participant LD1 (U.S. Army Non-Commissioned Officer), 17 November 2017.

[76] Participant HC2 (U.S. Air Force Officer), 17 November 2017.

with pushback from more senior members of the team. One Army aviator commented, "We want to avoid escalation – we want to control the escalation ladder.…We don't want to start a war."[77]

Participants not only sought to minimize escalation in the retaliatory actions they developed, but also in their handling of the drone wreckage. Teams that lost drones seemed relatively unconcerned about recovering the downed plane. Two teams opted to leave the wreckage in Katunia, while the other two teams planned to ask Katunia to return it. Underlying these decisions was the perception that the wreckage of the Predator was a disposable asset where "technical loss is minimal."[78] It was not viewed as sufficiently valuable or sensitive to justify the escalation that could result from deploying a recovery team or carrying out an airstrike to destroy the wreckage. One officer suggested that, "If we lost an extremely sensitive aircraft, we could send in [Special Operations Forces] or carry out a strike. This is high risk in terms of escalation, but we could do this."[79] The team agreed, however, there was "no return on investment" in taking action to recover or destroy the drone wreckage.[80]

In contrast to the limited recovery efforts, lighthearted jokes, and tempered military retaliation following an attack on a drone, teams took far more escalatory moves after attacks on manned aircraft. All three teams approved strikes on Katunian forces and two of these teams also deployed troops into Katunian territory to retrieve wreckage and crewmember remains. These more escalatory measures and greater risk acceptance appear driven by the belief that the loss of American lives demands a significant response to punish the adversary and deter future attacks.

[77] Participant HD2 (U.S. Army Officer), 17 November 2017.

[78] Participant LC2 (U.S. Army Non-Commissioned Officer), 17 November 2017.

[79] Participant LC4 (U.S. Army Officer), 17 November 2017.

[80] Participant LC1 (U.S. Army Enlisted), 17 November 2017.

Indeed, participants' language often took on a passionate and emotive tone. One Air Force officer made this clear by proclaiming, "This represents a conflict. If they shot down our service members, we retaliate."[81] An Army colonel expressed a similar sentiment and signaled less restraint in the retaliatory measures he was willing to take: "The gloves are off."[82]

When developing retaliatory options, teams understood their actions needed to support broader political and military objectives and expressed a desire to minimize escalation.[83] One naval officer asked, "How much to retaliate?...What's the endgame?"[84] Another officer spelled out three possible degrees of response: tit for tat, above, or below the level of the Katunian attack.[85] Unlike the responses to attacks on drones, which emphasized signaling and future punishment, teams concluded that a response to an attack on a manned aircraft should be forceful enough to degrade Katunian military capability. In an effort to reduce the likelihood that these retaliatory measures could spiral into a more significant conflict, some participants advocated non-kinetic means including sanctions, embargos, or cyber operations. Standalone non-kinetic responses, however, were seen as insufficient and were quickly discounted. One participant lamented that an "embargo makes us look weak, [we] must degrade [Katunia's] capabilities to wage war."[86] The teams

[81] Participant HA4 (U.S. Air Force Officer), 17 November 2017.

[82] Participant LB4 (U.S. Army Officer), 17 November 2017.

[83] Participants on all three teams recognized their military actions would be conducted as a component of a broader all-of-government response that might include parallel economic or diplomatic elements.

[84] Participant HA1 (U.S. Navy Officer), 17 November 2017.

[85] Participant HA4 (U.S. Air Force Officer), 17 November 2017.

[86] Participant HA3 (U.S. Marine Corps Enlisted), 17 November 2017.

ultimately decided that retaliatory action should send the "message that you attack our people, [we] at least respond in kind."[87]

After teams decided to launch military strikes, they carefully selected targets to minimize the potential for broader escalation. One team initially considered striking the SAM launchers responsible for downing the reconnaissance aircraft. After realizing that mobile SAMs are challenging to locate and could kill Katunian personnel, the team recommended striking Katunian Aerospace Force hangars as a means of degrading capabilities without significant risk of civilian or military casualties.[88] These strikes were intended to "roll back options" that Katunia could use in future hostilities. Another team also decided to strike the SAM launchers, but planned to use assets such as cruise missiles or long-range stand-off munitions that would allow servicemembers to carry out strikes from well outside Katunian airspace to "avoid flaring things up" by violating Katunian sovereignty.[89] The third team held off on launching punitive strikes, planning only to strike any threats that hampered efforts to recover crewmember remains.

In addition to their willingness to launch military strikes, teams that lost manned aircraft were adamant about the need to recover the remains of the downed crewmembers. Discussions surrounding recovery efforts invoked the hallowed military principle that America never abandons its fallen troops. As a result, two of the three teams deployed military forces into Katunian territory – an escalatory violation of international law – to recover remains and destroy any sensitive wreckage. One participant commented, "Get[ting] the bodies is an automatic choice. [It's] just

[87] Participant HB3 (U.S. Army Enlisted), 17 November 2017.

[88] Participant LB3 (U.S. Air Force Officer), 17 November 2017.

[89] Participant HB2 (U.S. Air Force Officer), 17 November 2017.

what you do."[90] Even with the military risk associated with launching a recovery operation, participants agreed that recovering remains was "everything we stand for."[91] Indeed, one team was even willing to destroy any threat that stood in the way of recovery efforts.[92] The team that did not deploy a military recovery operation opted to send a diplomatic request for the remains. This team considered "going in with rescue team to get remains and sensitive equipment and intelligence[,]" or bombing the wreckage, but believed that crossing into Katunian territory would be an "act of escalation" that could have adverse effects on world opinion toward the United States.[93] The team did, however, back up its diplomatic request for the remains with a significant posturing of U.S. military forces in the region. In short, the opportunities for less escalatory responses that existed when drones were attacked were off the table once American lives were lost.

Testing Amplified Aggression

To test the *amplified aggression* hypothesis, I assess whether military decisionmakers react differently to incursions by drones than they do to similarly threatening incursions made by manned aircraft. To do this, the wargame included a crisis vignette that features an attack aircraft from rival Katunia on a direct course toward an airbase used by U.S. forces. The aircraft, which has already penetrated into Dakastan's airspace, will reach the base in 30 minutes. The plane is not responding to radio calls and has already made several low passes over Dakastani military installations near the contested border region. All teams received the identical scenario, but I manipulated whether the intruding aircraft was a CH-4 attack drone or a manned Su-25 attack jet.

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90 Participant HA4 (U.S. Air Force Officer), 17 November 2017.

91 Participant HA3 (U.S. Marine Corps Enlisted), 17 November 2017.

92 Participant HA1 (U.S. Navy Officer), 17 November 2017.

93 Participant HB2 (U.S. Air Force Officer), 17 November 2017.

Teams were informed that the Dakastani government "asked the U.S. to carry out its obligations to provide integrated air defense" and were provided a list of assets at their disposal: U.S. Air Force F-16s fighters, Dakastan Air Force MiG-21 fighters, Patriot surface-to-air missile batteries, and Dakastan Air Force anti-aircraft artillery. The teams were asked to develop a response to the intruding aircraft.

If the *amplified aggression* hypothesis is true, military decisionmakers will take more aggressive action against a drone than a manned aircraft, even if both pose an equivalent threat. Decisionmakers will make this calculated decision if they mirror their own preferences onto Katunian decisionmakers and anticipate an attack on a drone will trigger a less escalatory reaction than an attack on a manned aircraft. The fear that killing foreign military personnel operating manned assets could trigger significant escalation should lead to more restrained responses that minimize the risk of casualties. Discussions among planning teams should therefore explicitly mention the higher risk of escalation when an intruder is a traditionally manned asset. The findings are summarized in Figure 5.15, below.

Table 5.15: Summary of Findings – Response to Intruder Wargame

		Escalation if Intruder Shot Down	Obligation to Defend Bases/Cities	Possible Probing	Lost Pilot/Defector	Final Plan
Drone Intruder	**Team 1**		•			**Shoot Down** 1. Shoot down if intruder flies toward bases or populated areas
	Team 2		•			**Intercept to Shoot Down** 1. Intercept w/ fighter jets (U.S./Dakastan) 2. Prepare Patriot missiles 3. Shootdown intruder Simultaneously contact Katunian Govn't
	Team 5	•	•			**Intercept to Shoot Down** 1. Intercept w/ fighter jets (U.S./Dakastan) 2. If armed, shoot down. If unarmed, do not shoot down
	Team 6		•			**Tiered Escalation to Shoot Down** 1. Intercept w/ fighter jets (Dakastan) 2. Escort to border 3. If drone does not respond/change direction, shoot down with anti-aircraft artillery
Manned Intruder	**Team 3**	•	•			**Tiered Escalation to Shoot Down** 1. Intercept w/ fighter jets (U.S. and Dakastan) 2. Order to land/escort to border 3. Warning shots 4. If fails to obey or opens fire, shoot down if armed. If unarmed, monitor
	Team 4	•		•	•	**Escort** 1. Intercept w/ fighter jets (U.S.) 2. ID intruder 3. Escort out of airspace 4. Fire only in self-defense
	Team 7	•		•	•	**Tiered Escalation to Shoot Down** 1. Intercept w/ fighter jets (Dakastan) 2. Contact Katunian Air Force 3. If intruder does not yield, fire warning shots If intruder does not yield to warning shots, shoot down with Patriot missiles

After receiving the vignette, most wargaming teams first tried to assess the intent of the intruding plane. All three teams facing a manned aircraft appeared hesitant to ascribe hostile intent. They questioned whether the incursion was deliberate and developed alternate explanations for why the aircraft had violated Dakastan's airspace. Two of the teams contemplated whether the Katunian pilot was defecting. One Air Force officer asked, "What is the intent of the adversary? We don't know it. It could be a defector [since it is] only one plane."[94] A member of another team referenced historical aircraft defections and asked if this might be a similar case, or whether the pilot was simply lost.[95] Another participant suggested that pilot could be in distress or have a faulty radio that prevented communication.[96] Despite these initial efforts to find alternate explanations for the intrusion, all three teams eventually concluded the aircraft could pose a threat that required some form of defensive response.

In contrast, teams facing an intruding drone were more likely to conclude that the drone had intentionally violated Dakastan's airspace and had nefarious intent. For instance, moments after being presented with the vignette, one participant proclaimed the intrusion was a "unilateral attack."[97] Another participant with a background in air defense announced, "This is an armed threat in Dakastan's airspace."[98] Participants on two of the four teams exposed to the drone treatment briefly raised questions about the drone's intent. One participant asked, "How positive are we of

[94] Participant HA4 (U.S. Air Force Officer), 17 November 2017.

[95] Participant HD1 (U.S. Air Force Enlisted), 17 November 2017.

[96] Participant HA3 (U.S. Navy Officer), 17 November 2017.

[97] Participant LB3 (U.S. Air Force Officer), 17 November 2017.

[98] Participant LC4 (U.S. Army Officer), 17 November 2017.

its exact ID?"[99] His teammates suggested they were "pretty sure[,]"[100] which appeared to assuage the participant's concerns as he responded with, "we should light it up" — a military colloquialism for illuminating a target with radar or opening fire.[101] On another team, participants discussed the challenge in proving the drone was under Katunian government control or whether it was lost or malfunctioning. One member of the team suggested reaching out to the Katunian government to inform them their aircraft would be shot down if it did not change course.[102] The team agreed to contact the Katunian government, but noted there was little time to wait for a formal response before taking action.

Both the drone and manned plane were attack aircraft, made low altitude passes over military outposts, and were on a direct course toward a large air base. Despite this equivalence of threat, participants initially searched for ways to explain away the threat posed by the intruding manned aircraft. This reaction demonstrates that military decisionmakers think about manned and remotely operated technologies differently, even if the systems have similar capabilities and pose similar threats. Specifically, military decisionmakers seem to believe there are more significant consequences for taking actions against traditionally manned platforms.

Once participants established the intruding aircraft was potentially threatening, they began developing plans to protect Dakastan and U.S. forces. The actions that teams adopted in response to the manned aircraft generally escalated gradually. Plans included steps to verify the identity of the intruder and provided ample escalation offramps – specifically teams allowed the manned

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[99] Participant HC3 (U.S. Army Enlisted Member), 17 November 2017

[100] Participant HC1 (U.S. Army Officer) and Participant HC2 (U.S. Air Force Officer), 17 November 2017

[101] Participant HC3 (U.S. Army Enlisted Member), 17 November 2017

[102] Participant LC4 (U.S. Army Officer), 17 November 2017.

aircraft to exit Dakastan's airspace. One participant explicitly described the need "to minimize risk" by carrying out "tiered escalation" that "at any point in time gives [Katunia] the opportunity to deescalate."[103] To do this, teams generally tried to make, in the words of one participant, "every effort to deter the adversary aircraft" before taking action that could kill the pilot.[104] The first step in this tiered approach was to launch fighter jets to intercept, identify, and monitor the aircraft. All teams hoped their fighters would escort the intruding Su-25 out of Dakastan's airspace. One team also planned to simultaneously contact the Katunian Air Force to establish the aircraft's intent. If the intruder did not comply with the orders of the intercepting fighters, one of the teams planned to continue escorting the intruder indefinitely and would only down the plane if it took a move – such as flying directly over population centers – that posed a direct threat to Dakastan or American forces. In the event of non-compliance, the two other teams planned to escalate to the next tier by firing warning shots at the Su-25. If the intruder failed to respond to the warning shots, one of the teams planned to down the intruder only if it was carrying munitions. If the intruding aircraft carried no weapons, the fighters would maintain an escort but not shoot it down. The other team that used warning shots ordered its Patriot air defense batteries to down the intruder if it disregarded the warnings.

Teams facing an intruding drone typically developed response plans similar to those of teams facing manned intruders, but appeared more willing to destroy the intruding drone without a gradual, tiered escalation. They often skipped over steps that might have allowed the drone to exit Dakastan's airspace and used more forceful language than participants responding to manned

[103] Participant LD2 (U.S. Army Senior Non-Commissioned Officer), 17 November 2017.

[104] Participant LD1 (U.S. Army Non-Commissioned Officer), 17 November 2017.

intrusions. As one participant bluntly stated: "Engage and destroy. That is our priority."[105] Other participants held similar positions, announcing they had "zero tolerance [for] this type of activity"[106] and that, "We will respond."[107] To that end, one team quickly decided to place Patriot air defense and anti-aircraft artillery units on alert and to down the drone if it approached population centers or military installations. The team did not discuss the political or military ramifications of shooting down an intruding drone and even jokingly referred to the response as a "turkey shoot."[108]

Not all teams facing drones were as carefree in deciding how to respond to the intruding drone. Just like teams facing a manned intruder, the other three teams first launched fighter jets to intercept the intruding drone. One of these teams even considered avoiding using kinetic actions by jamming the drone's controls electronically rather than shooting it down, but shelved the plans as there was no indication that friendly forces had this sort of electronic warfare capability.[109] Instead, the same team planned to inform the Katunian government that the drone would be shot down if it did not change course, mirroring another team's response to a manned intruder. The second of these teams launched fighters for the primary purpose of determining whether the intruding aircraft was armed or unarmed.[110] The team made no effort to communicate with the intruding aircraft or with the Katunian government. They decided to down the aircraft if it was

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[105] Participant LC4 (U.S. Army Officer), 17 November 2017.

[106] Participant LC1 (U.S. Army Enlisted), 17 November 2017.

[107] Participant LC2 (U.S. Army Non-Commissioned Officer), 17 November 2017.

[108] Participant LB2 (U.S. Navy Petty Officer), 17 November 2017.

[109] Participant LC3 (U.S. Air Force Senior Non-Commissioned Officer), 17 November 2017.

[110] Participant HB2 (U.S. Air Force Officer), 17 November 2017.

armed and to allow Dakastan's Air Force to decide how to respond if the aircraft was unarmed. Participants on this team perceived an armed aircraft to be too much of a risk to U.S. personnel at the base to allow it to continue unimpeded. The third team launched fighter jets to intercept the intruding drone and escort it back to the border. If the drone failed to yield to the interceptor's orders, the team ordered its shootdown using Dakastan's anti-aircraft artillery. Many of these plans skipped over steps that were used in the manned vignettes – such as warning shots – that gave the intruding aircraft an opportunity to avoid being shot down.

The more tempered response to a manned intrusion appears grounded in participants' desire to avoid significant escalation. Indeed, participants on all three teams facing the Su-25 voiced concerns that targeting a manned Katunian aircraft could lead to battlefield or regional escalation. One participant on the team that chose not to fire warning shots opined that any actions that could kill a foreign pilot should be avoided as "there is too much risk, even though doing so is justified and lawful."[111] Another participant on the same team suggested that responding with force was "very risky and [involved] significant uncertainty."[112] Some participants feared that taking aggressive moves such as warning shots might provoke the intruding pilot to open fire or drop a bomb, potentially generating casualties and sparking further escalation.[113] In comparison, only one of the four teams facing an intruding drone explicitly considered the risk of escalation associated with shooting down an adversary's drone. One participant mentioned the decision to

[111] Participant HA1 (U.S. Navy Officer), 17 November 2017.

[112] Participant HA3 (U.S. Marine Corps Enlisted), 17 November 2017.

[113] Participant HA4 (U.S. Air Force Officer), 17 November 2017.

respond to the intruder as a "choice to risk escalating tensions in the region over drones[,]" but did not expand on the extent and nature of these risks.[114]

Participants provided deeper insight into their decision-making logic during post-wargame interviews. Teams that confronted a manned aircraft in the vignette suggested they would have acted far more aggressively had the intruder been a drone. One participant commented that, "human life really does change the calculus."[115] His teammates agreed, stating that "once [you] put the body into it, it changes interactions between states"[116] and "when death becomes involved, it becomes tribal."[117] Without a pilot on board, the team agreed they would have "splash[ed]" a drone as soon as it violated Dakastan's airspace.[118] Participants on another team held similar views, stating they would have shot down an intruding drone as doing so incurred "no cost of taking a life"[119] and was a "non-escalation."[120] In contrast, participants who faced drones during the wargame explained how they would have taken a more restrained response to a manned intruder because the "risk of escalation with manned is higher."[121] Despite the heightened risk, teams still believed a reaction was necessary, but sought ways to limit the use of force. One team suggested it would have only shot down a manned intruder if it targeted infrastructure or personnel. Another

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[114] Participant HB1 (U.S. Army Officer), 17 November 2017.

[115] Participant LD3 (U.S. Army Officer), 17 November 2017.

[116] Participant LD2 (U.S. Army Senior Non-Commissioned Officer), 17 November 2017.

[117] Participant LD1 (U.S. Army Non-Commissioned Officer), 17 November 2017.

[118] Participant LD2 (U.S. Army Senior Non-Commissioned Officer), 17 November 2017.

[119] Participant HA1 (U.S. Navy Officer), 17 November 2017.

[120] Participant HA4 (U.S. Air Force Officer), 17 November 2017.

[121] Participant HB1 (U.S. Army Officer), 17 November 2017.

team suggested they would have attempted to redirect a manned intruder, rather than shooting it down.

While concerns about the risk associated with killing a foreign pilot dominated participants' decision-making logic, teams also considered several other complementary factors when deciding how to react to the intruding aircraft. In some cases, differences between the operating characteristics of drones and manned aircraft – and not differences in the risk of escalation – drove decisions on retaliation. Participants on one team facing drone intruders suggested that "manned intercept strategies don't work with drone[s]."[122] An Air Force fighter pilot on the team confirmed that warning shots would have little effect on a drone as no pilot was onboard to observe the warning shots.[123] As a result, this team escalated directly from an intercept to shootdown. During both the wargame and the post-game interviews, multiple teams proposed reactions that hinged not on whether the intruding aircraft was manned, but on whether it was armed or unarmed. During a post-game interview, one participant explained that it is "inconsequential that the pilot is on the ground. [It is] more about capability and degree of threat."[124] While threat perception mattered to some participants, it appeared to matter less than whether the aircraft was manned or unmanned. For example, one team that had ordered the shootdown of a drone if it failed to comply with instructions (regardless of whether it was armed or unarmed) said that it would "let [a manned aircraft] go" if it was unarmed.

[122] Participant HC1 (U.S. Army Officer), 17 November 2017.

[123] Participant HC2 (U.S. Air Force Officer), 17 November 2017.

[124] Participant HB2 (U.S. Air Force Officer), 17 November 2017.

CONCLUSION

The survey experiments and experimental wargames provide compelling support for the restrained retaliation and amplified aggression hypotheses. On one hand, the lack of a pilot makes military decisionmakers more willing to restrain retaliation after an attack on a drone than an attack on a manned asset. Members of the public also hold similar preferences, potentially informing the policies that government officials – who are subject to punishment at the polls – eventually enact. This less aggressive retaliation can help control escalation by reducing the likelihood that a shootdown incident will trigger actions that spiral into a more intense or geographically broader conflict. In other words, if states opt to do nothing or take only limited action after the loss of a drone, they create escalation off-ramps that might not be available when a manned aircraft is lost.

On the other hand, military officers and members of the public appear more likely to take aggressive moves against drones than against manned aircraft. Although participants in the wargames and surveys never explicitly referenced mirror imaging, many assumed that a rival would also restrain retaliation after an attack on a drone. The belief that an attack on a drone represents a "non-escalation" reinforces the idea that downing a drone falls at a fundamentally lower escalation threshold than a similar attack on an inhabited platform. These findings contribute to the argument that drones may lead militaries to use force more frequently, but that these uses of force are unlikely to escalate into broader or more intense conflicts.

The survey experiments yield additional insights on the divergent perception of drones and manned aircraft. While the lack of a human onboard distinguishes drones from manned aircraft, it appears that military and civilian respondents support more aggressive retaliation against an adversary who shoots down a manned aircraft than a drone, even when the pilot of the manned aircraft is not killed. If preferences for retaliation are driven solely by a desire to punish an adversary for killing a service member, respondents should, on average, demand similar responses following the downing of a drone and downing of a manned aircraft in which the pilot is rescued or captured – since there is no pilot death. The more escalatory preferences associated with a manned aircraft shootdown suggest that an attack on manned platforms reach a higher threshold than an attack on a drone, perhaps because of the potential loss of life associated with attacking an inhabited aircraft.

The mixed methods approach presented in this chapter also highlights the value of coupling survey experiments with experimental manipulations embedded in wargames. First, the survey experiments force respondents to select from a relatively narrow set of military and policy options that are ordered along five-point scales. While this allows for the precise measurement of the causal effect that drones have on escalation in the simulated crises, it does not allow participants to develop their own plans – as they can in the wargames. Second, the wargames generate far richer data on the assumptions and drivers of decision-making than the surveys. While the survey's free text responses provide some insight, the interaction between wargame participants sheds light on whether and how military decisionmakers consider factors such as risk, cost, effectiveness, and emotions into their planning efforts. For instance, the tone and content of discussions during the wargame provided insights on how emotional factors informed decisions on escalation. By coupling data generated through these two complementary approaches, I develop a richer understanding of how drones inform crisis escalation.

Chapter 6

U.S. Aerial Reconnaissance During the Cold War

Intelligence collection was a critical component of Cold War competition between the United States and its communist rivals. Intelligence operations helped monitor military and industrial capabilities, provided early warning of possible attacks, and pinpointed facilities that could be targeted in the event of war. This highly classified intelligence guided the development of tactics, shaped research and development, and informed military planning by the United States and its allies. This information was particularly important during crises, when it fueled decision-making at the highest levels of the United States government. The intelligence community and military relied on a host of intelligence gathering methods ranging from human sources to satellites, but airborne reconnaissance operations played a central role throughout the Cold War.[125] The Central Intelligence Agency and Pentagon relied on missions flown by both manned spy planes – like the high-altitude U-2 and earlier aircraft like the RB-29 – and unmanned drones to peer behind the iron and bamboo curtains. Some missions monitored rivals from international airspace, while others involved provocative penetrations into Chinese and Soviet airspace.

Planning these missions often involved senior officials including the Secretary of Defense, Chairman of the Joint Chiefs of Staff, Director of Central Intelligence, and in many cases, the

[125] For more on the role of aerial reconnaissance see, Burrows, *By Any Means Necessary*; Tart and Keefe, *The Price of Vigilance*; John Thomas Farquhar, *A Need to Know: The Role of Air Force Reconnaissance in War Planning, 1945-1953* (Maxwell Air Force Base, Alabama: Air University Press, 2004); Dino A. Brugioni, *Eyes in the Sky: Eisenhower, the CIA and Cold War Aerial Espionage* (Annapolis, MD: Naval Institute Press, 2010); Wolfgang Samuel, *Silent Warriors, Incredible Courage: The Declassified Stories of Cold War Reconnaissance Flights and the Men Who Flew Them* (Jackson, MS: University Press of Mississippi, 2019); Kevin Wright, *The Collectors: US and British Cold War Aerial Intelligence Gathering* (Warwick, UK: Helion and Company, 2019).

President himself. As the nested case studies in this chapter illustrate, these policymakers frequently debated the risks and benefits of using manned or unmanned reconnaissance platforms to gather information in places like China, North Korea, the Soviet Union and Cuba. In line with technology-enabled escalation control, these decisionmakers often preferred to employ drones in lieu of manned assets on high risk missions where the downing of a manned aircraft could cause significant political and military incidents. To be sure, however, drones were not always deployed in place of manned aircraft. In many cases, officials worried that drones would be less effective at collecting intelligence than manned assets, would be shot down at higher rates than manned platforms, or could reveal sensitive capabilities to adversaries. When manned planes were lost to communist fighter jets or surface to air missiles, decisionmakers were more likely to contemplate armed retaliation. Indeed, shootdown incidents often escalated, even if armed retaliation did not occur. Tension between states generally climbed to higher rungs on the escalation ladder than incidents where drones were lost to hostile action – providing empirical support for technology-enabled escalation control.

To test whether technology-enabled escalation control plays out outside of the experimental settings described in chapters 4 and 5, I draw from thousands of pages of archival materials to examine Cold War reconnaissance operations. I map the development of the United States drone program and then turn to three cases of peacetime and crisis reconnaissance operations during the Cold War: Cuba, North Korea, and China.[126] In each of these cases, the United States military and intelligence community used or considered using a mix of manned and unmanned

[126] The United States also conducted aerial reconnaissance operations using both manned and unmanned platforms during conflicts. For example, the Air Force and Central Intelligence Agency operated thousands of drone reconnaissance flights during the Vietnam War. This chapter, however, focuses on operations during peacetime and crises given the scope conditions to technology-enabled escalation control laid out in Chapter 2.

aircraft, and faced several shootdowns of reconnaissance aircraft. Recently declassified materials shed light on the decisions surrounding the selection of manned or unmanned assets and the logic surrounding the divergent responses to attacks on manned and unmanned aircraft across multiple theaters of operations and presidential administrations. Beyond providing empirical tests of the hypotheses associated with technology-enabled escalation control, the case studies in this chapter may be of interest to Cold War and airpower scholars. The archival materials, including several documents declassified specifically for this project, offer unique insight from the tactical to White House levels, shedding light on national security policymaking and crisis decision-making.[127]

U.S. DRONE DEVELOPMENT

Most scholarly and policy work on drones focuses on their use in the post-9/11 era. Remotely piloted aircraft, however, have played a role in military operations dating back to World War I. These early drone programs shed light on the motivations for drone development and allow me to explore how the reasons for using drones have evolved over time. Although drone technology has changed significantly, the U.S. military has long viewed drones as a means of carrying out operations with less risk to friendly aircrews.

The U.S. military's first drones surfaced during World War I in the form of primitive guided missiles. These "flying bombs" were aimed toward a target, launched, and eventually dove to the ground after flying a predetermined distance.[128] Although U.S. Army officials considered ordering up to 100,000 of these unmanned weapons, the lack of navigation technology limited

[127] Several of the documents cited in the case studies were declassified as a result of the author's Mandatory Declassification Review requests to the Air Force Historical Research Agency.

[128] These early drones estimated the distance between a launch site and the designated target by counting the number of propeller spins.

their accuracy and only twenty were built.[129] Throughout the 1920s and 1930s, engineers in the United States, United Kingdom, and Germany continued to research aircraft that could be operated by pilots via remote control. Few progressed beyond the testing stage, and those that did were generally used as targets for fighter pilots and anti-aircraft gunners.[130]

The use of drones for operational military purposes reappeared during World War II. The Army Air Forces and Navy developed drones for use as missiles against hardened targets in Europe and Japan that had withstood earlier conventional bombing operations. The Army Air Forces Aphrodite Project, for instance, attempted to use B-17s bombers converted into drones to destroy industrial facilities "in large German cities as far inland as practicable" and V-1 and V-2 rocket launch sites.[131] The B-17 drones were packed with 20,000 pounds of explosives and flown toward targets by a pilot onboard the aircraft. The pilot would bail out before reaching enemy territory, at which point the drone was flown to its target using remote control.[132] An Air Force assessment found that "the six missions flown were not satisfactory as far as damage to enemy installations is concerned."[133] Although the missions were unsuccessful and resulted in the deaths of several American crewmembers – including Joseph Kennedy Jr. – due to crashes and premature explosives detonations, these World War II projects highlighted the U.S. military's early rationale

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[129] Konstantin Kakaes, "From Orville Wright to September 11: What the History of Drone Technology Says About Its Future," in *Drone Wars: Transforming Conflict, Law, and Policy*, ed. Peter Bergen and Daniel Rothenberg (New York: Cambridge University Press, 2014), 361–62.

[130] Steven Zaloga, *Unmanned Aerial Vehicles: Robotic Air Warfare 1917-2007* (Oxford: Osprey, 2008), 6–7.

[131] Report on Aphrodite Project, 20 January 1945 (Secret); 527.431A-1; Air Force Historical Research Agency, Maxwell AFB, Alabama, 1-2.

[132] 3205th Drone Group History, 31 March 1954 (Secret); Air Force Historical Research Agency, Maxwell AFB, Alabama, 2.

[133] Report on Aphrodite Project, 2.

for developing drones.[134] The military looked to drones as a means of precisely delivering large amounts of ordnance against a target. Given the heavy wartime losses of American bomber crews, the military's intent seemed more focused on developing an effective combat capability than on removing American aircrew from harm's way. Indeed, archival documents make no reference to mitigating risk to friendly personnel.

In the years after World War II, drones were used to support the development of America's nuclear arsenal. Initially, surplus bombers were converted into drones that monitored atomic bomb tests. As part of Operation Sandstone, B-17 drones were flown through atomic clouds to collect samples of radioactive material and to photograph bomb blasts, eliminating the need to expose American pilots to radiation.[135] In addition to supporting bomb tests, the development of a remotely piloted long-range bomber was also a high priority for the Air Force, which had become an independent service in 1947.[136] Remotely piloted bombers would enable the United States to deliver munitions without exposing crews to enemy air defenses. The World War II-era Boeing B-29 Superfortress – the same type of aircraft that dropped the atomic bombs on Hiroshima and Nagasaki – was "successfully droned" in October 1948, although the drone bomber never saw operational service.[137]

As jets replaced propeller-driven aircraft, the Air Force refocused its drone development efforts to designing remotely operated jet bombers. The highly classified BRASS RING project,

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134 "Joseph P. Kennedy Jr.," John F. Kennedy Presidential Library and Museum, n.d., https://www.jfklibrary.org/learn/about-jfk/the-kennedy-family/joseph-p-kennedy-jr.

135 Drone Unit 742 Operation Sandstone; GP-Test-1-HI Jul 1947-May 1948; Air Force Historical Research Agency, Maxwell AFB, Alabama, 11.

136 3205th Drone Group History, 31 March 1954 (Secret), 5.

137 Ibid., 5.

for instance, called for a remotely piloted jet to deliver hydrogen bombs to targets in the Soviet Union. Researchers predicted that hydrogen bombs "would produce a lethal area so great that, were it released in a normal manner, the [manned carrier aircraft] would not survive the explosion effects."[138] To avoid losing American aircrews, the Air Force's Air Materiel Command began work in 1949 on a project to convert B-47 bombers into drones capable of "deliver[ing] a 10,000-pound package over a distance of 4,000 nautical miles with an accuracy of at least two miles from the center of the target."[139] Development continued for several years and advanced to test flights, but the BRASS RING drone was deemed "operationally undesirable, undependable, and unproven" and the project was cancelled in 1953.[140] Two factors contributed to the project's cancellation. First, navigation and remote-control systems of the era were not yet sufficiently advanced to produce an operational drone bomber that met the Air Force's requirements. Second, Air Force studies demonstrated that manned bombers could deliver a hydrogen bomb and escape from the blast area, eliminating the need for a remotely-piloted bomber.[141] While BRASS RING drones never entered operational service, the program demonstrated the emerging desire for remotely operated systems explicitly because they would allow the military to initiate operations with reduced risk to friendly aircrew.[142]

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[138] Study Four: Thermonuclear Weapon Delivery By Unmanned B-47, Project Brass Ring; K143,01 V.5 Pt.1; Air Force Historical Research Agency, Maxwell AFB, Alabama, 275.

[139] Study Four: Thermonuclear Weapon Delivery By Unmanned B-47, Project Brass Ring, 275.

[140] Study Four: Thermonuclear Weapon Delivery By Unmanned B-47, Project Brass Ring, 348.

[141] Study Four: Thermonuclear Weapon Delivery By Unmanned B-47, Project Brass Ring, 347-348.

[142] The U.S. military also began developing cruise missiles like the SM-62 Snark at roughly the same time as the BRASS RING program. Work on the SM-62, for instance, began in 1945. These early cruise missiles also suffered from many of the same navigation and guidance challenges as early drones. I appreciate Richard Betts for highlighting this point. For more, see "Northrop SM-62 Snark," National Museum of the US Air Force, May 29, 2015, http://www.nationalmuseum.af.mil/Visit/Museum-Exhibits/Fact-Sheets/Display/Article/196745/northrop-sm-62-snark/.

The growth of the Air Force's jet bomber fleet and the development of the remaining two legs of the nuclear triad - intercontinental ballistic missiles and submarine launched ballistic missiles – decreased the need for remotely operated bombers. As the Cold War progressed, however, the requirement for intelligence on the military capabilities of communist rivals increased significantly.[143] In the early years of the Cold War, the United States routinely flew manned reconnaissance aircraft around and through the airspace of Communist Bloc states to collect imagery and signals intelligence. Most of these missions were carried out using modified World War II-era transport aircraft or bombers outfitted with cameras and other sensors.[144] These relatively slow and low-flying aircraft typically flew without fighter escorts, and were increasingly vulnerable to intercept by the Soviet Union's new jet-powered MiG fighters and shootdown by surface-to-air missiles like the SA-2. By the early 1960s, even the Air Force's newer, high-altitude reconnaissance jets like the U-2, RB-47, and RB-57 were susceptible to an increasingly capable network of Soviet-built surface-to-air missiles.[145] Indeed, between 1950 and 1960, the air defense forces of Communist Bloc states intercepted over 30 western aircraft and shot down at least seven U.S. reconnaissance aircraft, resulting in the loss of 76 American service members.[146]

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[143] Lawrence Aronsen, "Seeing Red: U.S. Air Force Assessments of the Soviet Union, 1945-1949," *Intelligence and National Security* 16, no. 2 (June 2001): 103–32; Brugioni, *Eyes in the Sky*, 65–77.

[144] Burrows, *By Any Means Necessary*; Tart and Keefe, *The Price of Vigilance*; Colonel Wolfgang W. E. Samuel and Ken Hechler, *I Always Wanted to Fly: America's Cold War Airmen*, Reprint edition (University Press of Mississippi, 2011).

[145] "National Intelligence Estimate 11-3-61: Sino-Soviet Air Defense Capabilities Through Mid-1966 (Top Secret)" (Director of Central Intelligence, July 11, 1961), 1–2.

[146] Tart and Keefe, *The Price of Vigilance*, 71–168; Alexander L. George, *Case Studies of Actual and Alleged Overflights, 1930-1953 — Supplement* (Santa Monica, California: RAND, 1955), http://www.rand.org/pubs/research_memoranda/RM1349.html; Alexander L. George, "Soviet Reaction to Border Flights and Overflights in Peacetime," Product Page, 1954, http://www.rand.org/pubs/research_memoranda/RM1346.html.

In line with the expectation for a more escalatory response to attacks on manned platforms, many of these downings heightened diplomatic and military tension between the United States and its rivals. For example, the United States initiated proceedings against the Soviet Union at the International Court of Justice after Soviet fighters attacked B-29s off the Hokkaido Islands in 1952 and 1954.[147] More widely known, the May 1960 shootdown of a U-2 reconnaissance plane over the Soviet Union and the capture of its pilot, Gary Powers, led to a diplomatic standoff between President Eisenhower and Soviet Premier Khrushchev and the cancellation of a summit between the two leaders.[148] To be sure, not all incidents led to escalatory diplomatic or military responses. Taking action could publicly highlight that American reconnaissance aircraft had penetrated Soviet or Chinese airspace, a violation of international law.[149] In other cases, the United States lacked intelligence confirmation that Communist Bloc states had actually attacked missing aircraft.[150] Finally, even when senior military and civilian leaders believed military reprisals were justified, they often tempered their responses for fear of triggering larger conflicts. Even though shootdowns of U.S. reconnaissance aircraft did not always result in military responses, policymakers frequently considered armed reprisals. Indeed, they often explicitly discussed the rationalist and emotional drivers outlined in chapter 2 that underpin escalatory responses.

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[147] "Case Concerning the Aerial Incident of 7 October 1952 (United States of America v. Union of Soviet Socialist Republics)" (International Court of Justice, March 14, 1956), https://www.icj-cij.org/files/case-related/28/028-19550602-APP-1-00-EN.pdf; "Case Concerning the Aerial Incident of 7 November 1954 (United States of America v. Union of Soviet Socialist Republics)" (International Court of Justice, October 7, 1959), https://www.icj-cij.org/files/case-related/44/044-19591007-ORD-01-00-EN.pdf.

[148] For a detailed analysis of the Powers incident, see Michael R. Beschloss, *Mayday: Eisenhower, Khrushchev, and the U-2 Affair* (New York: Harper and Row, 1988).

[149] In 1958, for instance, a US Air Force C-130 on a reconnaissance mission was shot down after accidentally penetrating into the airspace above Soviet Armenia. Similarly, in 1964 an RB-66 was downed after straying off course into East German airspace.

[150] Michael L Peterson, "Maybe You Had to Be There: The SIGINT on Thirteen Soviet Shoot downs of U.S. Reconnaissance Aircraft," *Cryptologic Quarterly* (Secret) 12, no. 2 (1993): 22–23.

The risk to U.S. aerial reconnaissance operations increased as the Soviet Union developed more capable surface-to-air missile systems and interceptor jets able to fly at higher altitudes. As an alternative to manned reconnaissance aircraft, the Air Force and intelligence community began considering the use of drones as intelligence collection platforms. A 1954 Air Force report, for instance, described the need for a "drone type aircraft capable of producing inexpensive, high speed and accurate battlefield intelligence."[151] The following year, San Diego-based Ryan Aeronautics, which produced jet-powered target drones for the military, issued a press release that advertised a reconnaissance drone: "For tactical reconnaissance, a Firebee [target drone] could be equipped with aerial cameras, radar, reconofax and television installations to transmit intelligence information to operational headquarters."[152] Ryan Aeronautics representatives eventually presented their drone plans to Air Force leadership at the Pentagon in April 1960, one month prior to the Gary Powers U-2 shootdown. Ryan argued, "The use of U-2 manned vehicles for overflights of the territory of nations unfriendly to the United States creates…risks which are unnecessary to take. We feel there is a solution to this in the logical evolution of the unmanned Firebee drone system."[153] This early reconnaissance drone development effort provides support for the casualty aversion that underlies elements of technology-enabled escalation control theory: removing friendly aviators from harm's way was viewed as enabling the Air Force to carry out operations over hostile nations with less risk that a mission gone awry would trigger a diplomatic or military crisis.

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[151] Holloman Air Development Center Semi-Annual History (Secret), 1 July-31 December 1954; K280.10-52 Annex; Air Force Historical Research Agency, Maxwell AFB, Alabama, 89.

[152] Wagner, *Lightning Bugs and Other Reconnaissance Drones*, 8.

[153] Wagner, 13.

The Air Force initially showed little interest in obtaining remotely piloted aircraft, in part because it had already invested heavily in the development of the high altitude and high speed SR-71, a reconnaissance aircraft specifically designed to penetrate hostile airspace and remain out of reach of enemy air defenses.[154] Additionally, some senior Air Force leaders were resistant to Ryan's proposal as they initially viewed a "pilotless" plane as infringing on the traditional role of pilots who made up the service's elite. Acquiring unmanned aircraft could shift the Air Force's dominant missions and capabilities away from its then dominant mission of delivering nuclear weapons, and degrade what former Deputy Assistant Secretary of Defense and bureaucratic politics theorist Morton Halperin described as the Air Force's "organizational essence."[155]

This initially lukewarm reception changed after the Powers shootdown, and the Air Force explicitly began searching for ways to reduce the human – and associated political – risk associated with reconnaissance overflights. Ryan Aeronautics moved forward with its development of a reconnaissance drone and in February 1962 signed a contract with the Air Force to produce the Firebee Special Purpose Aircraft (SPA), which the service codenamed "Lightning Bug."[156] The drone was launched from a specially modified cargo aircraft and flew a preprogrammed route collecting imagery intelligence from high altitudes. Upon completion of its mission, the drone was recovered in mid-air using a helicopter or descended to the ground in friendly territory using a parachute. Film was then offloaded, developed, and analyzed by intelligence personnel.[157] This process was manpower intensive and involved dozens of personnel to launch and recover the drone

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[154] Wagner, 11–15.

[155] Halperin, *Bureaucratic Politics and Foreign Policy*, 28–32.

[156] Bill Grimes, *The History of Big Safari* (Bloomington, IN: Archway Publishing, 2014), 230.

[157] Paul W. Elder, *Project Checo Southeast Asia Report: Buffalo Hunter 1970-1972.* (Secret), (Honolulu, Hawaii: Headquarters Pacific Air Forces, 1973), 11.

and to analyze the data it collected.[158] Despite the significant personnel requirements, these crews could be stationed in friendly territory, enabling Lightning Bug to collect intelligence in areas that might be too dangerous or politically sensitive for manned aircraft.

Support for drones as reconnaissance platforms grew throughout the 1960s. One top secret Strategic Air Command document from 1964 highlighted the need for drones to carry out missions that might otherwise not be possible using manned aircraft: "with the improved defense posture of Communist countries the risk of performing operational reconnaissance has greatly increased…The development of a more economical method of penetrating the improved enemy defenses would (1) reduce the risk involved, and (2) allow a greater flexibility of reconnaissance operations. The primary objective of the Lighting Bug Program is to develop just such a method."[159] Indeed, the Lightning Bug allowed the Air Force to operate in high-risk areas with no threat to a pilot and the associated military and political challenges associated with losing a pilot to hostile fire.[160] Another assessment suggested that "the relative expendability of SPA made it ideal for penetrations into high-risk areas with no threat to the life of a pilot."[161] These assessments suggest decisionmakers viewed drones as a tool to carry out missions they might not otherwise be willing to launch – providing support for the increased initiation logic.

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[158] Annex of 350th Strategic Reconnaissance Squadron, 100th Strategic Reconnaissance Wing History 1 July-30 September 1968 (Secret); K-WG-100-HI SAR Jul-Sep 1968 v.2; Air Force Historical Research Agency, Maxwell AFB, Alabama, 7-9.

[159] History of the 4080th Strategic Reconnaissance Wing (SAC), Top Secret Annex, April-May-June 1964; TS5055 K-WG-4080-HI-Annex 1 Apr-30 June 1964; Air Force Historical Research Agency, Maxwell AFB, Alabama, 20.

[160] CORONA HARVEST Input: Strategic Reconnaissance in Southeast Asia 1 April 1968-31 December 1969 (Secret/NOFORN); T.S. OA-71-114, K416.041-5; Air Force Historical Research Agency, Maxwell AFB, Alabama, 87.

[161] Ibid, 86.

Although drones significantly lowered the human and political risk of aerial reconnaissance missions, some senior officials were not convinced they eliminated risk altogether. In a top secret memo to the Director of Central Intelligence, Edward Purcell, a radar expert who chaired the Reconnaissance Panel, noted that drones still involved political risks, "even with the pilot absent."[162] This political risk, however, was lower than that associated with losing American reconnaissance crewmembers to hostile action.

The decreased risk to friendly personnel was not the sole factor motivating the development and use of drones. Some military planners viewed drones as offering a lower cost means of conducting reconnaissance operations. A Strategic Air Command assessment from the 1960s noted the "cost of SPA in relation to the cost of other options made it relatively expendable.…Any other vehicle which could satisfy the same high-risk requirement would far exceed the cost of the SPA (in both lives and materiel) thereby making it the most expendable of any options."[163] Similarly, a classified history of Tactical Air Command drone operations explained, "Since World War II, the cost of tactical aircraft had gone from tens of thousands to millions of dollars each.…Better defense systems meant more of these necessarily expensive and sophisticated aircraft would be needed even as the attrition rate increased. It was in this setting that the aerospace press rediscovered and praised the drone/remotely piloted vehicle as the answer to increased costs and aircrew losses."[164]

These decreased risks and costs led to the first operational Lightning Bug deployment in August 1964. Over the next decade, the Lightning Bug and more advanced derivatives flew

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[162] Memo; Edward Purcell to DCI; 3 July 1963; Sanitized Volume 1 [National Reconnaissance Program]; Box 4; Papers of Lyndon Baines Johnson: National Security File, Intelligence File; Lyndon Baines Johnson Library, Austin Texas.

[163] CORONA HARVEST Input: Strategic Reconnaissance in Southeast Asia 1 April 1968-31 December 1969 (Secret/Noforn), 86.

[164] John Lumpkin, Tactical Air Command Drones/RPVs 1966-1968, February 1979 (Secret), iii.

thousands of missions in Southeast Asia collecting intelligence on targets in South and North Vietnam, Laos, Cambodia, and the People's Republic of China. These missions allowed American forces to conduct battle damage assessment after bombing raids, helped identify targets for the Rolling Thunder bombing campaigns, and monitored the flow of supplies and troops into communist controlled regions.[165] Later variants of the Lightning Bug conducted other missions over high risk areas in Southeast Asia including collecting signals intelligence on North Vietnam's air defense systems and dropping leaflets behind enemy lines.[166] Dozens of these assets were lost or severely damaged during missions, but these losses rarely generated significant concern among military decisionmakers. As one former Lightning Bug crew member explained, "there was a relatively laissez-faire attitude surrounding losses, we didn't think much about them."[167] In part because of the Lightning Bug's operational success in Southeast Asia, the military and intelligence community developed other drone programs and – as the case studies that follow illustrate – considered drone use in a variety of crisis settings throughout the Cold War.

Despite the lower human and financial costs that drones offered, they were not always deployed in lieu of manned assets during the Cold War. Indeed, senior policymakers sometimes chose to deploy manned reconnaissance aircraft into areas well-defended by adversary fighter jets and missiles. At the surface this might appear to challenge the increased initiation logic underlying technology-enabled escalation control. Yet in many cases, manned reconnaissance aircraft like the supersonic, high altitude SR-71 Blackbird were assessed to be relatively invulnerable to Soviet-

[165] Wagner, *Lightning Bugs and Other Reconnaissance Drones*, 57; Grimes, *The History of Big Safari*, 269–75.

[166] Elder, *Project Checo Southeast Asia Report: Buffalo Hunter 1970-1972.* (Secret), xii.

[167] Interview with Retired Air Force Chief Master Sergeant, 20 October 2017, Wright-Patterson AFB, Ohio.

produced air defense systems of the era.[168] As a result, certain manned systems were viewed as offering a higher likelihood of successful intelligence collection with a lower risk of being attacked or shot down than drone aircraft. This aligns with the experimental findings from chapter 4 which demonstrate greater support for the deployment of manned assets when they had a higher likelihood of accomplishing the mission than remotely piloted assets. Drones, however, were frequently considered as an alternative to manned aircraft and deployed in a variety of operational contexts during the Cold War.

The remainder of this chapter explores specific instances where manned or unmanned reconnaissance aircraft were deployed in three different theaters: Cuba, North Korea, and China. In each of these cases, the behavior of senior military and civilian policymakers was largely consistent with the expectations of technology-enabled escalation control. Drones were either considered or deployed on high risk missions to avoid political incidents that could lead to escalation. Indeed, as one Tactical Air Command report suggests, drones could be deployed into sensitive area "with a reduced probability of precipitating open hostilities."[169] When drones were lost to enemy fire, the United States generally took no military response, in contrast to the shows of force, military mobilizations, and diplomatic demarches that often accompanied the downing of manned aircraft.

[168] CORONA HARVEST Input: Strategic Reconnaissance in Southeast Asia 1 April 1968-31 December 1969 (Secret/NOFORN); T.S. OA-71-114, K416.041-5; Air Force Historical Research Agency, Maxwell AFB, Alabama, 87.

[169] John Lumpkin, Tactical Air Command Drones/RPVs 1966-1968, February 1979 (Secret); K417.042-22 66-78; Air Force Historical Research Agency, Maxwell AFB, Alabama, iii.

CUBA: RECONNAISSANCE DURING THE MISSILE CRISIS AND ITS AFTERMATH

Just 100 miles of the coast of Florida, Cuba was a hub of Cold War activity. Shortly after Fidel Castro established his communist government on the island, the United States initiated plans to undermine the Castro regime. Members of the U.S. foreign policy and security establishments feared Cuba would export communist revolution throughout the Western Hemisphere and were concerned that Cuba could be used as launching point for attacks on the United States. These fears became particularly salient in fall 1962 when the Soviet Union began to ship bomber aircraft and medium and intermediate range ballistic missiles to Cuba, ostensibly as a response to the botched, CIA-supported Bay of Pigs Invasion in April 1961 and the deployment of American ballistic missiles in Italy and Turkey.[170] The presence of offensive military assets just dozens of miles from Florida posed a significant threat to the American homeland.[171]

The delivery of Soviet offensive weapons to Cuba increased demand for intelligence collection operations over the island. A series of incidents involving reconnaissance aircraft in the Soviet Union and China in the summer of 1962, however, had decreased the frequency of reconnaissance missions over Cuba. In August 1962, an Air Force U-2 accidentally flew over Sakhalin Island, leading the Soviets to lodge a diplomatic complaint, and in September, China shot down a U-2 operated by the Republic of China Air Force. As a result, Secretary of State Dean Rusk and National Security Advisor McGeorge Bundy severely limited U-2 overflights of Cuba,

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[170] Memorandum from Malinovsky and Zakharov Informing of Decision to Provide IL-28s and Luna Missiles and of the Pre-delegation of Launch Authority to Pliyev; 8 September 1962; National Security Archives; https://nsarchive2.gwu.edu/nsa/cuba_mis_cri/620908%20Memorandum%20from%20Malinovsky.pdf.

[171] For more on the origins of the Cuban Missile Crisis, see Robert F. Kennedy and Arthur Meier Schlesinger, *Thirteen Days: A Memoir of the Cuban Missile Crisis* (New York: W. W. Norton & Company, 1999); Dobbs, *One Minute to Midnight*.

resulting in intelligence gaps about the status of the weapons buildup.[172] By fall, decisionmakers were pressing for additional intelligence collection. A top secret October 5, 1962 memorandum from the Committee on Overhead Reconnaissance (COMOR) to the United States Intelligence Board argued that there was "a pressing and continuing need for up-to-date intelligence on the progress of the Soviet arms buildup in Cuba. The very highest levels of the government are dependent upon this intelligence to assist in making policy decisions of immediate and vital concern to the nation."[173]

As with many other Cold War targets, aerial and satellite reconnaissance offered a means of gathering information on areas that were otherwise off limits to American personnel. The COMOR noted that satellite missions over Cuba could provide some intelligence, but that they were "not timely enough nor of sufficient resolution" to monitor the weapons deliveries and missile site construction.[174] The primary alternatives to satellites were manned reconnaissance aircraft, which fell into two categories: high-altitude strategic reconnaissance aircraft and tactical reconnaissance aircraft. High-altitude strategic reconnaissance assets were less vulnerable to the threat posed by the SA-2 surface-to-air missiles and MiG-21 fighter jets deployed in Cuba. Their high altitude also meant they could collect imagery of large swaths of the island without making repeated passes, decreasing the shootdown risk. Tactical reconnaissance aircraft like the RF-101

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[172] For a detailed examination of the factors that contributed to this intelligence gap, see David M. Barrett and Max Holland, *Blind over Cuba: The Photo Gap and the Missile Crisis* (College Station, TX: Texas A&M University Press, 2012); Max Holland, "The Photo Gap That Delayed Discovery of Missiles," *Studies in Intelligence* 49, no. 4 (April 2007), https://www.cia.gov/library/center-for-the-study-of-intelligence/csi-publications/csi-studies/studies/vol49no4/Photo_Gap_2.htm.

[173] Memorandum for the United States Intelligence Board from the Committee on Overhead Reconnaissance, Intelligence Justification for U-2 Overflight of Cuba (Top Secret); 5 October 1962; CIA-RDP68B00255R000300150014-9, 3.

[174] Ibid., 4.

and F8U-1P flew at lower altitude, making them more exposed to anti-aircraft artillery and allowing them to capture only narrow bands of imagery. The imagery these aircraft collected could therefore "provide detailed photography for technical intelligence purposes, but not the repeated, wide area coverage necessary to cover the present objectives."[175] These limitations meant that tactical reconnaissance aircraft could serve as a supplement to the high-altitude U-2, but not as a substitute.

Concerned that the White House would not authorize the deployment of manned aircraft in light of the Soviet and Chinese incidents, senior intelligence and defense policymakers also considered the use of drones as a lower risk means of collecting intelligence over Cuba. The Ryan Aeronautics reconnaissance drones that the Air Force had ordered in early 1962 were undergoing flight tests in Florida when the Cuban Missile Crisis began. Just weeks earlier, CIA's Deputy Director of Research, Herbert Scoville, Jr., assessed the drones – then codenamed Fire Fly – as not ready for operations over the Soviet Union due to uncertainty surrounding the drone's survivability against Soviet air defenses. Scoville did, however, urge the United States Intelligence Board to "consider its potential applications in other areas of the world such as Cuba."[176] During an October 5th meeting, the Secretary and Undersecretary of Defense, the Director of Central Intelligence, and the Director of the National Reconnaissance Office agreed that the Fire Fly drone should "go ahead for potential use in Cuba."[177] As the crisis unfolded, Joseph Charyk, Director of the National Reconnaissance Office, directed that plans be drawn up "for the Fire Fly vehicles to be employed

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[175] Ibid., 4.

[176] Memorandum for Secretary, USIB from Herbert Scoville Jr., USIB Action on FIRE FLY Reconnaissance Capability; 15 September 1962; CIA-RDP66R00638R000100100210-9, 1-2.

[177] Report of Meeting on NRO with McNamara, McCone, Gilpatric, and Charyk; 5 October 1962; CIA-RDP85B00803R000100160080-9.

against Cuba under the operational responsibility of the Department of Defense….under the NRO supervision and with CIA assistance."[178]

Although the Fire Fly drones could have easily been deployed from their base in Florida, they were not deployed during the Cuban crisis. The decision not to deploy the drones highlights two conditions under which a state might not employ drones even when doing so would reduce risk to friendly aircrew and the associated risk of escalation. First, the COMOR believed the Fire Fly would be "highly useful in covering specific objectives of limited scope. But the small area coverage obtainable by Fire Fly makes it less desirable than the U-2."[179] The greater perceived effectiveness of a manned platform in this case outweighed the reduced risk to friendly personnel and the political risks of a shootdown. Second, senior Air Force leaders were concerned that deploying the Fire Fly to Cuba would reveal a new and highly sensitive capability to the Soviet Union. The loss of a drone over Cuba could compromise a classified asset and sensitive technology that might be used in a future conflict against the Soviet Union.[180] Air Force Chief of Staff General Curtis LeMay was also reportedly concerned that the downing of even a single drone would represent a loss of a significant portion of the Air Force's then-nascent drone fleet. [181]

The White House reauthorized U-2 reconnaissance missions over Cuba in early October. These missions collected imagery of new ballistic missile launch sites in western Cuba, triggering

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[178] Memorandum for Deputy Director (Research), CIA from Director, NRO: Management of Fire Fly Drone Operation Over Cuba (Top Secret), 17 October 1962; CIA-RDP69B00279R000300040022-5.

[179] Memorandum for the United States Intelligence Board from the Committee on Overhead Reconnaissance, Intelligence Justification for U-2 Overflight of Cuba (Top Secret); 5 October 1962; CIA-RDP68B00255R000300150014-9, 4.

[180] Wagner, *Lightning Bugs and Other Reconnaissance Drones*, 42.

[181] *Foreign Relations of the United States*, 1961-1963, Volume XI, Cuban Missile Crisis and Aftermath, Document 134. Summary Record of the 17th Meeting of the Executive Committee of the National Security Council, 2 November 1963, https://history.state.gov/historicaldocuments/frus1961-63v11/d134, 350.

concern across the intelligence community.[182] Intelligence collection operations were subsequently increased, using a mix of manned high-altitude and tactical reconnaissance aircraft. In addition to concerns about the status of missile launchers in Cuba, decisionmakers were also worried about the flareup that could result from the downing of one of the manned reconnaissance aircraft. At the height of the crisis on October 23rd, the Joint Chiefs and the Executive Committee separately discussed how to react to an attack on a U-2 overflying Cuba. The Joint Chiefs initially adopted a graduated response plan. They agreed that if a U-2 was downed, one or two flights should continue until another U-2 loss occurred. At that point, they would decide "whether the projected attrition rate was acceptable." If it was, they would continue the flights. If not, they would attack all surface-to-air missile sites in Cuba and then resume flights. Mid-way through their meeting, Joint Chiefs received updated guidance from the Executive Committee.[183]

In contrast to the graduated retaliation proposed by the Joint Chiefs, President Kennedy approved a more escalatory plan to respond to the downing of a U-2. The President approved immediate retaliation "upon the most likely surface-to-air site involved in this action."[184] In the language of Thomas Schelling, this represented a response in the "same currency" as the initial transgression.[185] In other words, this tit-for-tat response was intended to deter additional attacks. If, however, the limited retaliation did not stop the hostile actions, the Executive Committee

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[182] David M. Barrett and Holland, *Blind over Cuba: The Photo Gap and the Missile Crisis*, 15–21.

[183] Notes Taken from Transcripts of Meetings of the Joint Chiefs of Staff, October-November 1962 Dealing with the Cuban Missile Crisis; National Security Archives; https://nsarchive2.gwu.edu/nsa/cuba_mis_cri/621000%20Notes%20Taken%20from%20Transcripts.pdf, 16.

[184] Minutes of the First Meeting of the Executive Committee of the National Security Council; 23 October 1962; John F. Kennedy Presidential Library and Museum, Boston, Massachusetts, https://microsites.jfklibrary.org/cmc/oct23/doc2.html.

[185] Schelling, *Arms and Influence*, 146–47.

expected the U.S. military to take actions to "eliminate the effectiveness of surface-to-air missiles."[186] Although the plan developed by civilian policymakers at the Executive Committee called for more rapid escalation than the Joint Chiefs' plan, both called for military responses to the downing of manned reconnaissance aircraft. These plans demonstrated that attacks on manned aircraft had significant potential for escalation, and also support arguments that civilian decisionmakers often hold more hawkish positions than their military leaders.[187]

Four days later, these plans were tested when a U-2 piloted by U.S. Air Force Major Rudolph Anderson was shot down while on a mission over Cuba. At 2pm on October 27th, the Joint Reconnaissance Center – the focal point for U.S. reconnaissance operations – reported that a U-2 flying over Cuba was overdue. Intelligence reports soon confirmed the Cubans had discovered the U-2 wreckage and Major Anderson's body. Later that afternoon, Chairman of the Joint Chiefs of Staff General Maxwell D. Taylor informed the Executive Committee of the U-2 shootdown. In line with the plans developed on the 23rd, Taylor announced that he believed the United States should retaliate with an airstrike on the missile site responsible for downing the U-2.[188] The Executive Committee made no decision about airstrikes, but cancelled the evening's remaining aerial reconnaissance missions.[189] At around the same time, other senior military officers readied themselves for impending airstrikes. Vice Admiral Charles D. Griffin, the Deputy Chief of Naval

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[186] Minutes of First Meeting of the Executive Committee of the National Security Council; 23 October 1962.

[187] For discussions of the relative hawkishness of military and civilian decisionmakers, see Betts, *Soldiers, Statesmen, and Cold War Crises*.

[188] Minutes of the Eighth Meeting of the Executive Committee of the National Security Council; 27 October 1962; John F. Kennedy Presidential Library and Museum, Boston, Massachusetts, https://microsites.jfklibrary.org/cmc/oct27/doc2.html.

[189] Notes Taken from Transcripts of Meetings of the Joint Chiefs of Staff, October-November 1962 Dealing with the Cuban Missile Crisis, 23.

Operations, for instance, began reviewing Contingency Plan 312, which included retaliation plans for an attack on reconnaissance aircraft.[190] Each of these actions suggested the loss of an American aircrew triggered the desire to punish the adversary for their actions.

After the Executive Committee Meeting, General Taylor called together his Joint Chiefs. He asked the senior officers of each service, "Should we take out a SAM site?" Air Force General Curtis LeMay responded, "No, we would open ourselves to retaliation. We have little to gain and a lot to lose."[191] Army Chief of Staff General Earle Wheeler agreed, commenting, "I feel the same way. Khrushchev may loose one of his missiles on us." Taylor pushed his service chiefs, arguing, "If this was wise on the 23rd, it should be just as wise on the 27th."[192] Wheeler responded by saying that intelligence that showed concrete launch pads for nuclear missiles had changed his thoughts on the use of force. The threat of a nuclear response seemingly tempered the retaliatory demands that had earlier been associated with the loss of a manned aircraft. Roughly three hours later at the final Executive Committee meeting of the day, President Kennedy said that if American reconnaissance planes were fired on the following day, "we should take out the SAM sites in Cuba by air action."[193]

The retaliatory strikes, however, were never carried out. After the final Executive Committee meeting on evening of the 27th, Attorney General Robert Kennedy visited Soviet

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[190] Chief of Naval Operations Office Log for October 27; 27 October 1962; National Security Archives; https://nsarchive2.gwu.edu/NSAEBB/NSAEBB398/docs/doc%2014E%20office%20log.pdf, 2.

[191] Notes Taken from Transcripts of Meetings of the Joint Chiefs of Staff, October-November 1962 Dealing with the Cuban Missile Crisis, 23.

[192] Ibid.

[193] Minutes of the Ninth Meeting of the Executive Committee of the National Security Council; 27 October 1962; John F. Kennedy Presidential Library and Museum, Boston, Massachusetts, https://microsites.jfklibrary.org/cmc/oct27/doc3.html. Kennedy also noted that his response would depend on how the Soviets responded to a request that the Soviets halt work on bases in Cuba as a condition to the discussion of other issues. The request was conveyed by United Nations Secretary General U Thant.

ambassador Anatoly Dobrynin to continue negotiating an agreement in which the Soviets would withdraw their missiles from Cuba if the United States removed its own missiles from Turkey and Italy and pledged not to invade Cuba.[194] According to Dobrynin's transcript of the meeting, Robert Kennedy described the demand for retaliation for the downing of the U-2 and death of its pilot.

> Because of the plane that was shot down, there is now strong pressure on the president to give an order to respond with fire if fired upon when American reconnaissance planes are flying over Cuba. The USA can't stop these flights, because this is the only way we can quickly get information about the state of construction of the missile bases in Cuba, which we believe pose a very serious threat to our national security. But if we start to fire in response – a chain reaction will quickly start that will be very hard to stop.[195]

The following day, President Kennedy and Khrushchev agreed to the terms of the missile withdrawal deal, averting further escalation. Indeed, the shootdown greatly increased Khrushchev's fear of escalation, contributing to his willingness to withdraw the missiles. The potential for an armed reprisal after the U-2 downing highlights the escalation risks associated with deploying manned aircraft during crises.

Although the crisis was resolved, the United States looked for ways to ensure Soviet offensive weapons were not reintroduced in Cuba and to monitor Cuban military activity. The same sort of debates on aerial reconnaissance that took place in the lead up to the missile crisis played out again in the months and years after it. As in earlier discussions, senior policymakers weighed the tradeoffs of different collection assets including satellites, manned aircraft, and

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194 Khrushchev's memoir notes that Kennedy pledged to remove missiles from Italy, however, there is dispute as to whether the withdrawal of missiles from Italy was part of the initial agreement. See Dominic Tierney, *Failing to Win: Perceptions of Victory and Defeat in International Politics* (Cambridge, MA: Harvard University Press, 2006), 105.

195 Dobrynin Cable to the USSR Foreign Ministry (Top Secret); 27 October 1962; National Security Archives; https://nsarchive2.gwu.edu/nsa/cuba_mis_cri/621027%20Dobrynin%20Cable%20to%20USSR.pdf, 1

drones. By mid-1963, the United States was operating two U-2 missions a day over Cuba because the Cuban government had refused to authorize on-the-ground inspections to safeguard against the reintroduction of offensive weapons. Although alternative methods of intelligence collection including satellites and drones were available, officials including Deputy Undersecretary of State for Political Affairs U. Alexis Johnson and Assistant Secretary of Defense for International Security Affairs Paul Nitze believed "the quantity of data that could be obtained by these alternative methods is smaller than that obtainable with the U-2 and would not meet the stated requirement."[196] As a result, the U-2s continued flying missions over Cuba.

By May 1964, Castro's continuing refusal to allow on-the-ground inspections combined with new reports of offensive missiles in Cuba reaffirmed the need for intelligence overflights. During two National Security Council meetings that month, senior decisionmakers considered deploying drones in place of manned U-2s. At the May 2nd NSC meeting, Director of Central Intelligence John McCone suggested that drones could be considered for use as an intelligence collection asset. He explained that "the shootdown of a drone would not create an incident exactly paralleling the shootdown of a U-2."[197] McCone's assessment provides strong evidence for technology-enabled escalation control. A drone loss would be characterized as fundamentally different from the loss of a manned aircraft, leading to a different – and likely less intense – set of political and military responses in line with the restrained retaliation logic.

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[196] *Foreign Relations of the United States*, 1961-1963, Volume XI, Cuban Missile Crisis and Aftermath, Document 337. Memorandum from the Deputy Undersecretary of State for Political Affairs (Johnson) and the Assistant Secretary of Defense for International Security Affairs (Nitze) to the President's Special Assistant for National Security Affairs (Bundy), 10 May 1963, https://history.state.gov/historicaldocuments/frus1961-63v11/d337, 805.

[197] *Foreign Relations of the United States*, 1964-1968, Volume XXXII, Dominican Republic; Cuba; Haiti Guyana, Document 265, Memorandum for Record, 2 May 1964, 638.

The discussion of drones continued at a follow-on meeting three days later. Despite McCone's belief that drones would avoid the type of incident surrounding a U-2 shootdown, both he and Secretary of Defense Robert McNamara offered limited support to drone operations. McNamara believed the military had "never operated drones to this extent" and that there were "numerous operational problems limiting the capability of drones."[198] Similarly, McCone feared that drones were more vulnerable to enemy air defenses and less capable than their manned counterparts. They flew at lower altitudes than the U-2 and could photograph a smaller swath of ground than the U-2. Because of the latter limitation, far more drone missions would need to be flown, pushing the cost of drone operations higher than those of U-2 operations.[199]

In addition to concerns about drone capability, policymakers also believed Cuban forces would be more likely to target drones than manned aircraft. In statements consistent with the amplified aggression hypothesis, cabinet level decisionmakers expressed their concerns. Undersecretary of State George Ball argued that "if it became known to the Cubans that we were flying drones, Castro would undoubtedly attack them." McGeorge Bundy agreed, saying that the "Cubans would act much more promptly against a drone than against piloted planes."[200] Underlying these assessments was the belief that drones signaled a lower degree of resolve than manned assets, and an attack on a drone would be unlikely to trigger an immediate armed reprisal. McNamara, for instance, noted that "if word gets around that we are using drones, the Cubans would say we are weakening our position."[201] McNamara suggested that the United States could

[198] *Foreign Relations of the United States*, 1961-1963, Volume XXXII, Dominican Republic; Cuba; Haiti Guyana, Document 268, Summary Record of the 531st National Security Council Meeting, 5 May 1964, 649.

[199] Ibid., 650.

[200] Ibid., 650.

[201] Ibid., 651.

carry on drone operations for several weeks even with enemy action, demonstrating – in line with the restrained retaliation logic – that a drone downing would not trigger the same sort of reaction as an attack on a manned U-2.[202] McNamara believed, however, that multiple drone downings could cause a political problem and that "if the Cubans knocked out drone after drone, we would have to make some response."[203] Yet, the precise response was not discussed. The meeting ended with Secretary McNamara agreeing to look into drone use and electronic counter measures that could enhance the survivability of manned reconnaissance assets.[204]

Later that year, the Secretaries of State and Defense, the Director of Central Intelligence, and the National Security Advisor continued to assess how to best gather intelligence on Cuba. Their conversation focused on identifying the means to most effectively collect imagery with minimal financial costs and risk of conflict. In one exchange, Secretary of Defense McNamara suggested that satellites like the KH-4 and KH-7 could provide both intelligence coverage of targets of interest. Ray Cline, head of the CIA's Directorate of Intelligence, commented that the cost of each satellite mission was a major consideration, to which McNamara responded, "it was much less costly than a war which might be brought on by a shoot down."[205] Another option considered was the deployment of manned aircraft like the U-2. Although McNamara thought the shootdown of a manned aircraft could lead to war, he believed there was a relatively low risk that the Cubans would attempt to shoot down a U-2.[206] The National Security Advisor, McGeorge

[202] Ibid., 652.

[203] Ibid., 650.

[204] Ibid., 653.

[205] Memorandum of Conversation on NSAM 311 (Top Secret); 18 November 1964; NLJ-010-004-4-18-6; Lyndon B. Johnson Presidential Library, Austin, Texas, 3.

[206] Ibid., 2.

Bundy, agreed with McNamara's assessment, commenting that "the Cubans are not likely to shoot down a U-2 at this time."[207] In contrast, Ambassador Llewellyn Thompson – in a statement in line with the amplified aggression logic – believed that use of unmanned aircraft such as drones or balloons in lieu of manned aircraft "would invite a shoot down."[208]

Throughout the Cuban Missile Crisis and its aftermath, senior policymakers including the President and Secretary of Defense routinely made decisions about drones and escalation that were consistent with several of the logics underpinning technology-enabled escalation control. Prior to the crisis, intelligence community leaders considered deploying drones as a means of carrying out military operations without the political risks associated with flying – and potentially losing – a manned reconnaissance aircraft over denied territory. Drones likely would have been deployed in lieu of manned assets as a way of avoiding escalation after a shootdown, but drones of the era were considered too vulnerable and too operationally inefficient. Decisionmakers during and after the Cuban Missile Crisis also provided support for the restrained retaliation hypothesis by expressing a willingness to respond to the downing of a manned U-2 with a far more escalatory military reprisal than the loss of a drone, which policymakers generally viewed as more expendable.

NORTH KOREA: AIRCRAFT SHOOTDOWN, ESCALATION, AND DRONE ALERTS

After the signing of the Korean Armistice Agreement in 1953, tensions on the Korean Peninsula continued to run high. To defend South Korea from potential North Korean aggression, the United States maintained tens of thousands of troops along the demilitarized zone (DMZ) separating North and South Korea and at bases throughout the southern half of the peninsula. In order to provide American, United Nations, and South Korean forces with warning of impending

[207] Ibid., 4.

[208] Ibid., 4.

North Korean attacks or provocation, the United States conducted significant intelligence collection operations in and around the Korean Peninsula using ships, ground observers, and airborne reconnaissance assets. The latter were particularly well-suited for collecting electronic and signals intelligence, such as emissions from air defense radars and communications between military units.[209] As a result, the United States Air Force and Navy conducted dozens of airborne intelligence gathering operations throughout Northeast Asia each month as part of the Department of Defense's Peacetime Aerial Reconnaissance Program (PARPRO).[210]

The importance of these missions in providing indications and warning intelligence increased during the mid-1960s. Beginning in 1966, North Korea mounted a series of armed attacks against American and South Korean troops stationed along the DMZ. This represented a marked shift from earlier North Korean activities, which had focused primarily on intelligence collection. In mid-October 1966, North Korean infiltration teams began ambushing American patrols, sabotaging trains, and even attacked the barracks of the U.S. Army's Second Infantry Division.[211] Between 1966 and 1968, North Korean troops launched 259 attacks, killing 40 American and 280 South Korean troops.[212] In response, the United States-led United Nations Command launched artillery strikes, while South Korea unilaterally conducted a series of raids across the DMZ attacking North Korean People's Army installations.[213]

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[209] *Project Checo: The EC-121 Incident* (Top Secret) (Honolulu, Hawaii: Headquarters Pacific Air Forces, 1970), 1.

[210] *Project Checo: The EC-121 Incident* (Top Secret), 1.

[211] Narushige Michishita, *North Korea's Military-Diplomatic Campaigns, 1966-2008* (New York: Routledge, 2009), 17–19.

[212] Michishita, 26–27.

[213] Michishita, 20–21.

North Korean provocations peaked in 1968 when Pyongyang initiated a series of high-profile operations again South Korean and American targets. In January 1968, North Korean commandos attempted to assassinate South Korean President Park Chung-hee. Thirty-one members of an elite North Korean People's Army unit infiltrated across the DMZ into South Korea to attack the Blue House presidential residence. The commandos were detected by South Korean civilians, setting off a nine-day manhunt. The mission was unsuccessful, but resulted in the deaths of 26 South Koreans, four Americans, and all but two of the North Korean intruders.[214] At the height of the search for Blue House intruders, North Korean forces captured the USS *Pueblo*, a U.S. Navy spy ship, on January 23, 1968. The *Pueblo* was operating off the coast Wonsan, North Korea collecting electronic intelligence when it came under attack by North Korean naval vessels. After the *Pueblo*'s commanding officer surrendered, North Korea impounded the ship and imprisoned its crew for eleven months.[215] Attacks continued for the remainder of the year. In September, a battalion of North Korean troops infiltrated south of the DMZ, and in October and November, another 120 commandos landed in South Korea hoping to recruit members for the Korean Worker's Party. The infiltrations set off nearly two months of counter-insurgency style operations aimed at killing the North Korean commandos.[216]

In light of the crisis surrounding the North Korean provocations – particularly the *Pueblo* incident – the United States stepped up its aerial reconnaissance operations in the Korean

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[214] Casualty numbers vary across sources. Some claim that three Americans and 66 South Koreans were killed, see Daniel P. Bolger, *Scenes from an Unfinished War: Low-Intensity Conflict in Korea, 1966-1969*, Leavenworth Papers 19 (Fort Leavenworth, KS: US Army Command and General Staff College, 1991), 65.

[215] Lloyd M. Bucher and Mark Rascovich, *Bucher: My Story* (New York: Doubleday, 1970); Mitchell B. Lerner, *The Pueblo Incident: A Spy Ship and the Failure of American Foreign Policy* (Lawrence, Kansas: University Press of Kansas, 2002); James E. Wise and Scott Baron, *Dangerous Games: Faces, Incidents, and Casualties of the Cold War* (Annapolis, Maryland: Naval Institute Press, 2010), 130–41.

[216] Wise and Baron, *Dangerous Games*, 141.

theater.[217] Between January and April 1969, for instance, the Air Force and Navy flew 190 missions over the Sea of Japan to monitor North Korean military activity.[218] Military planners recognized these missions involved significant risk as they "operated well outside the capability of friendly radar for a large portion of their missions and well within the North Korean air defense environment."[219] Indeed, one Pacific Command intelligence report suggested the reconnaissance flights were "vulnerable to communist reaction" by North Korean MiGs and that "North Korea still has the political initiative and the military capability to selectively react at any time."[220] Despite these risks, the National Security Council deemed these missions "essential if we are to maintain adequate cognizance of military capabilities and postures of communist countries" and that patrols over the Sea of Japan "contribute to the totality of our appreciation of the military strength and activities of North Korea."[221] Throughout most of the crisis, these missions were conducted without incident.

This changed on April 15, 1969 when two North Korean MiG-21 fighter jets downed a U.S. Navy EC-121M Warning Star reconnaissance aircraft flying a mission over the Sea of Japan. The attack killed all 31 American crewmembers, representing the largest single loss of U.S. aircrew during the Cold War. The propeller-driven aircraft – equipped with long-range radars and other sensors designed to collect adversary radar signals and electronic emissions – took off from

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[217] *Project Checo: The EC-121 Incident (Top Secret)*, 3.

[218] *Project Checo: The EC-121 Incident (Top Secret)*, 1.

[219] Message from Commander in Chief Pacific Command 26 January 1968 (Top Secret) cited in *Project Checo: The EC-121 Incident (Top Secret)*, 3.

[220] Memorandum from PACOM Air Defense Analysis Facility to PACAF Directorate of Operations Plans, 21 August 1968 (Secret) cited in *Project Checo: The EC-121 Incident (Top Secret)*, 3–4.

[221] Memorandum; Mission Basis for Downed EC 121M Navy Aircraft; 17 April 1969; North Korean Reconnaissance Shoot down 4/17/1969 Vol II Haig (2 of 2); Box 434; National Security Council Files: Korea EC-121 Shoot down; Richard Nixon Presidential Library and Museum Yorba Linda, California.

Naval Air Facility Atsugi, southeast of Tokyo, in the early morning hours of April 15th and flew west toward the Korean Peninsula, where it began flying a circular orbit 50 nautical miles east of the North Korean coastline – clearly within international airspace.[222] As the EC-121M neared the end of its mission, the crew received a radio warning of an impending intercept by North Korean jets. Six minutes later, the North Korean MiGs shot down the naval reconnaissance plane.

Planning a Response

The shootdown triggered immediate military action by forces in the Pacific theater. Within twenty minutes of the plane's downing, the Air Force scrambled two F-102 fighter jets to the eastern end of the DMZ where they were directed to await further directions. Three hours later, Fifth Air Force – the command responsible for Air Force operations in Northeast Asia – ordered all Korea-based tactical air forces to assume maximum readiness as it remained unclear whether the shootdown was an isolated incident or the start of a broader North Korean attack.[223] In addition to increasing its readiness posture, the military also initiated a large search and rescue mission, placing additional American assets in range of North Korean forces. Air Force and Navy aircraft assisted by ships from the Soviet Navy searched the Sea of Japan for survivors and wreckage in an operation that planners believed could be a target of North Korean attack.[224] Indeed, U.S. military aircraft were fired on during the search and rescue mission, but were unable to identify the source of the surface-to-air fire.[225]

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[222] Curtis K. Stringfellow and Peter M. Bowers, *Lockheed Constellation: Design, Development, and Service History of All Civil and Military Constellations, Super Constellations, and Starliners* (Osceola, WI: Motorbooks International, 1991), 74–76; *Project Checo: The EC-121 Incident (Top Secret)*, 5.

[223] *Project Checo: The EC-121 Incident (Top Secret)*, 7-8.

[224] *Project Checo: The EC-121 Incident (Top Secret)*, 11.

[225] *Project Checo: The EC-121 Incident (Top Secret)*, 12.

Planners at Pacific Command, the Pentagon, the State Department, and National Security Council also began developing military and diplomatic response options. Consistent with the predictions of the restrained retaliation logic, initial plans reflected a desire to significantly punish North Korea for an attack that had claimed the lives of American personnel. The day after the shootdown, the National Security Council outlined several key objectives for any U.S. response. Any response should maintain the right to use international airspace, deter similar hostile actions by North Korea or other countries, exact redress by retaliation or compensation, maximize international criticism of North Korea and minimize criticism of U.S. actions, and maintain domestic support for overseas security commitments.[226] These objectives informed the formulation of several potential diplomatic and military actions.

The least escalatory responses were those that were purely diplomatic in nature. The NSC considered several goals for options that did not involve the use of force: conveying an explicit warning that the next incident would lead to a military response, demanding compensation for the EC-121 and aircrew, maximizing international criticism against North Korea, or reducing tension by "treating the matter in relatively calm form."[227] These objectives shaped the potential "diplomacy only" options, which involved talks with the North Koreas at Panmunjom in the DMZ, calling a United Nations Security Council meeting or presenting a letter to the Security Council, or, using third country channels like the Soviets to convey warning to North Korea.[228] These diplomatic approaches, however, were generally viewed as being either unfeasible or unlikely to

[226] Alternative Courses of Action in Response to Korean Attack on US Aircraft (Top Secret), National Security Council Staff, 16 April, 1969; The National Security Archive; https://nsarchive2.gwu.edu/NSAEBB/NSAEBB322/Doc003.pdf, 1.

[227] Ibid., 13.

[228] Ibid., 13-18.

meet the diplomatic objectives if not coupled with military actions. When used in support of military action, diplomatic efforts were intended to establish the legal basis for U.S. actions and to seek support for military operations, while minimizing criticism and censure from the international community.[229]

The National Security Council also considered several military actions "not involving combat courses of action" such as repeat EC-121 reconnaissance missions with combat escort or a "show of force using air and naval forces in proximity to but outside of North Korea."[230] These actions were considered to pose little risk of escalation to full hostilities, but were viewed as generating little deterrent effect and imposing no costs on North Korea. Indeed the NSC believed these shows of force "would be viewed by North Koreans as unconvincing" and "allows their unlawful acts to go unpunished."[231] Consistent with the theoretical expectations outlined in chapter 2, the NSC assessment of the plans highlight how the non-combat reactions were viewed as providing insufficient punishment and deterrent value following an attack that cost the lives of American servicemembers. In other words, they were viewed as falling in a different "currency" than the North Korean attack or not being a sufficiently tit-for-tat response.

More escalatory "military combat options" were seen as having the advantage of providing "a greater opportunity to accomplish the possible objectives of deterrence, redress, and maintenance of our rights to use international airspace."[232] The proposals were "single, selected military combat actions" including destroying a North Korean aircraft off the coast of North Korea,

[229] Ibid., 11.

[230] Ibid., 2.

[231] Ibid., 3.

[232] Ibid., 4.

striking a selected North Korean airfield, carrying out shore bombardments of military targets on the east or west coasts of North Korea, ground raids across the DMZ, submarine attacks on North Korean naval vessels, blockades of North Korean ports, mining North Korean waters, or seizing North Korean assets – like fishing ships – on the high seas.[233] These options were viewed as positive acts of retaliation that would help exact redress and deter future action. In the case where ships or aircraft were targeted, the retaliation would be directly relatable to North Korea's violation of the right to the free use of international waters and airspace – highlighting a tit-for-tat response logic. NSC Staff believed these military options increased the risk of retaliatory action by North Korea, but posed little risk to drawing China or the Soviet Union into conflict.[234] Significant planning for many of these responses was carried out in the days after the attack. For instance, the Headquarters Pacific Air Forces developed a plan in which 24 U.S. Air Force F-4 fighter-bombers would launch from bases in Korea and Japan to strike Wonsan or Sondong Ni Airfields and destroy hardened facilities and aircraft.[235] Similarly, Strategic Air Command offered a plan to use B-52s based at Guam to attack Wonsan and Sondak Airfields.[236]

Several senior officers and policymakers initially leaned toward a response that would both punish North Korea and deter future actions against the United States. Admiral John McCain, the Commander in Chief of Pacific Command, for instance, argued for a strong reaction rather than a display of force. In a classified memo to the Joint Chiefs of Staff the day after the attack, he explained, "If we operate again in the Sea of Japan only as a show of force, and without positive

[233] Ibid., 5-11.

[234] Ibid., 4.

[235] *Project Checo: The EC-121 Incident (Top Secret)*, 23–25.

[236] *Project Checo: The EC-121 Incident (Top Secret)*, 26–28.

action, I believe that we continue to provide justification to their judgement of us as 'Paper tigers'. The end result might well be the opposite of our intended purpose and encourage rather than discourage further belligerence."[237] A top secret Central Intelligence Agency assessment published two days after the shootdown came to a similar conclusion. CIA analysts noted, "The North Koreans probably would view actions such as demonstrative air and naval maneuvers in proximity to North Korea essentially as a repetition of the US response to the Pueblo seizure. They would be inclined to interpret such demonstrations as indicating US unwillingness to resort to any direct application of force that might carry high risks of a resumption of major hostilities."[238]

Those within the NSC also initially preferred escalatory responses. Alexander Haig, then serving as the military assistant to National Security Advisor Henry Kissinger sent Kissinger a note strongly advocating for a military reprisal. Haig noted that unlike the *Pueblo* seizure in which crewmembers were imprisoned in North Korea, the death of the EC-121 aircrew meant that "similar inhibitions are not available in explaining a 'no action' stand." As a result, "all factors considered, a military retaliatory strike of some type is called for." Haig noted that even if the president was unwilling to launch an overt attack on a North Korean airfield, he should pursue a more covert military reprisal such as a "submarine ambush" against North Korean targets.[239]

President Nixon himself also believed a response of some sort was required. In a call to Kissinger the evening of the shootdown, Nixon explained, "there has to be some reaction here. I

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[237] Message, CINCPAC, subj: Mission of TF-71, 16 April 1969 (Top Secret) cited in *Project Checo: The EC-121 Incident (Top Secret)*, 15-16.

[238] *Intelligence Memorandum: Communist Reactions to Certain US Actions* (Top Secret), Central Intelligence Agency, 17 April 1969, 3.

[239] Memorandum Al Haig to Kissinger (Top Secret); 16 April 1969; General Materials EC-121 Shoot down (1 of 2); Box 436; National Security Council Files: Korea EC-121 Shoot down; Richard Nixon Presidential Library and Museum Yorba Linda, California.

have a feeling they're testing us."[240] Kissinger agreed, explaining the potential reputational consequences of inaction: "to let this one go again will be taken very seriously. There was an intelligence report of Nasser's conversation with Hussein to the effect, 'After all, it isn't so risky to defy the United States – look at North Korea and the Pueblo.'"[241] Throughout the crisis, Nixon continued to view options below the threshold of an armed reprisal as an inadequate response to the North Korean attack. On April 18th, for instance, he told Kissinger that the resumption of reconnaissance flights around Korea was "too much of a piddily thing to announce…It's not all that significant" and continued to express his desire to launch military strikes.[242] As a set of first – and more visible - steps, Nixon deployed a naval task force toward the Korean Peninsula and issued a demarche to North Korea.

In addition to reputational concerns on the international stage, Nixon also had domestic political motivations for considering a military reprisal – suggesting that public opinion plays a role in shaping decisions on military escalation. During the 1968 presidential campaign, Nixon had condemned the Johnson administration's lack of a military response following the *Pueblo* seizure.[243] Failing to act after the EC-121 shootdown could have led to criticism about a similarly weak response in a case where more Americans were killed. In a phone call with Kissinger two days after the shootdown, Nixon weighed the risks of the adverse public reaction for taking no

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[240] Telecon President and Kissinger (5:40pm), 16 April 1969; Chronology of EC-121 Shoot down #9; Box 435; National Security Council Files: Korea EC-121 Shoot down; Richard Nixon Presidential Library and Museum Yorba Linda, California.

[241] Ibid.

[242] Telecon President and Kissinger, 18 April 1969; Chronology of EC-121 Shoot down #9; Box 435; National Security Council Files: Korea EC-121 Shoot down; Richard Nixon Presidential Library and Museum Yorba Linda, California.

[243] Richard A. Hunt, *Melvin Laird and the Foundation of the Post-Vietnam Military: 1969-1973* (Washingotn, DC: Office of the Secretary of Defense, 2015), 39.

action with the risks of being criticized for heightening the risk of a second war in Asia by retaliating against North Korea.[244] Although there was no widespread consensus among the public on how to respond to the attack, some elected officials had called for immediate retaliation, including the use of nuclear weapons if necessary. South Carolina Congressman Lucius Mendel Rivers, for instance, announced "There can only be one answer for America – Retaliation – Retaliation – Retaliation." He explained. "I don't think nuclear weapons would be needed to bring this crowd to its knees, but if it requires that, let 'em have it."[245]

A Surprisingly Restrained Response

These initial reactions suggest policymakers believe that escalatory armed reprisals are justified following an attack on manned military assets that result in the death of American personnel. Indeed, senior decisionmakers appeared driven in part by emotional factors to avenge the deaths of American personnel and instrumental factors to deter future aggression. In the days following the shootdown, airstrikes against North Korea were the preferred option amon g several key decisionmakers. Indeed, just three days after the EC-121 attack, Nixon's staff prepared the speech he would deliver from the West Wing announcing military action in response to the "deliberate and well-planned attack." Had Nixon ordered the airstrikes, he planned to justify his reasoning to the American public and international community:

> For if we fail to act today to defend ourselves against unprovoked attack, we only invite a more serious challenge tomorrow….With these considerations in mind, and after the most painstaking examining of all the courses open to us, I have today ordered a carrier strike force in the Sea of Japan to launch an air attack against a North Korean air base. This is a single military action. It

[244] Hunt, 40.

[245] Chairman L. Mendel Rivers, D-S.C., of the House Armed Services Committee Called for Immediate U.S. Military Retaliation; 15 April 1969; North Korean Reconnaissance Shoot down 4/17/1969 Vol I Haig; Box 434; National Security Council Files: Korea EC-121 Shoot down; Richard Nixon Presidential Library and Museum Yorba Linda, California.

involves no larger commitment, and represents a challenge to no other nation.[246]

The retaliatory airstrikes, of course, never came to fruition. Instead, Nixon ordered the resumption of reconnaissance flights around the Korean Peninsula and directed the Seventh Fleet to surge a massive flotilla comprised of four aircraft carriers, 19 destroyers and cruisers and more than 350 aircraft to the Sea of Japan.[247] Between April 19th and 26th, this flotilla – referred to as Task Force 71 – conducted air and surface maneuvers off the coast of North Korea in a show of force intended to deter further provocations. In public statements, Nixon made clear that he reserved the right to take additional action on top of these initial deployments.[248] The Task Force, however was withdrawn to its pre-surge posture on April 26th with ships returning to bases and operating areas in Japan and Southeast Asia without further escalation.[249]

Although some military leaders and some of Nixon's civilian advisors initially sought an armed reprisal to punish and deter North Korea, the response was tempered out of fear that even a limited set of airstrikes could trigger a war that could undermine Washington's efforts in Vietnam. Secretary of Defense Melvin Laird, for instance, desired retaliation but realized initiating military action in Korea could jeopardize operations in Vietnam. In a phone called to Henry Kissinger, Laird described his thinking, "if there was some way we could hit one of their aircraft or ships, I would do it in a minute…But I have got concerns over what this might mean from the standpoint

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246 Draft No 2; 18 April 1969 (Top Secret); Very Sensitive; Box 440; National Security Council Files: Korea EC-121 Shoot down; Richard Nixon Presidential Library and Museum Yorba Linda, California.

247 Bolger, *Scenes from an Unfinished War: Low-Intensity Conflict in Korea, 1966-1969*, 106.

248 Press Conference No. 5 of the President of the United States; 18 April 1969; EC-121 Shoot down April 18-19 (1 of 8); Box 437; National Security Council Files: Korea EC-121 Shoot down; Richard Nixon Presidential Library and Museum Yorba Linda, California.

249 Seventh Fleet Operations Order from JCS to Secretary of Defense (Top Secret); 24 April 1969; NSC Meeting 4/16/69 North Korean Downing of US Aircraft; Box H-022; National Security Council Meetings.

of our force commitments in that area, and we must bear in mind that we can't put ourselves in a position where we are forced to pull back, as far as Vietnam is concerned."[250] Secretary of State William Rogers, CIA Director Richard Helms, and U.S. Ambassador to South Korea William Porter were similarly opposed to a military reprisal.[251] Rogers was concerned of the potentially adverse effect that launching military operations could have on public opinion, while Helms shared a combination of the concerns voiced by Laird and Rogers.[252]

Perceptions among some senior military officers on the ground were similar. General Charles Bonesteel III, Commander United States Forces Korea and Commander in Chief UN Command Korea reasoned that, "Much as all of us here would like to take a crack at N.K. there are certain general considerations bearing on contingency plans that a deeper responsibility to U.S. position world-wide, and more particularly to our avowed mission 'to defend the Republic of Korea against Communist aggression' requires us to set forth."[253] Bonesteel was particularly concerned that any military response could trigger a North Korean reaction that could draw American forces into a bloody conflict on the Korean Peninsula and damage the South Korean economy.[254] Indeed, a Joint Chiefs of Staff study forwarded to the White House on April 17th suggested that American forces in Korea had significant shortfalls in equipment and could only support 28 days of ground combat and 45 days of air operations. To resupply these forces,

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250 Telecon Secretary Laird to Mr. Kissinger, 16 April 1969; Chronology of EC-121 Shoot down #9; Box 435; National Security Council Files: Korea EC-121 Shoot down; Richard Nixon Presidential Library and Museum Yorba Linda, California.

251 Hunt, *Melvin Laird and the Foundation of the Post-Vietnam Military: 1969-1973*, 42.

252 Henry Kissinger, *White House Years*, Reprint Edition (New York: Simon & Schuster, 2011), 319–20.

253 Message, CINCUNC/COMUSKOREA, subj: Effect of Punitive Actions, 17 April 1969 (Top Secret) cited in *Project Checo: The EC-121 Incident (Top Secret)*, 16.

254 Ibid., 16.

equipment would need to be drawn from the logistics pipeline supporting operations in Southeast Asia, potentially weakening U.S. war efforts in Vietnam.[255]

While some senior policymakers – particularly Henry Kissinger – believed that an armed retaliation that exacted redress for the shootdown of a manned aircraft was the most appropriate response, competing military requirements in Southeast Asia forced the implementation of a more tempered plan. As Kissinger later explained, finding a military option that balanced the desire for tit-for-tat retaliation with minimizing the risk of becoming entrenched in a second Asian War was difficult: "those [military options] that seemed safe were inadequate to the provocation, those that seemed equal to the challenge appeared too risky in terms of the fear of a two-front war."[256] Had the United States not been as deeply engaged in Vietnam, it is probable that Nixon would have ordered military strikes. Indeed, Kissinger described the decision surrounding the response to the EC-121 downing as "a close call, which probably should have gone the other way."[257] Even without actual strikes, however, the deployment of Task Force 71 and the demarche delivered at Panmunjom represented a far greater military and diplomatic escalation than that which would have followed the loss of a drone.

Lessons Learned: Future Retaliation and Drone Operations Plans

Policymakers and national security practitioners drew several lessons about the risks of manned reconnaissance operations from the EC-121 shootdown. First, Nixon and his National Security Council recognized they had insufficient plans for dealing with attacks on manned assets

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[255] Fact Sheet, Logistic Support of Hostilities in Korea, 17 April 1969, Haig vol II; Box 434; National Security Council Files: Korea EC-121 Shoot down; Richard Nixon Presidential Library and Museum Yorba Linda, California.

[256] Kissinger, *White House Years*, 318.

[257] Kissinger, 321.

and other provocations. In the months following the EC-121 incident, the national security establishment began developing contingency plans in the event North Korea carried out further attacks on American personnel and manned assets. Many of these plans called for armed reprisal, highlighting that responses were generally less restrained and more escalatory when manned assets or personnel were attacked. The Chairman of the Joint Chiefs of Staff's FRACTURE PINE plan, for example, offered a "measured" option for U.S. retaliation to North Korean provocations. Under the plan, U.S. naval ships would fire long-range Talos surface-to-air missiles at North Korean jets operating from or between Wonsan and Sondong-Ni airfields.[258] The plan featured broad authorities that allowed for the targeting of North Korean aircraft even if they did not demonstrate hostile intent toward U.S. forces.[259]

Plans similar to FRACTURE PINE were discussed by the Washington Special Actions Group (WSAG), a group that Kissinger established in July 1969 to plan and coordinate government responses to crises. The group considered over two-dozen contingency plans that were designed to provide the president with a broad menu of options to quickly respond to future North Korean provocation. The potential response plans ranged from relatively non-escalatory actions such as non-combatant evacuations to the "selective use of tactical weapons against North Korea" in a punitive attack against military targets.[260] The most limited of these nuclear options involved using tactical fighter jets, carrier-based attack aircraft, or surface-to-surface missiles to strike up to

[258] Memorandum, Chairman of the Joint Chiefs of Staff (CJCS) Wheeler to Secretary of Defense Laird, May 15, 1969, Subject: TALOS Contingency Plan (FRACTURE PINE) (Top Secret), National Security Archives, https://nsarchive2.gwu.edu/NSAEBB/NSAEBB322/Doc08.

[259] Ibid, 2.

[260] Memorandum, Secretary of Defense Laird to NSA Kissinger, June 25, 1969, Subject: Review of US Contingency Plans for Washington Special Actions Group (Top Secret), The National Security Archive; https://nsarchive2.gwu.edu/NSAEBB/NSAEBB322/Doc12.pdf. Nuclear planning is discussed in Tab L of the memorandum.

twelve military targets with nuclear weapons with a yield of .2 to 10 kilotons.[261] While WSAG considered several options, Kissinger noted that in the event of a future contingency, the president would likely respond by doing nothing or select a response on the "extreme end of the range of possibilities" in order to prevent any North Korean countermeasures.[262] Even though the risk of massive escalation could restrain retaliation, the WSAG's contingency planning efforts demonstrate that decisionmakers believe far more escalatory responses are justified to punish or deter a rival after attacks on manned platforms and personnel.

The EC-121 downing also led to a second lesson consistent with the tenets of technology-enabled escalation control: using drones in place of manned reconnaissance aircraft could greatly reduce the political and military consequences associated with shootdowns. In the months following the EC-121 attack, a Pacific Command group tasked with analyzing the incident recommended the deployment of unmanned reconnaissance platforms. Air Force Major General John Morrison of the National Security Agency (NSA) took this recommendation and directed NSA personnel to investigate the use of drones to collect signals intelligence in the Korean theater. NSA discovered the Air Force had already started development of a drone that could substitute for manned aircraft on electronic intelligence gathering missions. After the EC-121 attack, the Air Force presented their drone plan at the Pentagon, and received approval for the program from Deputy Secretary of Defense Cyrus Vance in May, just one month after the shootdown. The Ryan Aeronautics Model TE drone made its first test flight in November 1969 and its first operational

[261] Ibid, Tab L.

[262] Memorandum, Haig to Kissinger, July 3, 1969, Subject: WSAG Meeting of July 2, 1969 (with attached minutes of the meeting) [Source: The Kissinger Transcripts: The Verbatim Record, edited by Dr. William Burr, The National Security Archive, https://nsarchive2.gwu.edu/NSAEBB/NSAEBB322/Doc13.pdf, 3

mission in February 1970.[263] Simultaneously, the Air Force took steps to "mini-man" its manned reconnaissance operations by moving intelligence analysts from aircraft to ground stations, where they analyzed data downlinked from reconnaissance aircraft operated by just a cockpit crew.[264] The Air Force continues to conduct operations using this "mini-man" approach both in Korea and in other regions today, highlighting the desire of senior policymakers to avoid the consequences of losing friendly intelligence aircrew.[265]

In the years after the EC-121 shootdown, drones were built into contingency and intelligence collection plans for the Korean theater. A report prepared by the interagency working group that assessed potential responses to North Korean provocations included drone reconnaissance in several of their plans.[266] In addition to contingency operations, drones like the Model TE – codenamed COMBAT DAWN – continued to play a role in peacetime intelligence collection in the Korean theater. By late 1972 the Joint Chiefs of Staff had doubled the collection mission for the COMBAT DAWN high-altitude signals intelligence drone from 30 to 60 hours each month.[267] Just a year later, however, the Air Force planned to phase out COMBAT DAWN

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[263] Although the official NSA history of the EC-121 redacts the location of the first operational Ryan Model TE drone mission, it is likely over the Korean Peninsula given that the report focuses on intelligence collection against North Korean targets.

[264] *The National Security Agency and the EC-121 Shoot down (Top Secret)* (Fort Meade, Maryland: Ofice of Archives and History, National Security Agency/Central Security Service, 1989), 44, https://www.nsa.gov/Portals/70/documents/news-features/declassified-documents/cryptologic-histories/EC-121.pdf. The U.S. Air Force and Navy do, however, still operate large reconnaissance aircraft like the RC-135 and EP-3 that carry intelligence personnel onboard.

[265] *The National Security Agency and the EC-121 Shoot down* (Top Secret), 44–45; "Air Force Distributed Common For more on the continuing use of mini-manned operations, which are now referred to as distributed operations see, Ground System Fact Sheet" (U.S. Air Force, October 13, 2015), http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/104525/air-force-distributed-common-ground-system.aspx.

[266] *Foreign Relations of the United States*, 1969-1976, Volume XIX, Part 1, Korea, 1969-1972, Document 26.

[267] *History of the Directorate of Operations 1 January to 30 June 1973* (Top Secret); K143.01 V.3; Air Force Historical Research Agency, Maxwell AFB, Alabama, 251.

operations in Korea because it "could no longer justify the expense of COMBAT DAWN in the current austere fiscal environment."[268] Although the COMBAT DAWN drones were phased out of service in Korea by 1975, the Air Force maintained a drone contingency force based in the United States that could be deployed worldwide in the event of crises.[269]

The following year, the Pentagon ordered the Air Force to prepare to deploy these U.S.-based drones for a high-risk reconnaissance operation following a crisis in the DMZ. On August 18, 1976, North Korean troops killed two U.S. Army officers in the Joint Security Area (JSA) of the DMZ. Captain Arthur Bonifas and Lieutenant Mark Barrett were leading a team of South Korean and American personnel in the JSA to trim a tree that blocked the line of sight between two United Nations Command guard posts. The obstructed view made troops stationed at the guard posts vulnerable to North Korean harassment. Shortly after the work party began trimming the tree, a Korean People's Army officer ordered the group to halt. When the American officers refused, North Korean troops brutally clubbed and axed them to death.[270]

The day after the Axe Murder incident, the 432nd Tactical Drone Group was placed into alert status for a possible deployment to Northeast Asia. Four AQM-34M drones along with two DC-130E mother ships and two CH-3 drone recovery helicopters were prepared to launch within two and half hours of receiving a deployment order.[271] If deployed, the drones would collect imagery of North Korean military positions within the DMZ. The secret cable from Tactical Air

[268] Ibid., 252.

[269] Ibid., 253.

[270] Michishita, *North Korea's Military-Diplomatic Campaigns, 1966-2008*, 73–77.

[271] According to the deployment order, the first DC-130E was to be put on two-and-a-half-hour alert and the second DC-130E on 12 hour alert. The aircraft would be deployed to Yokota Air Base, just outside Tokyo. Upon completing their mission, drones would be recovered near Kunsan Air Base, South Korea.

Command headquarters at Langley Air Force Base, Virginia to the 432nd Tactical Drone Group at Davis Monthan Air Force Base in Tucson, Arizona explained that "current and forecast weather conditions in Korea precludes use of high altitude, stand-off, photo reconnaissance of DMZ and adjacent North Korean Landmass. Use of RF-4 aircraft flying under the overcast, in or near DMZ, not considered prudent due [to] high risk factor."[272] In other words, low cloud cover precluded the use of manned high-altitude reconnaissance aircraft that flew beyond the reach of North Korean air defenses and the use of manned RF-4 tactical reconnaissance aircraft was too risky. Because they could collect imagery with lower operational risk, drones were seen as more easily deployable in this context than manned assets.

The reconnaissance flights would support a joint U.S. and South Korean show of force operation, codenamed Paul Bunyan, in which forces would enter the JSA to cut down the tree. Ultimately, the drones of the 432nd Tactical Drone Group were not deployed before Operation Paul Bunyan was launched on the morning of August 21. Over 100 United Nations Command personnel including combat engineers and special forces troops entered the JSA supported by attack helicopters, 20 utility helicopters carrying a U.S. infantry unit, and U.S. fighter jets and B-52s flying south of the DMZ.[273] The personnel cut down the tree without interference from North Korean forces. The next day, Tactical Air Command relaxed the two-and-a-half-hour alert for the 432nd to 24 hours, and removed the Drone Group from alert status on August 25.[274] Even though

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[272] Cable from HQ TAC Langley AFB VA/CP to 432TDG Davis Monthan AFB AZ/CC, Drone Deployment Planning; 20 August 1976; K-GP-RCN-432-HI 1 July 1976 – 30 September 1976; Air Force Historical Research Agency, Maxwell AFB, Alabama, 1-2.

[273] Michishita, *North Korea's Military-Diplomatic Campaigns, 1966-2008*, 79–80.

[274] Cable from HQ TAC Langley AFB VA/CP to 432TDG Davis Monthan AFB AZ/CC, Drone Deployment Planning; 21 August 1976; K-GP-RCN-432-HI 1 July 1976 – 30 September 1976; Air Force Historical Research Agency, Maxwell AFB, Alabama, 1; Cable from HQ TAC Langley AFB VA/CP to 432TDG Davis Monthan AFB AZ/CC,

the drones were not deployed, Tactical Air Command's planning reveals that senior military leaders considered drones to be a less risky and more easily deployable option than manned assets – providing support for the logic underlying the increased initiation hypothesis.

CHINA: DRONES BEHIND THE BAMBOO CURTAIN

The People's Republic of China was another critical intelligence target for the United States during the Cold War. In the years following the establishment of the People's Republic in October 1949, China engaged in a series of actions that challenged the United States and its allies in Asia. In fall 1950, China dispatched nearly a quarter million "volunteers" to fight against American and United Nations forces in Korea. By the time hostilities ended in 1953, more than three million Chinese personnel had served in Korea, including both ground and air forces.[275] During the same period, the People's Liberation Army (PLA) carried out military operations against America's ally, the Nationalist Republic of China, whose Kuomintang (KMT) government had fled to Taiwan after their military defeat in the Chinese Civil War. From 1950 to 1958, the PLA launched a series of operations aimed at capturing islands off the coast of mainland China that were under KMT control. These operations dragged the United States into crises in 1954-1955 and 1958, when the People's Republic of China threatened to seize the islands of Quemoy and Matsu.[276] In response, the United States bolstered its military support and deployed forces into the region to support the Republic of China's claims. China also helped arm and advise communist

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Korea Augmentation; 25 August 1976; K-GP-RCN-432-HI 1 July 1976 – 30 September 1976; Air Force Historical Research Agency, Maxwell AFB, Alabama, 1.

[275] For more on China's intervention, see Allen S. Whiting, *China Crosses the Yalu: The Decision to Enter the Korean War* (Stanford, CA: Stanford University Press, 1960), 116–50; Jian Chen, *China's Road to the Korean War* (New York: Columbia University Press, 1996), 190–210; Xiaoming Zhang, *Red Wings over the Yalu: China, the Soviet Union, and the Air War in Korea* (College Station, TX: Texas A&M University Press, 2003).

[276] Bruce A. Elleman, *Taiwan Straits: Crisis in Asia and the Role of the U.S. Navy* (Lanham, UK: Rowman & Littlefield Publishers, 2014), 75–102.

forces fighting American troops in Vietnam.[277] To monitor Chinese activity, the United States dedicated significant attention to collecting intelligence on China's capabilities and intentions.[278]

As in other regions of the world, airborne reconnaissance operations played a significant role helping to collect sensitive information in mainland China. Most early intelligence gathering missions were flown using slow moving aircraft like modified World War II-era B-29 bombers that flew along the periphery or over Chinese territory.[279] Early flights often penetrated deep into Chinese airspace, collecting information on military and industrial facilities.[280] As the PLA Air Force strengthened its air defense capability by acquiring new fighter aircraft, anti-aircraft artillery, and surface-to-air missile systems, U.S. military aircraft operating in and around China faced an increasing threat. Indeed, between 1949 and 1969, Chinese forces attacked at least 11 American military aircraft, including several reconnaissance aircraft.[281]

To avoid exposing American personnel to China's air defenses, the military and intelligence community turned to new means of intelligence collection. Some of these risk reducing measures involved new technologies. In the late 1950s, the United States began to deploy the high-altitude U-2 reconnaissance aircraft, which operated at an altitude of approximately

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[277] Jian Chen, *Mao's China and the Cold War* (Chapel Hill, NC: The University of North Carolina Press, 2001), 205–37.

[278] Brugioni, *Eyes in the Sky*, 260–66.

[279] Some of these aircraft were designated as RB-29s, while others were RB-50s, a post-World War II variant of the aging RB-29s. These aircraft were typically operated by Strategic Air Command's 55th and 91st Strategic Reconnaissance Wings.

[280] Brugioni, *Eyes in the Sky*, 260–66.

[281] Memorandum for Dr. Kissinger from Col Haig: Review of Vulnerable Intelligence Collection (Secret); 2 June 1979; Review of Vulnerable Intelligence Collection (May-Jun 69); Box 332; National Security Council Files: Subject Files; Richard Nixon Presidential Library and Museum, Yorba Linda, California.

70,000 feet, out of reach of most of China's fighters and air defenses.[282] Under Operation SOFT TOUCH, for example, the United States flew two U-2 missions over mainland China in 1958.[283] While these aircraft were less vulnerable than the slow-moving World War II era planes that were previously used for intelligence collection, they had their limitations. The May 1960 shootdown of Gary Powers in his U-2 highlighted the vulnerability of even high-altitude aircraft to Soviet-built surface-to-air missiles, leading President Eisenhower to bar reconnaissance flights over the Soviet Union. These restrictions, however, did not apply to China even though the PLA operated Soviet MiG fighter jets and the same SA-2 Guideline surface-to-air missile that had downed Gary Powers. Indeed, in July 1960, the CIA recommended U-2 overflights of China as a means of filling an "urgent and high priority requirement for additional photographic reconnaissance of Communist China."[284] The intelligence community also increasingly relied on its nascent array of reconnaissance satellites to collect imagery deep within Chinese territory.[285] But satellites of the era had difficulty penetrating cloud cover, could not easily be moved to collect on other targets, and often required long timelines between collection of imagery and delivery to intelligence consumers.[286]

In addition to technical solutions, the intelligence community sought to reduce risk to American personnel – and the associated risk of getting tangled up in a diplomatic or military crisis

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282 Situation Estimate for Project Chalice: Fiscal Years 1961 and 1962 (Top Secret); 14 March 1960; National Security Archives; https://nsarchive2.gwu.edu/NSAEBB/NSAEBB74/U2-08.pdf, 1.

283 Brugioni, *Eyes in the Sky*, 305–6.

284 CIA, Future of the Agency's U-2 Capability (Top Secret), 7 July 1960; National Security Archives; https://nsarchive2.gwu.edu/NSAEBB/NSAEBB74/U2-09.pdf, 4

285 Brugioni, *Eyes in the Sky*, 306.

286 Memorandum from Alexander Flax (National Reconnaissance Office) to Mr. Nitze, Mr. Helms, and Dr. Hornig. Scenarios for Utilization of the TAGBOARD Drones (Top Secret); 25 September 1967; CIA-RDP79B01709A000100060021-3, 3.

with China – by outsourcing airborne reconnaissance missions to foreign crews. After the 1958 Taiwan Straits Crisis, the United States began transferring reconnaissance aircraft to the Republic of China and coordinating intelligence collection operations. Under one of these agreements, the United States Air Force transferred RB-57 reconnaissance jets to the Nationalist Chinese and coordinated targets to photograph. Nationalist pilots flew these missions – which sometimes included deep penetrations over mainland China – and provided duplicate copies of the imagery they collected to the United States.[287] In January 1959, this partnership expanded when the Central Intelligence Agency launched a program to train pilots from the Republic of China Air Force to fly the U-2. Planners hoped that replacing American pilots with Nationalist Chinese pilots would reduce the likelihood of an international incident involving the United States if a U-2 was shot down over mainland China.[288] The Republic of China's Black Cat Squadron began U-2 overflights of mainland China in 1962, collecting much of the information on China's nuclear and missile development programs and its conventional military capabilities.[289]

The PLA's air defenses, however, soon posed a significant threat to U-2 operations. PLA forces downed four Nationalist-operated U-2s between 1962 and 1965. In a classified note to President Johnson, National Security Advisor McGeorge Bundy noted that the outsourcing the flights to China allowed the United States "to keep out of this entirely, and the Chinese Nationalists have always been very good about taking the responsibility and avoiding chatter. In that way we have so far kept these episodes from having the political impact of the U-2 lost over the Soviet

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[287] Brugioni, *Eyes in the Sky*, 265–66.

[288] For more on the downing of Nationalist-operated U-2s see, H. Mike Hua, *Lost Black Cats: Story of Two Captured Chinese U-2 Pilots* (Bloomington, Indiana: Author House, 2005).

[289] Brugioni, *Eyes in the Sky*, 306–12., Preliminary Report: U-2 Reconnaissance Mission C374C (Top Secret); 19 January 1965; Sanitized Volume 2 (National Reconnaissance Program); Box 4; National Security Files: Intelligence File; Lyndon B. Johnson Presidential Library, Austin, Texas.

Union[.]"[290] In other words, the United States had no need to escalate diplomatically or militarily because no American airmen were captured or killed.[291] Still, the high risk to operations and the potential political risk associated with losing manned aircraft over mainland China led the United States military and intelligence community to look toward unmanned options for intelligence collection of targets within China.

Increased Initiation

Drone operations over China began in 1964 when the United States deployed Firebee drones to Southeast Asia under the code name Operation BLUE SPRINGS. While BLUE SPRINGS missions focused primarily on North Vietnamese targets, they were soon flying into China to monitor PLA readiness and to detect Chinese support to communist forces in Vietnam.[292] One top secret document outlining the United States Intelligence Board's (USIB) requirements from March 1965 identified 20 targets in South China "requiring frequent coverage with high resolution stereo photography…to be achieved either by U-2 or BLUE SPRINGS (drone)."[293] The USIB demonstrated its desire to reduce risk to American aircrew by directing the intelligence community "to get BLUE SPRINGS coverage before sending the U-2."[294] To be sure, their

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[290] Memorandum for the President from McGeorge Bundy (Top Secret); 10 January 1965; McGeorge Bundy 1/1-2/28/65 Vol 8 (2 of 2); Box 2; National Security Files: Memos to the President, McGeorge Bundy, Vol 5-8; Lyndon B. Johnson Presidential Library, Austin, Texas.

[290] Ibid.

[291] This logic aligns with Austin Carson's argument that covert action can help control escalation. See, Carson, *Secret Wars*.

[292] One BLUE SPRINGS mission report from December 1964 indicates that Firebee drones were collecting imagery of Chinese airfields hundreds of miles inside China. See Nan-Ning Airfield South China, Blue Springs; 19 December 1964; CIA-RDP80T01471R000200050012-3.

[293] South China USIB Requirement (Top Secret); 22 March 1965; CIA-RDP68R00530A000100080042-3.

[294] Ibid.

guidance did not proscribe U-2 deployments, but still indicated a greater willingness to deploy drones than manned aircraft on high risk missions, providing support for the *increased initiation* hypothesis.

In addition to Firebee operations along the Vietnam-China border, the intelligence community looked to drones as a means of gathering intelligence in China's nuclear capabilities. Many of the facilities associated with China's nuclear weapons program, such as the Lop Nur test site, were located in western China far from borders where they could be monitored by aircraft flying outside of Chinese airspace, and were far beyond the Firebee's traditional operating areas. Flying manned aircraft deep within China was too risky due to an increasingly robust Chinese air defense network. America's expanding constellation of surveillance satellites provided one alternative that avoided violations of national airspace and eliminated the need to place aircrew in harm's way. A CIA report from 1967, however, noted that "satellite reconnaissance cannot be assured due to cloud cover" and "in rapidly changing tactical or crisis situations satellite reconnaissance can not provide a high enough rate coverage and data return to meet the need."[295]

As a complement to existing intelligence collection platforms, the CIA proposed a high-altitude, high-speed drone codenamed TAGBOARD. The CIA drone was launched from specially configured B-52 bomber and used a ramjet engine to operate at cruise speeds greater than Mach 3. After flying its preprogrammed route of up to 3000 nautical miles, TAGBOARD would eject its intelligence payload, which would be retrieved in mid-air by a modified C-130 cargo aircraft. The

[295] Memorandum from Alexander Flax (National Reconnaissance Office) to Mr. Nitze, Mr. Helms, and Dr. Hornig. Scenarios for Utilization of the TAGBOARD Drones (Top Secret); 25 September 1967; CIA-RDP79B01709A000100060021-3, 3.

drone itself would then self-destruct.[296] The CIA viewed TAGBOARD as a tool that could greatly decrease the human and political risks associated with intelligence overflights. Once CIA assessment of TAGBOARD utilization scenarios explained, "there are many situations and denied areas of the world in which there may be a substantial diminution in the political liability incurred by the United States by the use of drones rather than manned aircraft for overflight."[297]. Using the language introduced in chapter 2, the CIA believed the TAGBOARD could increase the menu of options for policy makers, allow the United States to initiate missions it would be unable to conduct using manned assets, and reduce the risks of diplomatic or military tensions in the wake of a shootdown.

Although the CIA touted the potential benefits of TAGBOARD operations, not all decisionmakers believed the CIA drone was a more desirable collection asset than manned platforms like the U-2 and SR-71. Specifically, some decisionmakers believed TAGBOARD would be more vulnerable to shootdown by surface-to-air missiles than manned aircraft like the SR-71 that were equipped with electronic counter-measures to defend them from air defensives.[298] Drone skeptics feared this would hinder TAGBOARD's ability to collect intelligence, creating a "very expensive program of doubtful value."[299] Thus, while drones expanded the menu of military

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[296] Memorandum from John Parangosky (Deputy Director of Special Activities) to Deputy Director for Science and Technology, TAGBOARD Program (Top Secret); 17 August 1967; CIA-RDP89B00980R000600090001-9, 1-2.

[297] Memorandum from Alexander Flax (National Reconnaissance Office) to Mr. Nitze, Mr. Helms, and Dr. Hornig. Scenarios for Utilization of the TAGBOARD Drones (Top Secret); 25 September 1967; CIA-RDP79B01709A000100060021-3, 1.

[298] Memorandum to Deputy Secretary of Defense, Special Assistant to the President, and Deputy Under Secretary of State for Political Affairs from Director of Central Intelligence, OXCART Reconnaissance of North Vietnam; 15 May 1967; OXCART (1 of 3); Box 8; Papers of Lyndon Baines Johnson: National Security File, Intelligence File; Lyndon Baines Johnson Library, Austin Texas, 10; Memorandum for Deputy Director of Science and Technology, EXCOM Issues (Top Secret); 15 November 1967; CIA-RDP74B00283R000100090007-8, 1.

[299] Memorandum for Deputy Director of Science and Technology, EXCOM Issues (Top Secret); 15 November 1967; CIA-RDP74B00283R000100090007-8, 1.

options, they were not necessarily the tool of choice. If manned aircraft were perceived to be more effective than drones at achieving intelligence collection or military objectives, they would be used even if they put friendly personnel over hostile territory – a logic that also appeared in the surveys in chapter 4.

In spite of the tepid support, President Nixon authorized four operational TAGBOARD missions through Chinese airspace. One mission was designed to gather information about a shipment of military goods from the Soviet Union and China to North Vietnam. The drone would fly over North Korean and Chinese rail lines and over Shanghai. None of the four missions was successful. Drones either disappeared or flew their programmed routes but their intelligence payloads were never recovered.[300] Despite the failure of TAGBOARD operations, they provide support for the increase initiation logic: President Nixon launched drones on an operation that would likely not have occurred had drones been unavailable.

Amplified Aggression and Restrained Retaliation

The drones operating in China were frequent targets for PLA air defenses, but the loss of these unmanned aircraft never triggered an escalatory American response. In November 1964, the Chinese government announced it had shot down a "pilotless high-altitude reconnaissance military plane of U.S. imperialism," in an attack that Chinese Minister of National Defense Lin Biao praised as a "major victory."[301] By the end of April 1965, China claimed to have downed five American Firebees. The downed drones were placed on display in Beijing and were reportedly visited by

[300] Brugioni, *Eyes in the Sky*, 223–25.

[301] "Red China Says U.S. Spy Plane Shot Down," *Los Angeles Times*, 17 November 1964 cited in Wagner, *Lightning Bugs and Other Reconnaissance Drones*, 74–75.

more than 30,000 Chinese citizens.[302] The shootdowns continued over the next several years, with the Chinese government using each incident for propaganda purposes. In January 1968, for instance, a Chinese state owned newspaper published an article announcing, "The Air Force of the heroic Chinese People's Liberation Army, which is boundlessly loyal to Chairman Mao Tse-tung's thought and Chairman Mao's proletarian revolutionary line, shot down a U.S. imperialist high altitude military reconnaissance plane when it intruded into China's airspace over southwest China for reconnaissance and provocation."[303] The PLA crew was subsequently awarded medals for successfully downing the Firebee.[304] China's repeated attacks on American drones and the propagandization of shootdowns offers support for the amplified aggression hypothesis. The shootdowns enabled China to demonstrate its air defense capabilities to domestic audiences without jeopardizing the lives of American personnel, thereby reducing the likelihood of American retaliation. In short, the lack of captured or killed crewmembers made drone downings easy for Americans policymakers to publicly ignore.

Despite the repeated drone shootdowns, the United States demonstrated restrained retaliation. The United States government refused to acknowledge drone operations over China even in the face of significant Chinese propaganda efforts. In response to Chinese media announcing the November 1964 shootdown, White House Press Secretary George Reedy commented, "I know nothing about it. This is the first I've heard about it."[305] The State Department similarly claimed they had "no information to support the Chinese claim" and the Defense

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[302] Wagner, 78.

[303] Wagner, 133.

[304] Wagner, 134.

[305] "Red China Says U.S. Spy Plane Shot Down," *Los Angeles Times*, 17 November 1964 cited in Wagner, 75.

Department offered no comment.[306] Indeed, this lack of response was intentional and pre-planned. Colonel Lloyd Ryan, Deputy Chief of the Reconnaissance Division at U.S. Air Force Headquarters during the launch of BLUE SPRINGS operations described the policy: "If they shoot one down and announce it publicly, don't deny it; but don't acknowledge it. Just reply, 'no comment' and sweat it out."[307] To further reduce the likelihood of political incidents and escalation following drone shootdowns over China, plans were made to either eliminate all identification markings from the drones or to design self-destruct mechanisms for the drones. These plans, however, were abandoned in favor of simply ignoring drone losses.[308] As one former Ryan Aeronautics employee explained, "A name plate doesn't receive the same public attention as an American pilot in prison."[309]

This restrained retaliation following drone shootdowns stood in contrast to the military and diplomatic action that sometimes accompanied the loss of American aircraft to China's air defenses. To be sure, the United States did not retaliate militarily to China's downing of manned aircraft that had penetrated into Chinese airspace, but it did launch search and rescue operations close to or in Chinese territorial airspace to recover downed crews. These efforts could lead to additional violations of Chinese sovereignty and created what Thomas Schelling referred to as "a threat that leaves something to chance," an action that increases the potential for escalation through accidents, miscommunication, or additional shootdowns.[310] In February 1968, for example, two

[306] "Red China Says U.S. Spy Plane Shot Down," *Los Angeles Times*, 17 November 1964 cited in Wagner, 75.

[307] Wagner, 57.

[308] Wagner, 57.

[309] Wagner, 78.

[310] Schelling, *Arms and Influence*.

unarmed US Navy aircraft on a ferry flight from the Philippines to an aircraft carrier in the Gulf of Tonkin experienced navigational difficulties and inadvertently strayed in airspace off the coast of the Chinese controlled Hainan Islands in the South China Sea. Chinese MiG fighters shot down one of the American aircraft, prompting an emergency meeting of President Johnson and his foreign policy advisors to discuss how to respond. Since the aircraft had violated Chinese airspace, discussions focused not on military retaliation, but whether and how to rescue the downed pilot. The Navy's Seventh Fleet proposed a helicopter rescue operation that would include a combat air patrol of Navy fighters to protect the rescue helicopter against further MiG attacks. The plan elicited tepid support from Johnson's senior advisors who feared the operation could trigger additional Chinese attacks. Secretary of State Dean Rusk believed the risks to the helicopter crew were too high, asking, "Do you want to risk 3 or 4 men for 1?"[311] Secretary of Defense McNamara voiced similar reservations: "I hate to say this Mr. President, because this pilot is one of my men. But I recommend against this action…There is a very high chance of losing 3 or 4 men in an effort to save 1. The chances are better than 50-50, perhaps 60 to 40 that this would involve us in a conflict with the Chinese."[312] Despite the risks, the President ordered the deployment of a reconnaissance aircraft that flew just outside Chinese airspace to continue the search for the downed crew.[313] Even this move was viewed risky as it heightened the chance of inadvertent violations of Chinese airspace that could trigger Chinese response.[314] Although the reconnaissance

[311] Notes of the President's Meeting on Violation of Chinese Airspace (Top Secret), 14 February 1968; February 14, 1968 – 1:14pm Foreign Policy Advisors on violation of Chinese Airspace; Box 2 Set II; Tom John's Notes of Meetings; Lyndon B. Johnson Presidential Library, Austin, Texas; 1-2.

[312] Ibid., 2.

[313] Ibid., 5.

[314] Ibid., 4.

aircraft never entered Chinese airspace, planning efforts and search operation illustrate how decisionmakers are willing to launch risky operations following the loss of manned aircraft – just as the participants did in the wargames in Chapter 5.

The End of Overflights

As President Nixon's national security staff worked to reestablish ties between Washington and Beijing, they began to question the value of drone missions in Chinese airspace. There was concern that an incident involving a reconnaissance aircraft over China could scuttle rapprochement efforts, much as the May 1960 U-2 incident led to the cancellation of the Paris Summit between President Eisenhower and Soviet Premier Khrushchev.[315] To be sure, President Nixon had approved the resumption of aerial reconnaissance missions over South China, which had been suspended in March 1968.[316] His March 1969 authorization, however, limited overflights to drones and required the 303 Committee – which oversaw covert operations – to approve each mission.[317] Despite the authorization, no missions were flown between March and October 1969 for a variety of reasons including the EC-121 shootdown, President Nixon's trip to Southeast Asia, and the easing of trade and travel restrictions between the United States and China.[318]

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[315] Background Briefing with Henry Kissinger and Ron Zielger; 16 July 1971; US China Policy 1969-1972; Box 86; National Security Council Files: Henry A. Kissinger Office Files, Country Files: Far East; Richard Nixon Presidential Library and Museum Yorba Linda, California, 9.

[316] The reconnaissance missions were halted at the insistence of Secretary State Dean Rusk who believed that the high level of drone reconnaissance combined with the inadvertent violation of Chinese airspace by U.S. military aircraft bombing targets in Vietnam "may have given the Chinese reason to believe that the US was being deliberately provocative." See Foreign Relations of the United States, 1969-1976, Volume XVII China, 1969-1972, Memorandum to Members of the 303 Committee, 14 March 1969, https://history.state.gov/historicaldocuments/frus1969-76v17/d10.

[317] Memorandum for the President from Henry Kissinger, Air Reconnaissance of South China (Top Secret); 9 October 1969; CIA-RDP74J00828R000100200028-9, 1.

[318] Ibid., 1.

By October 1969, the 303 Committee began debating the need for reconnaissance overflights of South China to meet intelligence requirements. Despite the need for intelligence on Chinese support to North Vietnam, Nixon's senior advisors remained cognizant that an incident could strain relations between Washington and Beijing. Indeed, the State Department opposed to any overflights as it was "not persuaded that the intelligence requirements and prospects of successful collection override the political considerations."[319] In a memo, Kissinger requested Nixon's approval to conduct these missions, specifically asking the president to select between the Firebee drone, the new TAGBOARD drone, the manned U-2, or SR-71 spy planes. Kissinger noted "the risk of shoot down of an SR-71 or TAGBOARD drone is virtually zero. The U-2R has an average survivability factor ranging from 92.5% during each single SAM site engagement if it flies directly overhead to 99.6% if attacked by MiGs….The 147T [Firebee] drones have approximately the same survivability factors as the U-2 to attack by either SAMs or MiGs."[320] On the "action" section of the memo where the president could select his options, only the drones are selected.[321] This provides support for the increased initiation hypothesis. It also suggests senior decisionmakers view drones as presenting fundamentally lower political and operational risks than manned assets. As relations between China and the United States improved, Nixon ordered the halt of all reconnaissance flights – manned and unmanned – over China in September 1971.

[319] Ibid., 2.

[320] Ibid., 3.

[321] Checkmarks appear only next to the 147T Drone and Tagboard Drone options. These no signature on the form, however, the checkmarks are likely Nixon's as the section was intended for the president to provide his response.

CONCLUSION

Each of the three cases in this chapter – aerial reconnaissance in Cuba, North Korea, and China – provide opportunities to test the theory of technology-enabled escalation control. Despite variation in the operational setting, presidential administrations, and senior military and civilian advisors, decisions on the deployment of drones and on crisis escalation often played out in a manner consistent with the logics that underpin technology-enabled escalation control. On one hand, policymakers generally viewed drones as a means of carrying out military operations with a lower risk of political incidents and escalation relative to deployments of manned assets. As a result, decisionmakers used drones to launch missions – such as the deep penetrations of TAGBOARD drones into China – that they otherwise would not have, providing support for the increased initiation hypothesis. At the same time, some senior policymakers expressed concerns that adversaries would take aggressive moves against drones and have fewer reservations shooting down drones than manned aircraft. Yet, in line with the restrained retaliation logic, policymakers did not consider taking the same type of military reprisals to drone shootdowns that they did after attacks on manned platforms.

To be sure, decisionmakers did not always behave in a way that technology-enabled escalation control might expect. Policymakers did not always respond with escalatory military retaliation in response to attacks on manned aircraft. After the downing of the U-2 over Cuba and North Korea's attack on the EC-121, senior civilian and military leaders contemplated launching military reprisals, but because of broader political and strategic considerations, tempered their responses. In both cases, however, decisionmakers planned for retaliatory action and came close to launching these military reprisals. In the Cuban case, airstrikes were never launched because the threat of escalation encouraged Khrushchev to negotiate a settlement that ended the missile crisis. And in the North Korean case, Nixon almost certainly refrained from launching retaliatory strikes because of the circumstances surrounding the quagmire in Vietnam. Even without military action, incidents involving manned assets generally heightened crisis escalation – often in the form of military mobilizations or intrusive search and rescue operations – more than incidents involving drones, which garnered little, if any public attention.

In other cases, policymaker behavior deviated from the expectations of technology-enabled escalation control by opting to employ manned assets even when drones were available. Indeed, drones were used far less frequently than manned reconnaissance aircraft during the Cold War.[322] While this seemingly runs counter to the increased initiation hypothesis, military and civilian decisionmakers typically weighed the tradeoffs of drones and inhabited platforms. President Kennedy's and Johnson's advisors, for instance, chose to deploy manned assets over Cuba because they believed manned assets were less vulnerable to shootdown than drones, more effective at collecting intelligence than drones, and because they did not want to reveal a new and sensitive capability to rivals. As drones have developed and become increasingly capable, these tradeoffs between risk and capability have become less apparent. Drone capabilities have improved significantly, and in some areas – such as endurance and maneuverability – have exceeded the capabilities of many manned assets. These increased capabilities, however, have also pushed the costs of acquiring and operating drones closer to those of manned assets. This introduces a new set of calculations for decisionmakers to contend with. Despite these higher costs, the lower risk of friendly casualties and the corresponding reduction in political risks associated with drone

[322] In contrast, a vast majority of U.S. aerial reconnaissance in 2018 was conducted using remotely piloted aircraft. Interview with U.S. Air Force officer, 20 December 2018.

operations, means that remotely operated systems will likely remain an attractive tool with which to initiate military operations.

Beyond offering evidence for and highlighting the limits of technology-enabled escalation control, the case studies in this chapter demonstrate that senior civilian and military policymakers often hold beliefs that generally align with those of the general public and more junior military personnel. Indeed, the logic, assumptions, and preferences of policymakers at the highest level of American government during the Cold War were often similar to those of the survey respondents and wargame participants in chapters 4 and 5. Their calls for aggressive and escalatory responses to the loss of manned aircraft, however, did not always translate into military action because of broader geopolitical realities that are not fully captured in wargames and survey experiments. This highlights the value of a multimethod approach in gathering a more complete understanding of both the logics that drive decision-making and the actual policymaking process. While this chapter finds broad support for technology-enabled escalation control in the United States, the next chapter examines whether the theory holds in a different political, military, and threat environment: Israel.

Chapter 7

Israeli Drone Use During the Campaigns Between Wars

The previous chapter assesses technology-enabled escalation control in the context of the United States' drone use during the Cold War. While the three nested cases in that chapter feature variation across presidential administrations, senior policy advisors, and operating environments, they focus on the use of drones purely for reconnaissance missions and during operations against Communist rivals. To examine whether drones contribute to technology-enabled escalation control in other states and operational environments, this chapter investigates Israel's development and use of drones. Israel represents an ideal test for technology-enabled escalation control for two key reasons. First, Israel is one of the world's largest drone producers and was the first state to employ armed drones operationally. This extended operational history, which includes periods of relative peace and conventional combat, allows me to examine how the Israel Defense Forces (IDF) and Israel's intelligence community employ drones across a range of operating contexts and missions – including both reconnaissance and armed strike. Second, the threat environment Israel faces is vastly different than that of the United States. Unlike the United States, which deployed its drones thousands of miles from home shores, Israel frequently uses drones in its near abroad against threats perceived as more existentially threatening.

Drawing from analysis of published sources and interviews with senior Israeli officials, including former national security advisors and IDF generals, this chapter provides support for elements of technology-enabled escalation control.[1] Like the United States, Israel developed

[1] While Chapter 6 relies primarily on archival materials, the dearth of openly available military archives on recent Israeli military activity forces me to draw primarily from published materials (much of it written by military veterans

drones as a means of carrying out operations in denied or contested areas with reduced risk to friendly personnel. The decreased political risks associated with captured or killed personnel led to the increased use of drones to support both peacetime and combat military operations from the 1960s through today. Indeed, many senior officials commented that drones enabled Israel to extend the length of the "campaigns between wars" – periods of low intensity conflict between large scale force-on-force confrontations.[2] In other words, drones allowed Israel to *temper and tailor targeting* in a way that Israeli policymakers believed helped control escalation. Specifically, by enabling tailored airstrikes on high value targets, drones allowed Israel to counter potential threats before large scale military operations were needed. At the same time, the cases examined in this chapter provide support for the other logics associated with technology-enabled escalation control. Israeli national security practitioners, for instance, discussed their greater willingness to deploy drones than manned assets on high-risk missions, providing support for the *increased initiation* hypothesis. Israel has also *restrained retaliation* following the loss of drones – often opting to ignore losses over adversary territory. This chapter begins by tracing the history of Israeli drone development and then explores how drone operations extend the "campaign between wars" by examining Israel's reported use of drones to carry out missions in Lebanon and Sudan.

ISRAEL'S DRONE DEVELOPMENT

Surrounded by potential rivals, Israel has long needed to monitor the military capabilities and intentions of its neighbors. In the first two decades of its existence, Israel engaged in a series of wars with its neighbors, who sought to eliminate the new state. Both during these wars and the

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or those with close ties to the Israeli military establishment) and from interviews of senior Israeli government and military officials.

[2] *Deterring Terror: English Translation of the Official Strategy of the Israel Defense Forces*, 25–27. Interview with Former Israeli Deputy National Security Advisor, 4 March 2018, Tel Aviv, Israel.

periods between them, the Israeli Air Force (IAF) and its predecessors flew reconnaissance missions to track the forces of Israel's adversaries, helping to target them during wartime and minimize the likelihood of surprise attacks in the periods between large wars. Indeed, one of the nascent Israeli Air Force's first missions was conducting reconnaissance flights that peered into the territory of potential rivals.[3] These early missions often relied on civilian aircraft that were vulnerable to enemy fire, although these outmoded utility and transport planes were soon supplanted by tactical reconnaissance aircraft that were more survivable in the face of adversary air defenses.[4]

The proliferation of Soviet produced air defense systems throughout the Middle East – including the same surface-to-air missiles that had downed U-2s in China, Cuba, and the Soviet Union – soon increased the threat to IAF operations.[5] Despite the increased risks, Israel's military and intelligence services still needed a means of gathering intelligence on the state's increasingly threatening neighbors. This need increased significantly after Israel's victory in the Six Day War in June 1967, when it gained control of territory in the Sinai Peninsula, West Bank, and Golan Heights. In each of these areas, Israeli forces needed the ability to see beyond their new borders to protect themselves from adversary activity.

Intelligence collection was a particularly challenging task along the Suez Canal. Although the Six Day War led to Israeli control of the Sinai Peninsula up to the east bank of the canal, Israeli

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[3] Eliezer Cohen, *Israel's Best Defense: The First Full Story of the Israeli Air Force* (New York: Crown, 1993), 7–8; Robert Gandt, *Angels in the Sky: How a Band of Volunteer Airmen Saved the New State of Israel* (New York: W. W. Norton & Company, 2017).

[4] Cohen, *Israel's Best Defense*, 6–7.

[5] Memorandum of Conversation: Discussion with Ambassador Yitzhak Rabid re Israeli Military and Financial Requirements (Top Secret); 29 July 1970; Israel 22 May 70-July 70, Vol V (2 of 12); Box 607; Country Files: Middle East; Richard Nixon Presidential Library and Museum Yorba Linda, California, 3-6.

troops could not simply look across the waterway to monitor the status of Egyptian forces. To hinder Israel's intelligence collection efforts and to complicate any Israeli assault across the canal, Egypt had constructed 30-foot high sand barriers along the western side of the canal. The IDF initially built observation posts to allow troops to look over the barriers, but Egyptian snipers soon started taking shots at Israeli observers.[6] Israel could also not easily mount aerial reconnaissance missions due to Egypt's deployment of surface-to-air missile and anti-aircraft artillery batteries to the region. Aircraft flying at low altitudes were at risk of being shot down, while aircraft operating at higher altitudes could not collect imagery of sufficiently high resolution to meet IDF and intelligence requirements.[7] As a result, Israel relied primarily on complex human intelligence operations to gather information on Egyptian military activity just across the canal. Israeli intelligence agents posing as Egyptians would travel to the Suez Canal via Europe, take photos, then take the same circuitous European route back to Israel. Such an approach was both risky and time consuming – and in the minds of some IDF intelligence officers, illogical. Indeed, IDF intelligence Major Shabtai Brill asked, "We need to launch such an operation to get a single photo of what is happening just over the canal?"[8]

Brill and his colleagues set off to develop a less risky and more expedient means of gathering intelligence on Egyptian forces using small, remote controlled hobby aircraft. After securing initial approval from his superiors, Brill devised a plan for the IDF's first drone fleet: three remote controlled airplanes equipped with 35-millimeter cameras with timers programmed

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[6] Yaakov Katz and Amir Bohbot, *The Weapon Wizards: How Israel Became a High-Tech Military Superpower* (New York: St. Martin's Press, 2017), 54.

[7] Katz and Bohbot, 54.

[8] Katz and Bohbot, 54.

to capture a photo every 10 seconds.[9] Despite the low risk and low cost of the IDF's first drones, some senior officers were concerned that Egyptian air defenses could easily down the planes. After demonstrating the aircraft were too small a target, the IDF approved the small drones for their first mission in July 1969. The drones flew over a town along the Suez Canal, gathering high resolution imagery that revealed the location of Egyptian trenches, equipment, and communications cables, critical information for Israeli military planners.[10] The mission was deemed a success and the drones were soon deployed on missions over Jordanian positions along Israel's eastern border. The operational effectiveness of these missions led Major General Aharon Yariv, head of IDF military intelligence, to establish a team to design a sturdier drone that could be integrated into IDF operations.[11] Although the program was cancelled after a series of crashes, the cancellation did not mark the end of Israeli drone development and operations efforts.

During the War of Attrition (1967-1970) that followed the Six Day War, Egypt, Jordan, and the Palestine Liberation Organization carried out artillery attacks, commando raids, and aerial and naval operations against Israeli forces and territory.[12] These actions posed a threat to Israel that demanded additional intelligence collection, while simultaneously making aerial reconnaissance operations more difficult. The greatest threats to Israel's air operations were Egypt's deployment of MiG fighter jets – including some piloted by Soviet personnel – and recently acquired Soviet-built SA-2 and SA-3 surface-to-air missile systems close to the canal

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[9] Katz and Bohbot, 55.

[10] Katz and Bohbot, 57–59.

[11] Katz and Bohbot, 58.

[12] Yaacov Bar-Siman-Tov, *The Israeli-Egyptian War of Attrition, 1969–1970* (New York: Columbia University Press, 1980); Isabella Ginor and Gideon Remez, *The Soviet-Israeli War, 1967-1973: The USSR's Military Intervention in the Egyptian-Israeli Conflict* (New York: Oxford University Press, 2017), 173–212.

zone. The losses these systems inflicted on IAF aircraft led Israeli policymakers to consider acquiring new reconnaissance platforms that would reduce the risk to Israel's pilots. Candidates included the French-produced Mirage IV and a variety of remotely piloted drones. The Mirage IV was deemed too susceptible to Egyptian air defenses, leaving remotely piloted aircraft as the best alternative.[13] Despite resistance from senior air force officials who believed drones challenged the prestige of fighter pilots, the IDF began the search for a reconnaissance drone.[14] The continuing losses of Israeli aircraft over the canal, including at least two RF-4 tactical reconnaissance jets, reinforced the IAF's need for unmanned reconnaissance assets.[15]

The IAF soon turned its attention to acquiring drones from Ryan Aeronautics, the same company that produced the Lightning Bug drones that the United States had deployed in Southeast Asia and China. The IAF hosted a Ryan Aeronautics delegation in March 1970 and began custom designing a reconnaissance drone that could be used for operations over the Suez.[16] The export of a military drone, however, required U.S. government approval. The acquisition of drones was such a priority for the Israeli government that Israel's ambassador to the United States, Yitzhak Rabin, specifically requested drones in a 1970 letter to President Nixon and raised the issue again during a meeting with Secretary of Defense Melvin Laird in July 1970.[17] Rabin lamented that Israel faced a significant threat from Soviet-built surface-to-air missiles and could not allow the Soviets and

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[13] William Wagner and William P. Sloan, *Fireflies and Other UAVs* (Arlington, TX: Aerofax, 1992), 50.

[14] Wagner and Sloan, 50.

[15] Lawrence Newcome, *Unmanned Aviation: A Brief History of Unmanned Aerial Vehicles* (Reston, VA: American Institute of Aeronautics and Astronautics, 2004), 93.

[16] Wagner and Sloan, *Fireflies and Other UAVs*, 50–53.

[17] Memorandum from Yitzhak Rabin to President Nixon (Top Secret); 27 April 1970; Presidential Correspondence: Israel Golda Meir 1970; Box 756; National Security Council Files: Presidential Correspondence 1969-1974; Richard Nixon Presidential Library and Museum Yorba Linda, California, Appendix Pages 1-2.

Egyptians to gain air superiority over the Suez Canal. To enable Israel to target these air defense sites more precisely, Rabin explained that the IAF first needed to be able to locate them. To do this, Rabin asked for 24 Ryan Aeronautics drones in addition to manned tactical reconnaissance jets, fighter bombers, and munitions.[18]

The State Department granted approval for the transfer of Ryan drones, dubbed the Model 124I and the first demonstration flight took place in the Sinai desert in August 1971. Just one month later, the IAF began flying the 124Is on operational flights through Egyptian airspace. The first of these missions flew over Egyptian SAM sites, while subsequent missions collected imagery of gun and missile emplacements west of the Suez Canal.[19] Although Israel reportedly lost at least two 124Is during operations over Egypt, the IAF did not publicly release information on these losses in line with the *restrained retaliation* logic. Missions flown using 124I drones contributed to the stream of information informing Israel's military and intelligence services, but the intelligence was not enough to help Israeli analysts anticipate the multi-front surprise attack launched by Israel's Arab neighbors in October 1973.[20]

Drones continued to play a role during the Yom Kippur War, serving as both decoys to draw anti-aircraft fire and as a reconnaissance platform collecting intelligence over targets in Egypt, Lebanon, and Syria, where they helped cue Israeli airstrikes.[21] Although the escalation to

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[18] Memorandum of Conversation: Discussion with Ambassador Yitzhak Rabid re Israeli Military and Financial Requirements (Top Secret); 29 July 1970; Israel 22 May 70-July 70, Vol V (2 of 12); Box 607; Country Files: Middle East; Richard Nixon Presidential Library and Museum Yorba Linda, California, 3-6.

[19] Wagner and Sloan, *Fireflies and Other UAVs*, 59–60.

[20] Uri Bar-Joseph, *The Watchman Fell Asleep: The Surprise of Yom Kippur and Its Sources* (Albany, NY: SUNY Press, 2005); Abraham Rabinovich, *The Yom Kippur War: The Epic Encounter That Transformed the Middle East* (New York: Schocken Books, 2017).

[21] Wagner and Sloan, *Fireflies and Other UAVs*, 61–63; Cohen, *Israel's Best Defense*, 429.

war had already occurred, deploying drones in lieu of manned assets prevented unnecessarily endangering Israeli airmen. Indeed, Colonel Eliezer Cohen, who commanded an IAF airbase during the war noted, "All the aircraft that Syria prided herself on having shot down after the war were pilotless."[22] The drones demonstrated their utility during the Yom Kippur War, but suffered from an important limitation. Because intelligence from the 124I drones could only be analyzed once the film was off-loaded after a mission, there was a considerable delay between when the intelligence was collected and when it might be incorporated into the planning of military operations. As a result, many airstrikes were launched on empty sites where air defense forces had previously positioned mobile surface-to-air missile launchers.[23] This led IDF leaders to call for the development of more advanced drones that could transmit intelligence to commanders and analysts in near-real time.[24] These systems could further reduce the need to deploy manned aircraft and ground observers into hostile territory, and could allow the IDF to *tailor targeting* against adversaries.

The task of managing development of the new drone fell to Brigadier General Uzi Eilam, then head of the IDF's Military Research and Development Unit. The initial drones Eilam hoped to acquire would provide commanders with tactical and operational intelligence, while avoiding the type of manned aircraft losses Israel had suffered during the Yom Kippur War.[25] The result of the drone development efforts were the Scout and Mestiff unmanned aerial vehicles, relatively

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[22] Cohen, *Israel's Best Defense*, 429.

[23] Interview with IDF Intelligence Officer (Reserve), Tel Aviv, Israel, 27 February 2018.

[24] Cohen, *Israel's Best Defense*, 429; Tamir Libel and Emily Boutler, "Unmanned Aerial Vehicles in the Israel Defense Forces," *The RUSI Journal* 160, no. 2 (May 2015): 70.

[25] Interview with Brigadier General (Retired) Uzi Eilam, Tel Aviv, Israel, 31 August 2016.

small aircraft that could stream video footage to commanders in real time.[26] Although the drones were ready for operational use by the mid-to-late 1970s, many senior IDF officers felt they should be preserved for the next major war to avoid revealing sensitive capabilities to rivals. Their views mirrored those of American commanders like General Curtis LeMay who had blocked drone flights over Cuba in the 1960s for fear that Soviets would learn about the Air Force's new unmanned aircraft. IDF General Headquarters, however, ordered that the systems be used in "daily wars," enabling the IDF to refine its drone tactics and technology.[27]

Over the next two decades, the IDF built an increasingly capable drone fleet and gained considerable operational expertise deploying drones in both combat and non-combat scenarios. Drones played a critical role helping to pinpoint Syrian missile sites during Israel's 1982 air campaign in Lebanon's Bekka Valley and were later used to monitor Israel's security zone in southern Lebanon.[28] By the early 1990s, Israel had equipped some of its reconnaissance drones with laser designators that allowed the remotely piloted aircraft to locate targets for airstrikes carried out using manned platforms such as fighter jets and attack helicopters.[29] By the 2000s, Israel had armed several of its drones, employing them during operations in Lebanon and Gaza.[30] By arming drones, the IDF could more rapidly conduct precision airstrikes on targets as the drones

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[26] Cohen, *Israel's Best Defense*, 430; Katz and Bohbot, *The Weapon Wizards*, 60; Interview with Brigadier General (Retired) Uzi Eilam.

[27] Interview with Brigadier General (Retired) Uzi Eilam.

[28] Libel and Boutler, "Unmanned Aerial Vehicles in the Israel Defense Forces," 70.

[29] Libel and Boutler, 70; Interview with Interview with Major General (Retired) Yaakov Amidror, 26 February 2018, Israel.

[30] Libel and Boutler, 71.

could carry out strikes without waiting for a manned aircraft. For the IDF drones were essential for tailored targeting missions, often in areas considered too risky for Israeli ground or air forces.

EXTENDING THE CAMPAIGN BETWEEN WARS

Having experienced conflicts with both state and non-state actors, Israel adopted a national security strategy aimed at prolonging the length of time between conventional conflicts. These periods, referred to as "campaigns between wars," are free of large-scale force on force confrontations, but still feature significant, albeit smaller-scale, military activity.[31] During these campaigns between wars, Israel continues to wage aggressive counter-terrorism operations, carry out covert action against state rivals – like its 2007 raid on a suspected Syrian nuclear reactor, and face terrorist attacks.[32] Israeli national security decisionmakers believe these limited operations deter rivals and degrade their warfighting capability, thereby preventing escalation to larger, and more destabilizing, conflicts.[33] Policymakers fear a large-scale war would involve the mobilization of Israel's reserve forces and involve attacks on the Israeli population, triggering downturns in tourism and the economy – events Israel's political leaders seek to avoid.[34] Instead of operations aimed at achieving decisive victory or gaining control of territory, campaigns between wars focus on more limited objectives such as targeting individual actors or critical resources and installations. As one former Israeli deputy national security advisor explained, "Israel can destroy if we are forced to destroy, but we can avoid this by using options that are lower on the policy menu –

[31] *Deterring Terror: English Translation of the Official Strategy of the Israel Defense Forces*, 25–27.

[32] Interview with Israel Defense Forces Colonel (Reserve), Infantry Officer/Senior IDF Planner, 31 August 2016, Tel Aviv, Israel.

[33] Interview with Former Israeli Deputy National Security Advisor.

[34] Interview with Former Israeli Deputy National Security Advisor.

‘starters before the main course.’”[35] The principle of extending the campaigns between wars was formalized in August 2015, when Israel’s Chief of General Staff, Lieutenant General Gadi Eizenkot, incorporated it into Israel’s national defense doctrine.[36]

Yaakov Amidror, Israel’s National Security Advisor between 2011 and 2013, described drones as an ideal tool with which to implement the policy of extending the length of campaigns between wars, explaining that “drones allow states to do many little things instead of going to war.”[37] In other words, military technology that allowed Israel to carry out precise strikes against its rivals with little risk to friendly forces, provided an alternative to initiating large-scale military operations. Another former senior policy advisor argued that “the range of choices is much more sophisticated” when drones are available, allowing Israel to avoid “massive and decisive action” against its adversaries.[38]

For senior Israeli decisionmakers, drones feature several characteristics that make them well suited for carrying out operations that extend the campaigns between wars. First, the lack of friendly personnel onboard makes drones easier to deploy on high risk missions than manned assets. As a former Director of the IDF’s Strategic Planning Division explained, “Drones make the use of force easier. They cancel the possibility that you will lose a solider – either killed or as a prisoner of war.”[39] Senior Israeli military officers feared that losing personnel could lead drag the IDF into drawn out, dangerous, and manpower intensive search and rescue operations behind

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[35] Interview with Former Israeli Deputy National Security Advisor.

[36] *Deterring Terror: English Translation of the Official Strategy of the Israel Defense Forces*, 25–27.

[37] Interview with Major General (Retired) Yaakov Amidror.

[38] Interview with Former Israeli Deputy National Security Advisor.

[39] Interview with Israel Defense Forces Brigadier General (Retired), Former Director of Strategic Planning Division.

enemy lines, and result in domestic political pressure for additional military action. These risks are particularly great in cases involving captured IDF personnel. As one retired IDF general explained, "The POW situation is more difficult. When someone is killed there is a funeral, but then people move on. When someone falls into the hands of the other side, you hear about them all the time in the media. This has a much deeper impact…and becomes a long saga with a very deep impact on society."[40]

Second, Israeli decisionmakers view drones as offering a set of military and intelligence collection capabilities that are particularly useful for waging campaigns between wars.[41] Specifically, many of the IDF's drones have long endurance and range. This allows Israel's military and intelligence community to track small, mobile targets – like terrorist leaders or arms shipments – for extended periods of time. In other words, drones can generally linger over a target for far longer than a manned aircraft can, gathering information that builds "pattern of life" – information about the daily routines associated with a target. Analysts can use this information to verify the identity of a target and identify the best time to strike, to avoid civilian casualties.[42] These more precise and accurate strikes allows Israel to tailor targeting to individual actors or facilities in an effort to avoid civilian casualties or collateral damage that often trigger blowback and more intense retaliation by Israel's adversaries. For Israel, avoiding collateral damage and civilian casualties is critical not only to abide by the law of armed conflict, but also for public relations purposes. The precise targeting that drones enable helps Israel avoid the propagandization

[40] Interview with Israel Defense Forces Brigadier General (Retired), Former Director of Strategic Planning Division.

[41] Interview with Israel Defense Forces Brigadier General (Retired), Former Director of Strategic Planning Division; Interview with Israel Defense Forces Colonel (Reserve), Infantry Officer/Senior IDF Planner; Interview with Israel Defense Forces Colonel (Retired), Intelligence Officer, 28 January 2017, New York, NY.

[42] Interview with Israel Defense Forces Colonel (Retired), Intelligence Officer.

of civilian deaths by groups like Hamas and Hezbollah.[43] The long range of many IDF drones also allows Israel to conduct operations far beyond its borders without the need for complex refueling operations. Additionally, the IDF's armed drones are able to complete all multiple phases of the targeting cycle: finding a target, fixing the target's location, tracking the target, targeting it, engaging the target with missiles, and then assessing the effectiveness of the airstrike.[44] This enables the IDF to carry out operations with fewer assets than required prior the advent of drones, when multiple reconnaissance missions and separate aircraft for intelligence collection and strike operations were needed.

The sections that follow examine two types of operations where Israel has employed drones: targeted killings – or assassinations – of Israel's rivals and precision airstrikes on military equipment being transported to Israel's adversaries. The cases demonstrate that Israel's use of drones appears to align with several tenets of technology-enabled escalation control. Israeli decisionmakers appear more willing to launch high risk operations when drones are available, providing evidence for the *increased initiation* logic. Drones have also allowed Israeli commanders to launch strikes that involve more *tailored targeting* than large-scale airstrikes or conventional ground operations. In the minds of Israeli decisionmakers, these tailored strikes help prevent Israel's adversaries from launching larger and more destabilizing attacks. Finally, relative to attacks on manned assets, Israel has exercised more *restrained retaliation* following the loss of its unmanned drones than the loss of manned assets during the campaign between wars.

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[43] Interview with IDF Major General (Retired) Yaakov Amidror; Interview with Israel Defense Forces Colonel (Reserve), Infantry Officer/Senior IDF Planner.

[44] Ronen Bergman, *Rise and Kill First: The Secret History of Israel's Targeted Assassinations* (New York: Random House, 2018).

Targeted Killings

In the years following the 9/11 attacks, the United States waged a drone campaign to eliminate suspected terrorists in places like Pakistan, Yemen and Somalia.[45] Although the United States' targeted killing program attracted the attention of policymakers and the international community, Israel pioneered the practice of "selective targeting" using drones to target a state's rivals in the early 1990s. Using drones to support or carry out targeted killings represented an evolution in Israel's long record of assassinating its rivals. Even before the advent of drones, Israel's intelligence and military services relied on a range of tactics – including teams of assassins and the conventional bombing of rival's headquarters – to eliminate adversaries of the state.[46] Drones, however, offered a new means of carrying out selective targeting that involved relatively low risk to Israeli personnel and provided the ability to tailor targeting to minimize the risks of civilian casualties or collateral damage.

Targeting leadership and technical experts in a terrorist organization can degrade the group's ability to operate.[47] Eliminating senior leaders can weaken command and control, create power struggles as members seek to fill leadership vacuums, and cause senior leaders to alter their behavior for fear of becoming targets themselves.[48] Similarly, targeting technical experts, like bomb makers, can degrade a group's operational capacity. Using drones to carry out these operations can reduce the need for missions such as ground force raids that expose friendly

[45] Andrew Cockburn, *Kill Chain: The Rise of the High-Tech Assassins* (New York: Henry Holt and Co., 2015); Woods, *Sudden Justice*.

[46] For a historical overview of Israel's targeted killing program see, Bergman, *Rise and Kill First*.

[47] For a study examining the conditions under which "decapitation strikes" are effective, see Jenna Jordan, "When Heads Roll: Assessing the Effectiveness of Leadership Decapitation," *Security Studies* 18, no. 4 (2009): 719–55.

[48] Gal Luft, "The Logic of Israel's Targeted Killing," *Middle East Quarterly* 10, no. 1 (January 2003): 3–13.

personnel to greater risk. Israel's special operations forces, for instance, have suffered casualties when carrying out operations in the Gaza Strip, making drones a more attractive alternative.[49] They also offer an alternative to operations like large ground incursions or shelling that pose higher levels of risk to civilians or infrastructure surrounding the intended target. Reducing the risk of friendly and civilian casualties may subsequently mitigate the likelihood of escalation that could be triggered by reprisals for the loss of friendly personnel or local civilians.

Israel's first known use of drones to support a selective targeting operation occurred in February 1992, when drones enabled the assassination of Hezbollah Secretary General Abbas al Moussawi. Israeli intelligence suspected that al Moussawi would attend a memorial service in the city of Jibchit in southern Lebanon. The IDF decided to track al Moussawi's motorcade using an IAF drone and collect intelligence that could be used to plan a future operation in which al Moussawi would be abducted and exchanged for Israelis held by Hezbollah. On the day of the memorial ceremony, IAF drone pilots searched for al Moussawi's motorcade using intelligence gleaned from human sources. Once al Moussawi's motorcade was located, drones tracked the vehicles as they moved from the memorial ceremony to a compound where al Moussawi was meeting with other Hezbollah leaders. Intelligence analysts assessed with high certainty that al Moussawi was traveling in the motorcade, and critically, that there was little chance that Iranian or Lebanese government officials were traveling with him.[50]

Although the initial plan called only for an intelligence collection mission, IDF Chief of General Staff Ehud Barak advocated for more aggressive action. On the day of the mission, Barak

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[49] Judah Ari Gross, "Intense Clashes with Gaza Break out as Hamas Commander Said Killed in IDF Raid," *The Times of Israel*, November 11, 2018, https://www.timesofisrael.com/israel-said-to-kill-senior-hamas-commander-in-gaza-drone-strike/.

[50] Bergman, *Rise and Kill First*, chap. 22.

received Prime Minister Yitzhak Shamir's authorization to assassinate al Moussawi – in part because of the high-quality intelligence gathered by the drone tracking al Moussawi's motorcade. Barak ordered the IAF to scramble armed Apache attack helicopters to the motorcade's location, which drone operators relayed to the Apache pilots. After receiving the target location, the attack helicopters launched a series of airstrikes, killing al Moussawi, his wife and son, and four members of al Moussawi's entourage.[51] This drone-enabled targeted killing represents a case where Israel carried out an operation that would likely not have occurred had drones not been available as a low risk means of collecting intelligence on al Moussawi's location, providing support for the increased initiation hypothesis.

In the years after al Moussawi's assassination, targeted killings involving drones became a standard practice for Israel's military and intelligence services. In some cases, armed drones would both locate a target and then carry out a strike. In others, drones were used in coordination with intelligence and special operations forces or manned assets.[52] Other high-profile leaders that Israel selectively targeted using drones included the Hamas military chief, Ahmed Jabari in 2012 and a senior Hezbollah field commander in Syria in 2015.[53] Israeli national security policymakers viewed these tailored targeting efforts as a means to eliminate threats to Israel and extend the length of periods between wars by degrading an organization's ability to carry out attacks against

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[51] Bergman, chap. 22.

[52] Katz and Bohbot, *The Weapon Wizards*, 71.

[53] Amos Harel et al., "Hamas Military Chief Ahmed Jabari Killed by Israeli Strike," *Haaretz*, November 14, 2012, https://www.haaretz.com/.premium-head-of-hamas-military-wing-killed-in-israeli-gaza-strike-1.5198247; Jeremy Sharon, "Six Iranians Killed in Israeli Strike in Syria, Including Revolutionary Guards General," *The Jerusalem Post*, January 19, 2015, https://www.jpost.com/Arab-Israeli-Conflict/Report-Six-Iranians-killed-in-Israeli-strike-in-Syria-including-Revolutionary-Guards-general-388210.

Israel.[54] To be sure, killing senior leaders can trigger escalation.[55] Hezbollah retaliated for al Moussawi's assassination by shelling Israel, bombing a synagogue in Turkey, and attacking the Israeli Embassy in Buenos Aires.[56] Similarly, Hamas launched a volley of rockets into Israel after Jabari was killed and launched suicide attacks on Israeli targets after attacks on other senior leaders.[57] While these acts represent escalations in the use of force, some analysts suggest these retaliatory acts are relatively limited in nature. They are also likely to generate fewer casualties than those that would result if the groups were left to operate unchecked.[58] In turn, smaller numbers of casualties might allow Israel to take less significant reprisals, helping prevent the outbreak of larger and more intense military confrontations.

Interdicting Advanced Weapons

A second approach that Israel has used to extend the periods between wars is destroying weapon shipments en route to groups like Hamas and Hezbollah. In many instances, these strikes are carried out far from Israel's borders, before the weapons can threaten Israeli territory and citizens. The attacks are intended to degrade a rival's capabilities, deter their activity, and ultimately prevent adversaries from taking actions that could lead to larger escalation.[59] To be sure, Israel carried out targeted strikes on targets considered to pose an existential threat even without the use of drones. For example, the IAF destroyed Iraq's Osirak nuclear reactor in 1981 and

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54 Interview with Israel Defense Forces Colonel (Reserve), Infantry Officer/Senior IDF Planner.

55 Future research might explore whether the type of asset used to carry out the assassination shapes the degree of retaliation.

56 Bergman, *Rise and Kill First*, 402–3.

57 Bergman, 546–47.

58 Luft, "The Logic of Israel's Targeted Killing."

59 *Deterring Terror: English Translation of the Official Strategy of the Israel Defense Forces*, 25–27; Interview with Israel Defense Forces Colonel (Reserve), Infantry Officer/Senior IDF Planner.

attacked a Syrian reactor in 2007.[60] The expansion of Israel's drone fleet, however, increased the state's ability to conduct tailored targeting operations against an expanded set of targets.

Drones are an ideal asset for monitoring and striking targets outside of Israel, particularly those that are highly mobile – like arms shipments. The lack of personnel onboard a drone provides Israel with plausible deniability in the event of shootdowns or crashes, decreasing the political risk associated with operations. Drones also provide useful tactical benefits that can increase the effectiveness of precision strike missions against both mobile and stationary targets. Their long endurance enables them to monitor targets, a more difficult task for manned reconnaissance assets with shorter dwell times. Armed drones also allow Israel to track moving targets and then execute a strike, without the need for other assets.

In January 2009, Israel employed this approach when it used drones to destroy a consignment of weapons being smuggled from Iran to Gaza through Egypt and Sudan. Israeli intelligence identified a shipment of advanced weaponry – including Fajr-3 rockets – that had been off-loaded from a ship in Port Sudan on the Red Sea. The shipment was being prepared for overland transport. Rockets like the Fajr-3 were perceived as a significant threat to Israel's security; their 43-kilometer range allowed them to reach several Israeli cities when launched from the Gaza Strip.[61] These attacks often triggered escalatory Israeli retaliatory airstrikes and raids. To prevent the rockets from being used against Israel and the associated escalation, the Israeli

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[60] Shlomo Nakdimon, *First Strike: The Exclusive Story of How Israel Foiled Iraq's Attempt to Get the Bomb* (New York: Summit Books, 1987); Rodger Claire, *Raid on the Sun: Inside Israel's Secret Campaign That Denied Saddam the Bomb* (New York: Broadway Books, 2005); Leonard S. Spector and Avner Cohen, "Israel's Airstrike on Syria's Reactor: Implications for the Nonproliferation Regime," *Arms Control Today* 38, no. 6 (2008): 15–21; Judah Ari Gross, "Ending a Decade of Silence, Israel Confirms It Blew up Assad's Nuclear Reactor," *Times of Israel*, March 21, 2018, https://www.timesofisrael.com/ending-a-decade-of-silence-israel-reveals-it-blew-up-assads-nuclear-reactor/.

[61] *Worldwide Equipment Guide, Volume 1: Ground Systems* (Fort Leavenworth, Kansas: U.S Army Training and Doctrine Command, 2015), Chap. 6, 14–15.

government decided to destroy the arms shipment. The Israeli military, however, had a narrow window in which to act. Attacking or capturing the weapons in Egypt was unlikely because of the delicate diplomatic relationship between Israel and Egypt. Waiting until the shipment reached Gaza was not practical either because Hamas would quickly stash the equipment in its network of tunnels and safehouses. Once hidden, Israel's intelligence services and military would have difficulty locating the rockets. Even if the rockets were found, launching special forces raids or airstrikes to destroy them would be challenging because of the Hamas-controlled operating environment and the threat of civilian casualties and collateral damage when carrying out airstrikes in urban areas.[62]

These political and operational challenges led Israeli decisionmakers to develop plans to strike the arms convoy as it traveled through Sudan. Israel could more easily track the convoy as it drove along dessert roads. Further, launching airstrikes at trucks on these isolated roads carried relatively low risk of civilian casualties or collateral damage. Drones were viewed as the ideal asset to support the strike operation. As an Israeli security source explained, "with a moving target with no definite time for the move, UAVs are best as they can hover extremely high and remain unseen until the target is on the move."[63] Upon receiving political authorization from civilian leaders, an IAF Heron TP reconnaissance drone was launched to track the rocket-transporting as it moved through the Sudanese desert.[64] Once the reconnaissance drone pinpointed the location of

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[62] Katz and Bohbot, *The Weapon Wizards*, 72–75.

[63] Quoted in Uzi Mahnaimi, "Israeli Drones Destroy Rocket Smuggling Convoys in Sudan," *The Sunday Times*, March 29, 2009, https://www.thetimes.co.uk/article/israeli-drones-destroy-rocket-smuggling-convoys-in-sudan-rp5sgvbp5jt.

[64] Interviews with a former Deputy National Security Advisor, a military aide to the Israeli Prime Minister, and a former head of IDF Strategic Planning all indicate that the use of drones outside of Israel's borders generally requires approval from the office of the Prime Minister.

the arms shipment, armed Hermes 450 drones were dispatched to strike the convoy with air-to-ground missiles, destroying 23 trucks and killing 43 smugglers.[65]

Although some media reports suggested that the strikes were conducted by F-16 and F-15 fighter-bombers in addition to the Hermes 450 drones, the airstrikes would likely not have occured had drones not offered a low-risk means of tracking a moving convoy thousands of miles from Israel.[66] Without drones, Israeli intelligence could have opted to deploy special operations forces to Sudan, launched manned aircraft into Sudan's airspace, or relied on satellite imagery to track the shipment. Dispatching ground forces to Sudan and operating manned aircraft for extended periods in Sudan's airspace to track the convoy would have exposed IDF personnel to significant risk of attack or capture. And satellites might not have been able to provide the type and rate of data needed to track mobile targets.[67] In other words, without drones, Israel may have been unable to track and subsequently target the rocket shipment, potentially allowing the rockets to enter Gaza. From there, the rockets could be used against Israel, triggering a military reprisal. Drones, therefore, likely enabled Israel to carry out a mission it might not otherwise have launched, providing support for the increased initiation hypothesis.

The January raid was deemed a success. In a veiled statement shortly after the strike, then Israeli Prime Minister Ehud Olmert commented, "We operate in many places near and far and

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[65] Mahnaimi, "Israeli Drones Destroy Rocket Smuggling Convoys in Sudan"; Katz and Bohbot, *The Weapon Wizards*, 75.

[66] "How Israel Foiled an Arms Convoy Bound for Hamas," *Time*, March 30, 2009, http://content.time.com/time/world/article/0,8599,1888352,00.html.

[67] For an assessment of the challenges of tracking mobile ground targets, see Alan J. Vick et al., *Aerospace Operations Against Elusive Ground Targets* (Santa Monica, CA: RAND Corporation, 2001), https://www.rand.org/pubs/monograph_reports/MR1398.html.

carry out strikes in a manner that strengthens our deterrence."[68] In the years that followed, Israel conducted a series of additional strikes on weapons shipments transiting through Sudan. A strike in February 2009, for instance, reportedly killed an additional 40 smugglers and destroyed 12 more containers of Iranian weapons bound for Gaza.[69] Then in 2011, Israel reportedly launched an airstrike on a car occupied by Hamas arms smugglers in Port Sudan.[70] The following year, Sudan's government accused Israel of attacking an arms factory in Khartoum.[71] Although the Israeli officials made no public comment about these attacks, analysts noted that armed IAF drones could have carried out the operations.[72] In each of these cases, drones provided a lower risk means of carrying out operations – either intelligence collection or armed strikes – intended to prevent Israel's adversaries from receiving the arms needed to launch larger and more escalatory operations. Indeed, as a former Israeli National Security Advisor explained, "Drones open the space for decisionmakers to maneuver short of war."[73]

While no Israeli personnel were reported lost during these operations in Sudan, Israel reportedly lost a drone over Sudan in 2015. In May 2015, Sudan's military announced it had "toppled an Israeli drone that infiltrated its airspace."[74] Israel's response to the reported shootdown

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[68] "How Israel Foiled an Arms Convoy Bound for Hamas."

[69] Katz and Bohbot, *The Weapon Wizards*, 76.

[70] Avi Issacharoff, Amos Harel, and Yossi Melman, "Air Strike on Car in Port Sudan Kills Two," *Haaretz*, April 6, 2011, https://www.haaretz.com/1.5147572; Ian Black, "'Israeli Attack' on Sudanese Arms Factory Offers Glimpse of Secret War," *The Guardian*, October 25, 2012, sec. World news, https://www.theguardian.com/world/2012/oct/25/israeli-sudanese-factory-secret-war.

[71] Black, "'Israeli Attack' on Sudanese Arms Factory Offers Glimpse of Secret War."

[72] Black.

[73] Interview with IDF Major General (Retired) Yaakov Amidror.

[74] Jack Khoury, "Sudan Army Says It Toppled Israeli Drone That Infiltrated Its Air Space," *Haaretz*, May 6, 2015, https://www.haaretz.com/sudan-army-says-it-toppled-israeli-drone-1.5358963; Ari Yashar, "Sudan Claims It Shot Down Israeli Drone," *Arutz Sheva*, May 6, 2015, http://www.israelnationalnews.com/News/News.aspx/195049; Some

aligned with the expectations of the restrained retaliation logic. Official Israeli spokespersons offered no comment, while one Israeli defense source informed reporters that no Israeli drone had been shot down over Sudan.[75] Israel initiated no observable retaliatory action for the downing. This lack of a response makes sense. Many Israeli officers viewed that the loss of a drone as falling below the threshold of action that necessitates a military response. One IDF intelligence officer commented that "nobody cares when a drone is lost."[76] Another retired IAF brigadier general explained that the use of "unmanned [aircraft] gives decisionmakers freedom. There is no need to respond if you don't want to after a drone is shot down."[77] In other words, decisionmakers could easily deescalate after the loss of a drone to hostile fire.

The absence of response to drone downings was vastly different from Israel's actions following the loss of manned IAF assets during campaigns between wars. For instance, Israel launched a massive, multi-decade search for IAF navigator Ron Arad after he was captured in Lebanon in 1986. The operation involved numerous military, intelligence, and diplomatic efforts including commando raids that led to additional Israeli casualties, an offer of financial aid to Iran in exchange for information on Arad, and the capture of Hezbollah members for interrogation.[78] More recently, Syria's shootdown of an Israeli F-16 fighter jet in February 2018 led Israel to launch

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reports noted that Sudanese officials did not identify the drone as Israeli, "Sudan Unsure Where Downed Drone Came From," *The Times of Israel*, May 7, 2015, https://www.timesofisrael.com/sudan-unsure-where-downed-drone-came-from/.

[75] "Sudan Unsure Where Downed Drone Came From."

[76] Interview with IDF Intelligence Officer (Reserve).

[77] Interview with IAF Brigadier General (Retired), Former UAV Base Commander, 28 August 2016, Herzliya, Israel.

[78] Ronen Bergman, "Israel Offered Iran Billions for Arad," YNet News, December 22, 2005, https://www.ynetnews.com/articles/0,7340,L-3188619,00.html.

a massive series of airstrikes that reportedly destroyed more than half of Syria's air defenses.[79] Even though the Israeli pilot survived the shootdown, Israel targeted radar and missile sites throughout Syria in retaliation for the jet's downing. As in the findings in the survey experiments and wargames fielded on U.S. military personnel, Israeli decisionmakers seem more apt to take escalatory retaliatory after the loss of manned platforms than remotely piloted ones.

CONCLUSION

Israel's use of drones to target Hezbollah and Hamas leaders and to interdict shipments of advanced weapons provides support for technology-enabled escalation control. Despite having a threat environment, domestic political context, and leadership structure that differs from the United States, Israeli national security policymakers shared several of assumptions and decision-making logics with their American counterparts described in Chapters 4, 5, and 6. For instance, Israeli decisionmakers launched missions that perhaps would not have been carried out had drones not been available as a low risk means of collecting intelligence or carrying out airstrikes. They also demonstrated greater restraint in responding to the loss of drones over enemy territory. At the same time, the cases analyzed in this chapter illustrate how Israel has used drones in efforts to carry out tailored targeting of its rivals' leadership and material resources, something not tested in the preceding chapters.[80] The findings of these case studies suggest technology-enabled escalation control is generalizable beyond the U.S. case.

Drones appear to have played an important role in implementing Israel's military doctrine of increasing the length of campaigns between wars. Indeed, senior Israeli policymakers believe

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[79] Harel, "Israel Believes Syria Strikes Took out Nearly Half of Assad's Air Defenses."

[80] Kinetic targeting was not examined in the U.S. case studies in Chapter 6 because the United States did not use drones to support targeting operations outside of combat zones during the Cold War.

that using drones to carry out or support military operations with limited objectives can help control escalation to broader and more destabilizing large-scale conflicts. Specifically, drones have allowed Israel to *increase initiation* of operations that would have been too dangerous or unfeasible had remotely operated aircraft not been in Israel's arsenal. Drones enabled Israel to carry out precision strikes in areas thousands of miles from Israeli territory and to collect detailed intelligence on small and mobile targets closer to home, allowing the IDF to carry out *tailored targeting* missions with lower risks of both friendly and inadvertent civilian casualties.

After missions are launched, Israel's responses to the loss of drones during the campaigns between wars aligns with the expectations of the *restrained retaliation* hypothesis. The reported loss of an Israeli drone over Sudan in 2015, for instance, triggered no response from the IDF.[81] Israel has adopted similar responses to other drone losses such as Iran's reported shootdown of an IDF drone in 2014 and the loss of an Israeli drone over Lebanon in 2015.[82] These muted responses stand in stark contrast to cases where Israel has launched massive military reprisals or search operations following the loss of manned aircraft.

Israel's use of drones to conduct operations to extend the length of the campaigns between wars will likely persist given Israel's less than hospitable neighborhood. Indeed, Israel's strategic environment became even more challenging in the years following the Arab Spring. While Israel continued to face challenges from groups like Hamas and Hezbollah, other actors – including Iran and Russia – became increasingly active in Israel's backyard during the Syrian Civil War. The

[81] Khoury, "Sudan Army Says It Toppled Israeli Drone That Infiltrated Its Air Space."

[82] Thomas Erdbrink, "Iran Says It Shot Down an Israeli Drone," *The New York Times*, August 24, 2014, https://www.nytimes.com/2014/08/25/world/middleeast/iran-says-it-shot-down-an-israeli-drone.html; "Lebanese Army Says It Captured Crashed Israeli Drone," *The Times of Israel*, July 11, 2015, https://www.timesofisrael.com/lebanese-army-says-it-captured-crashed-israeli-drone/.

presence of these militarily capable actors has bolstered the capabilities of Israel's regional rivals through arms transfers and increases Israel's intelligence requirements.[83] For senior Israeli national security officials, drones provide a means of providing for Israel's security while mitigating the risks of escalation. As the commander of an IAF drone squadron explained in 2016, "The Russians are now in the Mediterranean, challenging our presence. How do we continue to guard our borders and assets without approaching the wrong vessel, being shot down, and dragging the country into a diplomatic adventure?"[84]

Because of this changing security environment, the IAF expanded its drone fleet throughout the 2000s and 2010s, replacing several manned platforms with remotely piloted ones. For instance, the IAF replaced the manned King Air intelligence, surveillance, and reconnaissance aircraft used to monitor the Israeli coastline with Israeli-produced drones. Israeli defense analysts noted that the move "decreases risk to personnel…and is efficient from a budgetary standpoint [because] it costs less to maintain drones."[85] This trend will likely continue. Indeed, the growing reliance on drone aircraft has increased the number of drone flight hours significantly. By 2016, drones had the highest number of flying hours of any type of aircraft in the IAF fleet.[86] The increased demand for drones suggests they will play an expanding role in Israel's military operations – allowing Israel to continue extending the length of the campaigns between wars and avoid destabilizing escalation.

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[83] Interview with Israeli Defense Expert/Defense Correspondent, 4 March 2018, Rehovot, Israel.

[84] Draft manuscript provided to author by Defense Correspondent, 4 March 2018.

[85] Ibid.

[86] Interview with IAF Brigadier General (Reserve), Former UAV Base Commander.

Chapter 8

Conclusion

This dissertation examines how a rapidly proliferating class of weapons affects crisis dynamics and escalation. As the project's empirical findings demonstrate, remote warfighting technologies – like drones – can enable decisionmakers to initiate the use of force more frequently, but limit the potential for escalation during crises. This theory, which I refer to as technology-enabled escalation control suggests that technologies that remove friendly personnel from harm's way make military operations more likely by lowering the political barriers for using force, but also reduce the likelihood that these deployments will lead to escalation. This is in part because drones and other remote warfighting technologies can gather intelligence that helps overcome information asymmetries that often lead to interstate conflicts, can help tailor targeting to make kinetic action more precise, and can remove incentives for escalatory acts of retaliation following attacks by rivals.

To test this theory of technology-enabled escalation control, the project leverages a mixed-methods research design that combines survey experiments, experiments embedded in military wargames, and case studies informed by archival materials and interviews with senior national security decisionmakers in the United States and Israel. Each component of the research design examines how perceptions of different actors within a state – the public, military officers, and senior civilian leaders shape escalation. The empirical findings provide strong support for the theory, but also suggest several areas where the theory can be applied beyond the state use of drones and present avenues for future research.

This chapter begins by reviewing the central tenets of technology-enabled escalation control and summarizing the empirical findings from the overall research design. The chapter then explains the project's contributions to scholarly studies of armed conflict and its implications for national security and interstate relations. Next, I assess the generalizability of the theory by examining two cases beyond the state use of drones: U.S. use of cyber operations against North Korea and Hezbollah's use of remotely piloted aircraft. These cases allow me to probe whether technology-enabled escalation control dynamics are also evident in relation to technologies other than drones, and whether and how the underlying logics apply to non-state actors. The chapter concludes by identifying several potential avenues for future research.

SUMMARY OF THEORY AND FINDINGS

Technology-enabled escalation control posits that military technologies like drones increase the frequency with which states initiate military operations, but limit the potential for escalation during crises relative to the use of inhabited assets. By removing friendly personnel from harm's way, drones lower the risk of friendly casualties and the associated political barriers, making their operational deployment more likely. This can *increase initiation* of various types of military operations. For instance, by lowering barriers to deployments, decisionmakers may more easily launch these systems on intelligence collection missions that help to gather information that overcomes information asymmetries. More complete information about a rival's capabilities and intentions might help *temper targeting* if a rival is found to lack hostile intent or capability. Or, it could restrain targeting if the adversary is viewed as more capable than initially thought, invoking principles of deterrence by denial. Additional information can also help *tailor targeting* and allow military decisionmakers to carry out more precise operations against a rival. Precision targeting may enable a state to eliminate a threat without a larger and more escalatory operation or to eliminate a target before it poses a more significant threat.

The removal of friendly forces from harm's way can also reduce the likelihood of escalatory acts of retaliation during crises. In contrast to attacks on manned assets in which the lives of friendly personnel are lost, the loss of a machine does not generally trigger the same type of instrumental or emotional reactions that can lead to escalatory military reprisals. This *restrained retaliation* can prevent crises from escalating and can offer decisionmakers with off-ramps with which to de-escalate tense situations. Knowledge that an adversary might choose not to retaliate after an attack on a drone, however, might lead actors to *amplify aggression* and attack remotely operated assets with a higher frequency than inhabited ones. Although these actions may lead to more losses of equipment, they are unlikely to present the same potential for escalation as attacks on manned platforms. In short, remotely operated systems can actually contribute to escalation control and interstate stability, a notion that runs counter to much of the public discourse surrounding drone use and academic theories linking technology and armed conflict.

Each element of my multi-method research design tests different aspects of technology-enabled escalation control theory. The results of these tests support the core of the theory, and also suggest additional avenues for future research. Chapters 4 and 5 use experiments embedded in surveys and wargames played by national security practitioners to test the hypotheses associated with the theory. The survey experiments present U.S. civilian and military respondents with realistic, though hypothetical, crisis scenarios that vary whether inhabited assets or remotely piloted ones are involved. Respondents are then asked for their preferences toward the initiation and escalation of military force. The results of the survey experiments suggest that drones influence the preferences of members of the public and mid-grade military officers in similar ways, and often for similar reasons. Respondents are, on average, more prone to support the deployment of remotely piloted assets than manned ones on potentially dangerous missions. If drones are lost to a rival's actions, both military and civilian respondents call for more restrained retaliatory measures than to the loss of manned platforms. Indeed, many respondents considered a rival's downing of a U.S. military drone as being insufficiently significant of an act to warrant an armed reprisal. At the same time, both military and civilian respondents were more willing to take aggressive action against an intruding drone than against an intruding manned aircraft, believing that doing so would generate little response from the rival.

The results of the experiments embedded in wargames played by national security practitioners yield more support for the theory. The wargames, moreover, arguably provide far richer insights on the decision-making process of military officers than the survey experiments, which collect only limited qualitative data on the logics underlying respondent preferences. These in-person interactive scenarios also more closely model the dynamics of actual crisis response situations than internet-based surveys completed in isolation. Qualitative data gathered from discussions between wargame participants demonstrate that military officers' decisions involving drone use and responses to adversary drones are driven by both instrumental factors – aimed at protecting assets – and emotional ones driven by a deeply held American military conviction of defending one's comrades in arms and avenging their deaths.

In Chapter 6, I test the theory in a real-world context by probing U.S. reconnaissance operations during Cold War crises. Drawing from thousands of pages of recently declassified archival materials from the White House, Pentagon, State Department, and Intelligence Community, I find that technology-enabled escalation control largely explains the behavior of U.S. decisionmakers responsible for military and intelligence operations in North Korea, China, and

Cuba. The military and intelligence agencies developed drones as a means of reducing the exposure of friendly forces to adversary threats – and the political risk associated with losses – during intelligence gathering operations. Although early drones often lacked the capability of manned assets, they were frequently deployed or considered for deployment *in lieu* of inhabited platforms. Many decisionmakers of the era understood these assets were more likely to be fired upon than manned ones – in line with the amplified aggression logic – but were willing to accept this risk to collect intelligence without exposing personnel to shootdown situations that had the potential to create political and military standoffs.

A study of Israel's drone program, which is based on interviews with senior Israeli national security sector officials, also provides support for my theory of technology-enabled escalation control. Israel, which has long used drones both for reconnaissance and strike operations, employs its remotely piloted aircraft as part of a national escalation control strategy. Drones enable the Israeli Defense Forces and Israel's intelligence services to collect intelligence and carry out precision strike missions that target key adversaries and individuals during periods of relative calm, helping to extend the length of time between conventional conflicts involving larger-scale uses of armed force. In other words, drones enable tempered targeting that Israel uses to prevent smaller issues from escalating into larger, conventional conflicts.

To be clear, there are limits to the theory and the empirical tests presented in this dissertation. First, the theory does not apply to all warfighting technology. Instead, it applies only to technologies that remove friendly personnel from the front lines. This is a necessary condition since each of the logics underlying the theory assume limited or no risk to friendly forces. Second, the theory focuses primarily on the decision to deploy forces and escalate during interstate crises.

The project's research design focused specifically on capturing the effects of manipulating the type of asset – inhabited or remotely operated – on decisions surrounding the use of force and escalation. While the surveys and wargames, yielded valuable insights on these effects, extensions of the project might consider three additional manipulations. First, additional experiments might manipulate the stakes of a conflict in which drones are being considered or used. The current set of experiments holds constant the missions, yet decisionmakers may be willing to accept different degrees of risk depending on the mission at hand. For instance, civilian and military policymakers may be more willing to expose friendly forces to risk for missions aimed at countering an existential threat than for a lower stakes mission. Second, and relatedly, future research might more deliberately vary whether drones are being used for reconnaissance or attack missions. While the existing experiments include both types of missions, they generally appear in separate experiments, rather than being varied in a single experiment. As described in chapter 2, decisionmakers might be more prone to take hostile action against an armed drone than a reconnaissance drone, potentially leading to different escalation pathways depending on whether the drone is armed or unarmed. To be sure, however, the armed-unarmed distinction will likely become less apparent and important since modern drones are increasingly multi-purpose platforms capable of carrying out both types of missions. Finally, the additional studies might focus greater attention on the financial cost of drones. For instance, would decisionmakers prefer to deploy a remotely piloted drone that costs more than a manned aircraft on a risky mission?

Further research might more deeply explore how the preferences of each of the three groups assessed in this study – the public, military decisionmakers, and senior civilian decisionmakers – interact and shape the implementation of actions and policies surrounding crisis escalation. On one hand, the case studies provide some insight into these interactions. For example, analysis of the

EC-121 shootdown highlights how the response was shaped by a combination of concerns about potential domestic political consequences among civilian decisionmakers and fears of military risks among senior uniformed officers and civilian defense officials. On the other hand, future experiments might attempt to better simulate real world dynamics. For instance, the survey and wargame experiments fielded on military samples helped identify the preferences of national security practitioners that might one day advise senior leaders or make operational level decisions about the use of force. However, during actual crises, most deliberate decisions on escalation would be directed by decisionmakers at much higher echelons, such as the National Security Council. Future experimental work might therefore attempt to recruit current or former NSC staff or other civilian officials to participate in surveys or wargames. Or, it might expose military and civilian decisionmakers with treatments that vary levels of public support for escalation. These extensions would enhance the project's external validity and potentially yield valuable insights that build upon the growing body of work that examines the role that perceptions of the public, advisors, and leaders play in crisis decision-making and decisions on the use of force.[1]

Extensions of the project might also more deeply probe whether technology-enabled escalation control theory generalizes to other states. Although the two states profiled in this dissertation vary along several dimensions such as threat environment, national leadership, and military organizations, both states are democratic with highly professionalized militaries that are subordinate to civilian control. Despite these similarities, however, there were differences in the behavior of Israeli and American decisionmakers. For instance, as Chapter 7 describes, Israel launched a massively escalatory retaliation after Syria downed an IAF F-16 fighter jet in 2018,

[1] Saunders, "Leaders, Advisers, and the Political Origins of Elite Support for War"; Horowitz and Fuhrmann, "Studying Leaders and Military Conflict"; Busby et al., "Multilateralism and the Use of Force."

even though the pilot survived. In contrast, American decisionmakers have escalated through the mobilization of forces and through diplomatic means after attacks on manned assets outside of combat zones, but has generally not launched significant military retaliation.[2] This suggests that state-level factors influence escalation dynamics, something that should not come as a surprise given the context-dependent nature of escalation.

One important factor that might have influenced the different degrees of retaliatory escalation in the U.S. and Israeli cases is the number and type of competing military priorities that a state faces. For Israel, the primary security threats are located in its immediate vicinity. Israeli forces can, in nearly all cases, strike key targets using assets operating from bases in Israel – without the need for forward bases or overseas deployments. Indeed, IAF aircraft equipped with long-range air-to-ground missiles can reportedly strike a large number of adversary targets without leaving Israel's airspace.[3] Because of the geographically limited scope of Israel's threat environment, Israeli decisionmakers can face fewer concerns that a limited retaliatory strike will inhibit its ability to carry out operations elsewhere. Further, Israeli decisionmakers consider the degree to which a rival might further escalate after an Israeli retaliation. In cases where Israel maintains escalation dominance, it may retaliate. When it does not, Israel may opt to not launch military action.[4] In contrast, the global scale of U.S. military operations may mean that the United States needs to withdraw forces from, one region of the world in order to launch retaliatory actions

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[2] One recent exception is the Pentagon's tit-for-tat launch of strikes against Houthi radar sites in Yemen after Houthi fighters launched missiles at the USS *Mason* in 2016. See Phil Stewart, "U.S. Military Strikes Yemen after Missile Attacks on U.S. Navy Ship," *Reuters*, October 13, 2016, https://www.reuters.com/article/us-yemen-security-missiles-idUSKCN12C294.

[3] Interview with Brigadier General, Former Director of IDF Strategic Planning Division, Tel Aviv, Israel. 31 August 2016.

[4] Interview with IDF Intelligence Colonel (Retired), Former Deputy Head of IDF Combat Intelligence, January 2017.

in another. If shifting forces, even temporarily, would detract from a more important national security objective, the United States may refrain from retaliating – as they did following North Korea's downing of the EC-121 reconnaissance plane during the Vietnam War.

Another question worth exploring is whether technology-enabled escalation control operates differently in states of varying regime types.[5] For instance, might autocratic leaders view human life differently and consequently be more prone to deploy or attack inhabited assets? Existing literature suggests that non-democratic leaders can be casualty averse and face political consequences for launching unpopular military operations. Exploring how these autocrats use remote warfighting technology would yield important theoretical and policy insights on their propensity to use force.

BROADER APPLICATIONS OF TECHNOLOGY-ENABLED ESCALATION CONTROL

Thus far the project has tested technology-enabled escalation control on one type of increasingly common weapon system used by state actors. But does technology-enabled escalation control apply to other military technologies and to the use of these systems by non-state actors? To explore the generalizability of the theory, I examine two cases additional cases: cyber operations by the United States and the use of drones by non-state actors. If the theory is broadly generalizable, the logics of increased initiation, tailored targeting, and restrained retaliation should be seen in these additional cases.

[5] Several scholars argue that regime type can affect decisions on the use of force and force employment. Notable works include, Kenneth M. Pollack, *Arabs at War: Military Effectiveness, 1948-1991* (Lincoln, NE: University of Nebraska Press, 2002); Reiter and Stam, *Democracies at War*; Weeks, *Dictators at War and Peace*; Caitlin Talmadge, *The Dictator's Army: Battlefield Effectiveness in Authoritarian Regimes*, 1 edition (Ithaca, NY: Cornell University Press, 2015).

Cyber Warfare

Like drones, cyber warfare capabilities have proliferated widely to both state and non-state actors. Dozens of states now maintain institutions tasked with conducting defensive or offensive cyber operations, and non-state actors have increasingly leveraged cyber operations against their rivals.[6] Beyond their rapid proliferation in recent years, cyberwarfare operations share several other parallels with operations conducted using remotely operated systems. First, both drones and cyber operations remove friendly personnel from the physical frontlines, allowing states to conduct operations without putting troops in harm's way. This reduced risk to friendly troops may, if the increased initiation logic applies to the cyber domain, lead states to more easily initiate cyber actions than conventional operations. Second, drone and cyber operation can either gather information on rivals (computer network exploitation) or launch attacks aimed at degrading a rival's capabilities (computer network attack).[7] Third, both types of technologies can enable precision targeting. Just as a drone can loiter over a target for extended periods of time waiting for the prime opportunity to attack, so too can cyber operatives. Offensive cyber operators can penetrate into adversary networks and attempt to strike a specific node or actor without generating significant collateral damage.[8]

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[6] For example, Max Smeets, "Integrating Offensive Cyber Capabilities: Meaning, Dilemmas, and Assessment," *Defence Studies* 18, no. 4 (October 2018): 395–410; Melissa K. Griffith, "A Comprehensive Security Approach: Bolstering Finnish Cybersecurity Capacity," *Journal of Cyber Policy* 3, no. 3 (September 2018): 407–29; Nadiya Kostyuk and Yuri M. Zhukov, "Invisible Digital Front: Can Cyber Attacks Shape Battlefield Events?," *Journal of Conflict Resolution* 63, no. 2 (February 2019): 317–47.

[7] Chris Inglis, "Illuminating a New Domain: The Role and Nature of Military Intelligence, Surveillance, and Reconnaissance in Cyberspace," in *Bytes, Bombs, and Spies: The Strategic Dimensions of Offensive Cyber Operations*, ed. Herbert Lin and Amy Zegart (Washington, D.C.: Brookings Institution Press, 2019), 19–44.

[8] For more on cyber targeting, see Austin Long, "A Cyber SIOP? Operational Considerations for Strategic Offensive Cyber Planning," *Journal of Cybersecurity* 3, no. 1 (February 18, 2017): 19–28.

Despite these similarities, there is a fundamental difference between drone and cyber operations. While drone operations send a physical asset into or near a rival's territory, there is no such physical equivalent in cyber operations. This can make attribution difficult, sometimes leaving states unable to point a finger at the party responsible for an attack. The lack of a physical intruder in rival territory also changes how actors might defend against cyber attacks. While a state can shoot down an intruding drone, defensive actions in the cyber domain might, for instance, entail degrading the capability of servers in a rival's homeland or elsewhere. Despite these differences, several studies suggest that cyber operations do not result in the same degree of escalation as similar operations carried out using more traditional means.[9] Much like drones, cyber operations appear to fall at a lower threshold than operations by inhabited assets, potentially helping to control escalation.

To explore whether and how the logics associated with technology-enabled escalation control play out in the cyber domain, I look to the U.S. intelligence community's attempt to degrade North Korea's missile capabilities using cyber operations. During the early years of the Obama administration, North Korea increased the pace of its nuclear weapons and missile programs and adopted a more aggressive posture toward its South Korean neighbors. Just months after Obama took office, North Korea – then under the leadership of Kim Jong Il – conducted a missile test under the guise of a satellite launch. North Korea also took several provocative actions against South Korean forces. In March 2010, North Korea launched a torpedo against a South Korean warship, killing 46 sailors. Just five months later, North Korean forces attacked

[9] Sarah Kreps and Jacquelyn Schneider, "Escalation Firebreaks in the Cyber, Conventional, and Nuclear Domains: Moving Beyond Effects-Based Logics," 2019, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3104014.

Yeongpyeong Island in South Korea, killing four and wounding 22.[10] The North Korean threat continued to grow over the course of the Obama administration, and diplomatic efforts had little effect in countering Pyongyang's increasing hostility.

Among the most significant North Korean threat was the rapid development of its medium and long-range missiles, which could be used to deliver nuclear warheads. As early as 2011, North Korea was developing missiles like the KN-08, which had the range to strike the United States. U.S. Navy Admiral James Winnefeld, the Vice Chairman of the Joint Chiefs of Staff, announced in March 2013 that "the KN-08 probably does have the range to reach the United States."[11] North Korea conducted several additional missile tests, and in 2015, claimed it had developed a submarine launched ballistic missile capability.[12] The risk that these missiles could reach the United States and its allies worried American policymakers. Indeed, a U.S. Department of Defense report assessed that North Korea's missile and nuclear program "goes beyond minimal deterrence to one that could provide greater freedom action for North Korean aggression or coercion against its neighbors."[13]

The Obama administration considered several strategies to counter the North Korean missile threat. One option was a diplomatic approach that involved asking the People's Republic

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[10] Van Jackson, *On the Brink: Trump, Kim, and the Threat of Nuclear War* (New York: Cambridge University Press, 2018), 59–62.

[11] "Transcript: DOD News Briefing on Missile Defense from the Pentagon," U.S. Department of Defense, March 15, 2013, https://archive.defense.gov/Transcripts/Transcript.aspx?TranscriptID=5205.

[12] Most analysts believe the test failed, or was not an actual submarine launch ballistic missile. "North Korea Tested Submarine-Launched Missile, but Launch Failed," Reuters, November 28, 2015, https://www.reuters.com/article/us-northkorea-missile-idUSKBN0TH09M20151128.

[13] "Military and Security Developments Involving the Democratic People's Republic of Korea: Report to Congress" (U.S. Department of Defense, 2017), https://media.defense.gov/2018/May/22/2001920587/-1/-1/1/REPORT-TO-CONGRESS-MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-DEMOCRATIC-PEOPLES-REPUBLIC-OF-KOREA-2017.PDF.

of China to cut support to North Korea. This plan was rejected, however, because China often fell through on enforcing agreements with North Korea. A second option was launching military strikes on North Korean leadership and missile sites. Indeed, President Obama reportedly announced that he would have targeted North Korean leadership and weapons sites, but realized that pinpointing the location of these targets was nearly impossible. Obama worried that a failed strike would then trigger retaliation and risk war on the Korean Peninsula.[14] At the same time, senior defense leaders were concerned that ballistic missile defenses might be incapable of stopping an inbound barrage of North Korean missiles. Indeed, the Missile Defense Agency found that ground-based interceptors in Alaska and California failed 56-percent of the time under near-perfect conditions.[15]

Because of these concerns, the Obama administration reportedly turned to a "left-of-launch" strategy aimed at halting the development of missiles before they could be operationally employed. The approach involved manipulating the production of missile components or guidance systems, often through the use of computer network operations, and since the early 2010s had been considered a pillar of the Department of Defense Integrated Air and Missile Defense plans.[16] In 2013, for instance, the Joint Chiefs of Staff described joint air and missile defense as a program "where all capabilities…cyber warfare, directed energy and electronic attack…are melded into a

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[14] David E. Sanger and William J. Broad, "Trump Inherits a Secret Cyberwar Against North Korean Missiles," *The New York Times*, March 4, 2017, https://www.nytimes.com/2017/03/04/world/asia/north-korea-missile-program-sabotage.html; Jackson, *On the Brink: Trump, Kim, and the Threat of Nuclear War*, 78.

[15] "Fact Sheet: Ballistic Missile Defense Intercept Flight Test Record" (Missile Defense Agency, April 2019), https://www.mda.mil/global/documents/pdf/testrecord.pdf; Sanger and Broad, "Trump Inherits a Secret Cyberwar Against North Korean Missiles."

[16] For an in-depth discussion of left-of-launch operations, see Herbert Lin, "Hacking a Nation's Missile Development Program," in *Bytes, Bombs, and Spies: The Strategic Dimensions of Offensive Cyber Operations*, ed. Herbert Lin and Amy Zegart (Washington, D.C.: Brookings Institution Press, 2019), 151–71.

comprehensive joint and combined force capable of preventing an adversary from effectively employing an of its offensive air and missile weapons."[17]A year later, the Chief of Naval Operations and the Army Chief of Staff urged the Secretary of Defense to develop a missile defense strategy "incorporating 'left of launch' and other non-kinetic means of defense."[18]

Although specific details of the left of the launch program remain classified, the operations appear to have had an effect on North Korea's missile program. The failure rate of missile tests climbed to 88-percent, leading Kim Jong Un to reportedly investigate and execute officials associated with missile testing.[19] The availability of cyber warfare tools allowed the United States to initiate operations against North Korea that President Obama had considered too risky to conduct using conventional forces. The approach also allowed the Pentagon and U.S. intelligence community to tailor targeting to the missile program and, like the Israeli strategy of extending the campaigns between wars, to delay North Korea's ability to threaten conventional operations against the United States.[20]

The U.S. use of cyber operations against North Korea provides strong support that the core logics of technology-enabled escalation control operate in this domain. To be sure, there are key differences between cyber and drone operations, the most critical of which in the North Korean

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[17] "Joint Integrated Air and Missile Defense: Vision 2020" (The Joint Staff, December 5, 2013), https://www.jcs.mil/Portals/36/Documents/Publications/JointIAMDVision2020.pdf.

[18] Jonathan W. Greenert and Raymond T. Odierno, "Memorandum for Secretary of Defense: Adjusting the Ballistic Missile Defense Strategy," November 5, 2014, http://missiledefenseadvocacy.org/wp-content/uploads/2015/03/03062015_Memo.pdf.

[19] Samuel Osborne, "North Korea 'Executes Official in Charge of Nuclear Test Site,'" *The Independent*, December 20, 2017, https://www.independent.co.uk/news/world/asia/north-korea-nuclear-test-site-official-executed-kim-jong-il-park-in-young-punggye-ri-a8119711.html; Jackson, *On the Brink: Trump, Kim, and the Threat of Nuclear War*, 77.

[20] Some analysts critique the left-of-launch efforts, arguing that it was at best a palliative move that did not achieve a lasting strategic effect. Indeed, they argue that the efforts simply pushed North Korea to be more opaque about its missile testing and development. See Jackson, *On the Brink: Trump, Kim, and the Threat of Nuclear War*, 77–78.

case were the covert nature of the operations and the lack of a physical U.S. asset that North Korea could attack in self-defense. Escalation control could therefore be attributable to the covert nature of the operation, rather than the technology employed. However, senior U.S. officials spoke openly about left of launch operations, seemingly claiming responsibility for the failures of North Korean missile tests.[21] Further, the two mechanisms are not mutually exclusive. Cyber warfare is not only more covert, but can also enable states to carry out operations with less risk to friendly personnel and to execute highly tailored targeting. Obama seemingly opted to use cyber-enabled left of launch operations to precisely and accurately target North Korean military infrastructure, something that would have been difficult and far more escalatory using traditional kinetic operations. These findings align with a growing body of research that suggests that operations carried out using cyber warfare capabilities often result in less escalatory responses than similar operations carried out in the physical domain.[22]

Drone Use by Violent Non-State Actors

As a second assessment of the theory's generalizability, I loosen the dissertation's scope condition about the use of force by actors with nearly symmetric military capabilities and examine whether technology-enabled escalation control applies to the use of drones by violent non-state actors. Groups like Hezbollah, Hamas, and the Islamic State (ISIS) have used a variety of drones – ranging from modified hobbyist quadcopters to large remotely-piloted, military-grade aircraft – to carry out both reconnaissance and strike missions against both state and non-state actors.[23] To

[21] Sanger and Broad, "Trump Inherits a Secret Cyberwar Against North Korean Missiles."

[22] Kreps and Schneider, "Escalation Firebreaks in the Cyber, Conventional, and Nuclear Domains: Moving Beyond Effects-Based Logics"; Brandon Valeriano and Benjamin Jensen, "The Myth of the Cyber Offense: The Case for Restraint," Policy Analysis (Cato Institute, January 15, 2019), https://www.cato.org/publications/policy-analysis/myth-cyber-offense-case-restraint.

[23] Amos Harel, "Air Force: Hezbollah Drone Flew Over Israel for Five Minutes," *Haaretz*, November 9, 2004, https://www.haaretz.com/1.4752200; Dan Gettinger and Arthur Michel, "A Brief History of Hamas and Hezbollah's

be sure, there is significant variation across violent non-state actors. Their differing goals, ideologies, and organizational structures can make it difficult to test the theory across all group types.

Violent non-state actors, however, typically share several characteristics that differentiate them from democratic state actors in ways that may not align with the logics that underpin technology-enabled escalation control. First, not all violent non-state actors are casualty averse. Indeed, many rely on suicide attacks and extol the virtues of martyrdom.[24] Second, these groups are often at a power disadvantage compared to their rivals. As such, the tactics and technologies they employ may simply be the best or only way of carrying out an operation, rather than as a means of limiting the risk of casualties or escalation. These organizations may also not seek to temper or tailor their targeting, and instead seek to generate large numbers of casualties with little regard to the laws of armed conflict. Finally, many violent non-state actors may not seek to control escalation. Instead, a common terrorist strategy is to provoke a rival to launch an overwhelming response to attacks.[25] Terrorist groups can then cite these disproportionate government responses in their efforts to gain recruits and supporters.

As an empirical probe of this extension, I examine Hezbollah's use of remotely piloted aircraft against Israel and during the Syrian Civil War. To be sure, Hezbollah arguably has more state-like characteristics and greater military capability than many other violent non-state actors.

Drones," Center for the Study of the Drone, July 14, 2014, https://dronecenter.bard.edu/hezbollah-hamas-drones/; Don Rassler, *The Islamic State and Drones: Supply, Scale, and Future Threats* (West Point, NY: United States Military Academy, 2018).

[24] Robert Pape, *Dying to Win: The Strategic Logic of Suicide Terrorism* (New York: Random House, 2005); Mia Bloom, *Dying to Kill: The Allure of Suicide Terror* (New York: Columbia University Press, 2007).

[25] Andrew H. Kydd and Barbara F. Walter, "The Strategies of Terrorism," *International Security* 31, no. 1 (Summer 2006): 69–72.

This, however, still serves as a useful hoop test, or plausibility probe, of technology-enabled escalation control's applicability to non-state actors.[26] Passing the hoop test affirms the plausibility of the theory's applicability. If, however, evidence does not indicate that the theory applies, the theory is eliminated from subsequent consideration. Several observable indicators would provide support for the theory's applicability to non-state actors. Hezbollah should use drones to carry out missions they would not otherwise initiate (*increased initiation*); drones should allow Hezbollah to carry more precise operations (*tempered/tailored targeting*); and Hezbollah should take less escalatory reprisals to the loss of drones than to the loss of personnel (*restrained retaliation*).

Hezbollah, an Iranian-backed Shia militant organization, has been a key actor in the Iran-Israel proxy conflict since the early 1980s.[27] The group has used a variety of tactics to attack and harass Israeli forces and supported Bashar al-Assad during the Syrian Civil War. Although the group has traditionally relied on ground forces, guerrilla warfare, rockets, and terrorist attacks, Hezbollah entered the drone scene in the early 2000s. In 2004, Hezbollah flew an Iranian-built remotely piloted aircraft over Israel for nearly 20 minutes before the Israeli Air Force intercepted it. The overflight caused no damage to Israel, but did signal Hezbollah's capability to penetrate Israeli airspace and triggered fears that Hezbollah could use drones to attack Israel.[28] These

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[26] Stephen Van Evera, *Guide to Methods for Students of Political Science* (Ithaca, N.Y.: Cornell University Press, 1997), 31–32.

[27] In addition to carrying out militant activity, Hezbollah provides public services and has its own political party. See Augustus R. Norton, *Hezbollah: A Short History* (Princeton, NJ: Princeton University Press, 2007); Matthew Levitt, *Hezbollah: The Global Footprint of Lebanon's Party of God* (Washington DC: Georgetown University Press, 2013).

[28] Milton Hoenig, "Hezbollah and the Use of Drones as a Weapon of Terrorism," Public Interest Reports (Federation of American Scientists, June 5, 2014), https://fas.org/pir-pubs/hezbollah-use-drones-weapon-terrorism/.

concerns led Israel's Knesset Foreign Affairs and Defense Committee to investigate the incident.[29] Fears of Hezbollah using drones to carry out an attack were not unfounded. Shortly after the 2004 drone incident, Hezbollah leader Hassan Nasrallah told a rally that future drone missions could reach "deep, deep" into Israel and "be laden with a quantity of explosives, forty to fifty kilograms, and hit any target, be it water or power plant, a military base or airport."[30]

These fears came to fruition in 2006 when Hezbollah launched a series of drones laden with explosives to strike targets in Israel. In July 2006, a small drone attacked an Israeli warship off the coast of Beirut, leaving four Israeli sailors missing.[31] The following month, Hezbollah launched Iranian-built Ababil drones armed with explosive charges at Israel. One of these drones made it to the outskirts of the Israeli city of Haifa before it was intercepted and downed.[32] Several years later in 2012, Hezbollah flew an Iranian-built Shahed drone from a facility in southern Lebanon and penetrated dozens of miles into Israeli airspace. The drone approached Israeli nuclear facilities in Dimona before it was shot down by Israeli fighter jets, raising concerns that the drone may have collected intelligence of highly sensitive Israeli facilities.[33] More significantly, the breach of restricted airspace demonstrated the ability of Hezbollah – and its Iranian patron – to reach some of Israel's most critical infrastructure. Hezbollah did not retaliate for the shootdown of its drone. Instead, Hassan Nasrallah turned the drone mission into a propaganda victory,

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[29] Harel, "Air Force: Hezbollah Drone Flew Over Israel for Five Minutes."

[30] Yochi Dreazen, "The Next Arab-Israeli War Will Be Fought with Drones," *The New Republic*, March 26, 2014, https://newrepublic.com/article/117087/next-arab-israeli-war-will-be-fought-drones.

[31] Hamza Hendawi, "Israel: Hezbollah Drone Attacks Warship," *Washington Post*, July 14, 2006, http://www.washingtonpost.com/wp-dyn/content/article/2006/07/14/AR2006071401786.html.

[32] Dreazen, "The Next Arab-Israeli War Will Be Fought with Drones."

[33] "Hezbollah Drone Operations Celebrated in Museum," Arabian Aerospace, February 4, 2019, https://www.arabianaerospace.aero/hezbollah-drone-operations-celebrated-in-museum.html.

announcing, "we are uncovering a small part of our capabilities…It is our natural right to send other reconnaissance flights inside occupied Palestine…This is not the first time and will not be the last."[34] Senior Iranian officials also praised the mission, claiming that the mission demonstrated "strategic deterrence" by being able to reach airspace near Israel's nuclear reactor.[35]

In addition to carrying out drone operations against Israel, Hezbollah has also used drones to support the Assad regime during the Syrian Civil War. These missions were often carried out alongside Iranian, Syrian, and Russian forces, and involved a mix of military grade and modified commercial off-the-shelf drones. In 2014, Hezbollah launched a successful drone strike against a headquarters of the al-Nusra Front, a Salafist jihadist organization, near the Lebanon-Syrian border.[36] By 2016, Hezbollah had shifted to using smaller and cheaper modified commercial drones to strike ISIS targets in Syria.[37] These micro drones carried small cluster bombs that were used to precisely target Syrian rebels.[38] Although these systems allowed Hezbollah to tailor targeting, it is unlikely Hezbollah did this as a means of escalation control. Given Hezbollah's history of indiscriminate targeting of civilian populations, Hezbollah likely viewed the drones

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[34] "Hezbollah Drone Proves Tehran's Capabilities, Says Iranian Defense Minister," *The Times of Israel*, October 14, 2012, http://www.timesofisrael.com/hezbollah-drone-proves-tehrans-capabilities-says-iranian-defense-minister/.

[35] "Hezbollah Drone Proves Tehran's Capabilities, Says Iranian Defense Minister."

[36] Gili Cohen, "Hezbollah Strikes Nusra Front Positions near Syria Border, Iran Says," *Haaretz*, September 22, 2014, https://www.haaretz.com/hezbollah-attacks-nusra-front-near-syria-1.5304809.

[37] Abbas Al-Sabbagh, "Hezbollah Expands Its Arsenal," *An-Nahar*, August 10, 2018, https://en.annahar.com/article/842769-hezbollah-expands-arsenal.

[38] Kyle Mizokami, "Terrorist Group Hezbollah Is Reportedly Using Drone Bombers," Popular Mechanics, August 16, 2016, https://www.popularmechanics.com/military/weapons/a22366/hezbollah-drone-bombers/.

primarily as a low cost and effective means of hitting targets that they might otherwise not have been able to strike.[39]

Hezbollah's use of drones provides tentative limited support for technology-enabled escalation control in cases beyond those involving state actors with roughly symmetrical capabilities. First, drones enabled Hezbollah to carry out operations it might not otherwise have been to conduct, providing support for the increased initiation logic. However, Hezbollah's willingness to initiate missions using drones was likely not because remote warfighting technologies reduced the risk to Hezbollah personnel. Instead, drones provided a capability to reach targets that Hezbollah would otherwise be unable to easily target. In other words, principles of escalation control and casualty aversion appeared less important to Hezbollah's decision logic than that of states. Further, the publicity that Hezbollah leaders attached to these drone missions suggests one aim was to demonstrate that it possessed advanced military capabilities that could threaten targets in Israel. The mechanisms underlying the increased initiation logic in this case appears to be different than those of the state actors examined in Chapters 4 through 7, whether due to their status, or the relative asymmetry in capabilities.

The operation of the restrained retaliation logic in the Hezbollah case appears similar to its operation with state actors. Hezbollah did not take significant retaliatory actions after the loss of its drones to Israeli air defenses. In contrast, Hezbollah generally threatens retaliation for Israeli strikes against its personnel.[40] Finally, although drones also helped Hezbollah tailor its targeting

[39] For Hezbollah's record of indiscriminate targeting, see *Civilians Under Assault: Hezbollah's Rocket Attacks on Israel in the 2006 War* (Washington, D.C.: Human Rights Watch, 2007), https://www.hrw.org/reports/2007/iopt0807/.

[40] For example, see Liz Sly and Suzan Haidamous, "Hezbollah Vows Retaliation against Israel for Airstrike against Site in Lebanon," *Washington Post*, February 24, 2014, https://www.washingtonpost.com/world/middle_east/hezbollah-vows-retaliation-against-israel-for-airstrike-against-site-in-lebanon/2014/02/26/6a7c3edc-9ede-11e3-878c-65222df220eb_story.html; Matthew Levitt, "Hezbollah: Pulled between Resistance to Israel and Defense of Syria," *CTC Sentinel* 8, no. 2 (February 2015): 2–5.

during operations against Israel and in the Syrian Civil War, Hezbollah likely considered this precision targeting as a means of gaining tactical advantage rather than controlling escalation. Indeed, violent non-state actors that tailor targeting may actually generate more casualties or more precisely strike critical targets, triggering more significant retaliation from an adversary. This could result in greater escalation rather than escalation control, undercutting the technology-enabled escalation control.

The two cases briefly examined above suggest that elements of technology-enabled escalation control are generalizable across different types of remote warfighting technology and different types of actors. Additional testing, however, will help to more fully explore the limits of the theory's generalizability and will help provide data that can help inform policymaking as remote warfighting technologies become increasingly common in modern conflicts.

CONTRIBUTIONS TO SCHOLARSHIP AND POLICY

The theory of technology enabled escalation control builds upon scholarly theories that link technology and armed conflict and contributes to scholarly understanding of escalation dynamics. First, unlike many theories that examine technology and conflict, technology-enabled escalation control highlights the effect of technology on escalation *after* the initial decision to use force. Many existing logics argue that technology can influence decisions on initiating the use of force, but understanding escalation dynamics also requires looking what happens after force is first used. Second, the project's theory and findings suggest that certain types of technology can have a stabilizing effect on escalation dynamics, even if those technologies reduce the costs and risks of military operations. This raises questions about the scope conditions of several dominant international theories that argue that technologies which make warfighting less risky and less costly increase the likelihood of conflict and make the world less stable. While these technologies can increase the likelihood of conflict onset, this project's empirical findings demonstrate that remote warfighting technologies can also lower the risks of destabilizing escalation precisely because they lower the risks and costs of military action. At the same time, many theories suggest that technologies that are massively destructive – such as nuclear weapons – can promote stability by deterring the use of military force. The findings presented in Chapters 4 through 7 demonstrate that technologies need not threaten complete destruction to promote stability. In short, the project perhaps offers a variant of the stability-instability paradox, in which a class of technologies makes military action during crises more likely but less intense than those that might occur if remote warfighting technologies were not available. Understanding how crises unfold is particularly important in an era where the nature of conflict has shifted from large scale wars aimed at gaining and holding control of territory to conflicts with more limited objectives.[41]

The project also contributes to the resurgence of scholarly attention toward escalation and escalation dynamics. Although much of the foundational work on escalation took place during the Cold War, recent research has returned to the study of escalation in a variety of operational contexts. Scholars have examined the risks of inadvertent escalation,[42] the use of covert action as a means of escalation control,[43] and the dangers of escalation between the United States and its near-peer competitors.[44] Many of these studies note that technologies can play a role in shaping escalation dynamics, a topic that this dissertation examines in depth. This project's findings, for instance, suggest that the concept of escalation thresholds that are common in academic studies

[41] Zenko, *Between Threats and War*.

[42] Acton, "Escalation through Entanglement."

[43] Carson, *Secret Wars*.

[44] Alexander Lanoszka, "Russian Hybrid Warfare and Extended Deterrence in Eastern Europe," *International Affairs* 92, no. 1 (January 2016): 175–95; Talmadge, "Would China Go Nuclear?"

require more nuance. For instance, rather than classifying actions as the deployment of limited military force, scholars may need to consider whether assets dispatched on these limited deployments are inhabited or remotely piloted. This distinction, as the experiments and case studies highlight, is important to policymakers and the public, and may result in different degrees of escalation.

Beyond questions dealing purely with the use of force and escalation, the project raises broader theoretical questions about crisis signaling and domestic politics. The use of remote warfighting technologies that take friendly personnel out of harm's way may lead scholars to reconsider existing theories of crisis signaling. Most logics suggest that the most credible signals during crises are those that tie an actor's hands or force it to sink costs. These sorts of actions are considered credible because they put skin in the game and require actors either to pay ex ante costs by deploying personnel or ex post costs for reneging on agreements.[45] For instance, the U.S. Army's Berlin Brigade lacked the capability to defeat East German and Soviet forces in the event of war. Instead, the brigade was designed as a signal to reassure allies of Washington's commitment to the defense of Berlin and to deter communist aggression by "[dying] heroically, dramatically, and in a manner that guarantees that the action cannot stop there."[46]

What happens to crisis signaling when technologies like drones allow states to carry out military operations without putting skin the game is an important and increasingly salient theoretical and policy question. The empirical findings in this project suggest that drones are a weaker signal than manned assets since decisionmakers seem more willing to take actions against

[45] James D. Fearon, "Signaling Foreign Policy Interests: Tying Hands versus Sinking Costs," *The Journal of Conflict Resolution* 41, no. 1 (1997): 68–90.

[46] Schelling, *Arms and Influence*, 47.

remotely piloted aircraft than inhabited ones. Yet, some studies suggest drones still signal resolve to rivals. According to these studies, drones represent a credible signal of a state's commitment to continuing military operations since leaders may be less prone to halt operations even after multiple drone losses.[47] As such, drones may represent a new "currency" for coercive diplomacy.[48] Drone deployments and actions against drones may allow states to signal capacity and resolve prior to and during crises without necessarily endangering friendly or rival personnel. Shooting down a drone, for instance, can allow states to signal displeasure with a rival's surveillance activities without the risk of escalation that might be associated with downing a manned aircraft. Similarly, selecting not to shoot down a rival's drone can also convey a message to a potential rival. In short, the emergence of new technologies that enable states to project military power without demonstrating skin in the game suggests that scholars and policymakers may need to rethink the determinants of credible signals. To be sure, significant demonstrations of hand tying or sunk costs are still likely to convey the most credible signals to both rivals and allies, but remote warfighting technologies provide decisionmakers with a new set of tools with which to signal and bargain with other states and non-state actors.

Technologies that take friendly warfighters off the battlefield not only influence dynamics on the international stage, but might also shape matters of domestic politics and accountability. As the survey experiments in Chapter 4 demonstrate, the public is more supportive of military deployments involving drones than those involving manned assets. In the minds of the domestic

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[47] Amy Zegart, "Cheap Fights, Credible Threats: The Future of Armed Drones and Coercion," *Journal of Strategic Studies,* Forthcoming .

[48] Erik Lin-Greenberg, "So China Seized a U.S. Drone Submarine? Welcome to the Future of International Conflict," *The Washington Post*, December 23, 2016, https://www.washingtonpost.com/news/monkey-cage/wp/2016/12/23/so-china-seized-a-u-s-drone-submarine-welcome-to-the-future-of-international-conflict/. Other scholars have made similar arguments that low risk operations allow states to more easily use military force as a tool of coercive diplomacy. See, Chamberlain, *Cheap Threats*.

public, remotely operated systems largely eliminate the risk to friendly forces, reducing concerns about the consequences of armed conflict. Deploying machines instead of men and women into harm's way might not only increase public support for conflict, but in some cases, might make it difficult for the public to even know when their leaders are carrying out military operations overseas. Without the deployment of friends, family members, and neighbors – and the associated publicity surrounding troop mobilizations, the public may have less knowledge about their nation's military operations. As a result, decisionmakers may have greater freedom to carry out military action without the degree of oversight and scrutiny often attached to more traditional operations.

The decreased risk to friendly forces that drones provide may also make it easier for policymakers to avoid the political consequences – or audience costs – associated with backing down from threats. Many scholars argue that leaders avoid backing down after making foreign policy threats for fear that their constituents will punish them for doing so.[49] Drones and other remote warfighting technologies, however, increase the policy menu for decisionmakers and may provide a tool for carrying out some action after making an initial threat instead of being forced to renege entirely. For instance, a leader might threaten to carry out a large military operation against a rival state, but then realize that doing so is impractical and risky. Rather than backing down entirely and taking no action, a leader might opt to launch drone strikes, helping mitigate the audience costs she faces.[50]

[49] James D. Fearon, "Domestic Political Audiences and the Escalation of International Disputes," *The American Political Science Review* 88, no. 3 (September 1994): 577–92; Tomz, "Domestic Audience Costs in International Relations."

[50] For more on how an expanded policy menu helps leaders "back up" instead of "back down" from threats, see Erik Lin-Greenberg, "Backing up, Not Backing down: Mitigating Audience Costs through Policy Substitution," *Journal of Peace Research*, May 29, 2019.

In short, technology-enabled escalation control highlights how certain types of military technologies that remove friendly personnel from harm's way necessitate rethinking the contours of existing theories on conflict and crisis. Many of our existing theories were developed to help explain the large conventional battles that defined many of the wars of the 20th centuries and do not fully account for the ways in which new technologies have reshaped the conduct of modern conflict.

POLICY IMPLICATIONS

Richard Betts cautions that the "Military, budgetary, diplomatic, and political implications of technological advances…are seldom understood and often are not clear until long after new weapons have been deployed. Ensuring that…inadvertent negative consequences [of new military systems] do not outweigh their benefits has become progressively more important." [51] To that end, the theory and findings presented in this dissertation have several implications for national security practitioners and foreign policymakers. Drones and other warfighting technologies that remove friendly personnel from harm's way are rapidly proliferating, allowing both state and non-state actors to incorporate these capabilities into their operations. Indeed, Pakistan and Indian have reportedly used drones to collect intelligence on each other, violent non-state actors like the Islamic State have used rudimentary drones to carry out attacks on government forces, and Russia has flown drones over separatist controlled regions of Ukraine.[52] An understanding of how drones

[51] Richard K. Betts, ed., *Cruise Missiles: Technology, Strategy, Politics* (Washington, D.C.: The Brookings Institution, 1981), 1.

[52] Ahmad, "India Denies Its Drone Shot down by Pakistan along LoC"; Rassler, *The Islamic State and Drones: Supply, Scale, and Future Threats*; Jakub Palowski, "Russian Drone Shot Down Over Donbas," Defence24, April 11, 2016, https://www.defence24.com/russian-drone-shot-down-over-donbas-video.

shape escalation dynamics can help inform force employment and contingency planning, doctrine, and the development of norms surrounding their use.

As more states and non-state actors acquire drones, the likelihood these systems will be operationally deployed should increase, in line with the increased initiation logic. States might use these systems to carry out aggressive probes into a rival's territory, recognizing that there is little risk of escalation relative to the deployment of manned assets on similar missions. Decisionmakers might also be prone to carry out more strikes against targets overseas, as evidenced by Washington's use of drones on counterterrorism missions in places like Pakistan and Yemen.[53] This increased rate of drone deployments could lead to greater incidences of confrontation between state militaries, potentially necessitating the need for more deliberate planning and policies on how states should react during these situations.

Another consideration for policymakers is whether increased drone use will heighten the risk of drone-triggered inadvertent escalation and, what Thomas Schelling described as threats that leave something to chance – an action that deliberately exploits the risks and uncertainties of seemingly low-level military activity.[54] If, for instance, drones allow states to more easily launch strikes against a rival's infrastructure and personnel, a state might inadvertently strike targets that are considered critically important to a rival. For example, a state might use a drone to launch strikes on what it believes to be a tactical military command post, but could in fact be a key nuclear command and control node.[55] Or, a state on the receiving end of drone attacks might shoot down

[53] Woods, *Sudden Justice*.

[54] Thomas C. Schelling, *The Strategy of Conflict* (Cambridge, MA: Harvard University Press, 1960), 203.I am grateful to Robert Jervis for highlighting this point.

[55] For more on the concept of inadvertent escalation see Chapter 2 of this dissertation and Posen, *Inadvertent Escalation*; Acton, "Escalation through Entanglement."

what it thinks is a drone, but is actually a manned aircraft. Either of these actions could lead to military responses that are more significant than what decisionmakers might have wanted. In short, the risk of confrontations and inadvertent escalation is, in part, a game of odds – a larger number of missions means a greater number of potential missions to go awry.

Policymakers will need to assess whether the increased frequencies of military encounters and heightened risk of inadvertent escalation is more or less escalatory and destabilizing than operations that would occur if drones were unavailable. The case studies in Chapters 6 and 7 show that policymakers have historically considered the tradeoffs between using manned and remotely piloted assets. For instance, members of the Kennedy and Johnson National Security Councils debated the balance of intelligence gathering capabilities and operational risks associated with launching drones over Cuba.[56] In more recent years, however, growing casualty aversion among the population and decisionmakers in many states has led drones to be viewed as a cure all solution to a range of foreign policy challenges.[57] As drones become more ubiquitous, military and civilian decisionmakers may benefit from more deliberate guidance and planning surrounding their use during crises and conflicts.

Currently, much doctrine is "platform agnostic," making no references to specific types of military assets. In other words, current doctrine typically does not differentiate between remotely piloted and inhabited assets. The lack of clear doctrine can subsequently contribute to confusion on issues surrounding tactics and force employment. Indeed, some combat aviators described not having guidance on whether to carry out intercepts against manned and remotely piloted aircraft

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[56] See Chapter 6.

[57] Schulman, *Weird Birds: Working Paper on Policymaker Perspectives on Unmanned Aerial Vehicles and Their Impact on National Security Decision-Making*.

differently.[58] More broadly, existing airspace regulations have only limited guidance for remotely piloted aircraft operations.[59] Yet, the findings from the experiments in Chapters 4 and 5 highlight how military decisionmakers take different action depending on whether operations entail inhabited or remotely operated assets. More refined guidance might better posture military decisionmakers for future conflicts in which remote warfighting technologies are more common, potentially helping to avoid unwanted escalation.

One specific area where doctrinal clarity is critically needed is the definition of what constitutes a remote warfighting system. While the remotely piloted aircraft (or ground or maritime vehicle) itself is the most apparent component, remote warfighting systems are systems of systems.[60] These typically include a large support infrastructure that includes ground control stations, communication satellites, and ground-based intelligence processing facilities.[61] Under international law, each of these components could be considered be a lawful target during military operations since they all enable the operation of a combat system. Many of these sites, however, remain far outside of combat zones, meaning that strikes on these sites could lead to horizontal escalation. Military planners and policymakers will need to consider how strikes on these systems might influence escalation dynamics during crises and armed conflicts.

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[58] Interview with U.S. Air Force Lieutenant Colonel (Reconnaissance Pilot/Combat Operations Planner), 1 June 2016, Ramstein Air Base, Germany; Interview with U.S. Air Force Major (Remotely Piloted Reconnaissance Aircraft Pilot), 1 June 2016, Ramstein Air Base, Germany;

[59] Interview with U.S. Air Force airspace planner, 2 2 June 2016, Ramstein Air Base, Germany; Interview with U.S. Air Force Lieutenant Colonel (Reconnaissance Pilot/Combat Operations Planner).

[60] Gilli and Gilli, "The Diffusion of Drone Warfare?," January 2016, 71–80.

[61] For descriptions of these control stations and intelligence sites, see "Air Force DCGS Fact Sheet"; "MQ-9 Fact Sheet."

As the operational deployments of drones increase, there is also value in considering the norms and international laws that govern their use. Under existing international agreements, there is generally no distinction between inhabited and remotely operated assets. The Law of Armed Conflict, for instance, does not establish separate guidelines for the military use of manned and unmanned platforms, and instead focuses on regulating the effects that weapons of any type can have on the battlefield. Similarly, agreements such as the Chicago Convention of 1944 and the UN Convention on the Law of the Sea which govern access and use of airspace and the maritime domain treat inhabited and remotely piloted craft as equals. Despite the equivalence of inhabited and remotely piloted assets under these agreements, the findings presented in this dissertation and recent state practice highlights that militaries often use and react differently to inhabited and remotely piloted platforms.

This divergent behavior suggests emerging international norms surrounding RPA use that map on to deeply embedded features of the law of armed conflict. There appears to be a greater tacit agreement among states that the downing of a remotely operated asset will not trigger an aggressive military or diplomatic response. Indeed, the experimental findings, case studies, and contemporary events all demonstrate that states are often willing to ignore the loss of a drone to hostile activity, or react with less than a tit-for-tat response. While this appears to be an emerging norm, states may find benefit in formalizing agreements or guidelines to help inform the future use and interactions of these systems. Formal regulations may become even more important as remotely operated systems are augmented with artificial intelligence that increases their autonomy.[62] These guidelines or regulations, which could be similar to those that governed the development and use of earlier generations of weapons, might offer procedures for de-escalation

[62] Paul Scharre, “Killer Apps: The Real Dangers of an AI Arms Race,” *Foreign Affairs* 98, no. 3 (June 5, 2019): 144.

in the event of incidents or limit proliferation of remote warfighting technologies in a way that prevents arms racing.[63]

Drones will almost certainly continue to be a feature of modern warfare into the foreseeable future. Their ability to lower the risks and costs associated with deploying forces coupled with the growing number of drone producers will likely contribute to the continuing proliferation of increasingly advanced drones to state and non-state actors. The understanding that drones can help control escalation – and the limits to this claim – should help inform policymaking and military decision-making in a way that reduces the risk of crisis escalation.

FINAL THOUGHTS AND PATHWAYS FOR FUTURE RESEARCH

This project proposes and tests a theory of technology-enabled escalation control, focusing primarily on the use of drones by democratic state actors. While this concluding chapter assessed the theory's applicability to cases beyond state drone use and introduced broader theoretical and policy considerations, there are several avenues for further research. Future work might probe the generalizability of the theory across various types of actors and technologies, assess the theory's durability in a world of increasingly proliferated drones, or examine the applicability of the theory in situations where crises have transitioned into armed conflict. Research in each of these areas will provide scholars and policymakers with a richer understanding of the effect of technology on conflict dynamics.

The findings of the empirical analysis raise several additional questions that present pathways to expand the project into new research areas. For instance, future work might explore how allies and security partners conceive of drones during crises, helping to deepen scholarly and

[63] Several historical agreements serve as precedents. For instance, the U.S.-Soviet Incidents at Sea Agreement (1972) offered guidelines on how to de-escalate confrontations between American and Soviet warships on the high seas.

policy understanding of crisis bargaining and alliance reassurance. For instance, do allies consider a patron state's deployment of drones to be a credible signal of the patron's commitment and reassurance?

Additional work might explore the future of warfare by tackling questions surrounding the implications of increased drone proliferation and the burgeoning use of other remote warfighting technologies, like artificial intelligence (AI) enabled autonomous weapon systems. How does crisis escalation unfold in a world in which actors on all sides of a crisis have access to drones? What happens to escalation dynamics if and when remotely piloted drones are supplanted by autonomous systems with no operator in the loop? Could states use the lack of a human operator as a means of deescalating crises by arguing that actions – like an airstrike – were not intentional, but were instead the result of faulty or poorly trained AI? Further, how might states adapt their tactics if drones help to control crisis escalation? Will states eager to escalate simply eschew the substitutive use of these remote warfighting technologies? Such research might entail experimental studies that manipulate the balance of remote warfighting technologies across the sides of a crisis dyad or whether actors are using remotely operated or fully autonomous systems.[64]

Future studies might examine the extent to which technology-enabled escalation control applies after crises escalate into large-scale, conventional military operations. Can the availability and use of remote warfighting technologies during conventional wars help prevent further escalation? Perhaps more importantly, can systems like drones help deescalate conflicts that are already underway? More specifically do the restrained retaliation and tempered targeting

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[64] Some research has already started to engage with these questions, Kenneth Anderson and Matthew C. Waxman, "Debating Autonomous Weapon Systems, Their Ethics, and Their Regulation Under International Law," in *The Oxford Handbook of Law, Regulation, and Technology*, ed. Roger Brownsword, Eloise Scotford, and Karen Yeung (New York: Oxford University Press, 2017), 1097–1117; Michael C. Horowitz, "Artificial Intelligence, International Competition, and the Balance of Power," *Texas National Security Review* 1, no. 3 (May 2018): 36–57; Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (W. W. Norton & Company, 2019).

mechanisms that operate during interstate crises also play out during periods of conflict? Future work might also assess whether and how targeting by drones affects escalation dynamics. For instance, does it matter whether airstrikes are carried out by a drone or manned asset? That is, do decisionmakers on the receiving end of these strikes respond differently depending on the type of asset involved. Do drone intelligence gather missions trigger concerns of expanding military actions that lead rivals to intensify their own military actions, escalating armed conflicts?

Technology-enabled escalation control theory and the findings presented in this dissertation aim to offer a more complete explanation for technology's effects on conflict dynamics and crisis escalation. Addressing the questions highlighted above will help test the limits of the theory across a range of technology types and operating contexts. The findings of this further research will expand our understanding of how technologies that remove friendly personnel from harm's way affect the nature of conflict and escalation and provide policymakers with the data needed to inform their decisions. A deeper understanding of the relationship between remote warfighting technologies and conflict dynamics will not only provide us with a better understanding of the future of warfare, but also hopefully help policymakers and national security practitioners to control crises before they escalate into more intense or broader conflicts that threaten international security.

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Appendix A

Interview Subjects

United States

Former National Security Advisor to the Vice President (2010s)
Former Senior White House Official
Richard Speier, Member of Original MTCR Negotiating Team
U.S. Congress, Military Legislative Assistant
Senior Official, State Department Bureau of International Security and Non-Proliferation
Congressional and Public Affairs Officer, Department of State, Bureau of Pol-Mil Affairs
Department of Defense Senior Executive Service, Advisor to Secretary of Defense
Department of Defense Civilian, Defense Security Cooperation Agency
U.S. Air Force Colonel, MQ-1 Pilot, Former MQ-1 Squadron Commander
U.S. Air Force Colonel, F-15E Combat Systems Officer
U.S. Air Force Lieutenant Colonel, MQ-1/9 Pilot
U.S. Air Force Lieutenant Colonel, Information Operations
U.S. Air Force Lieutenant Colonel, EC-130 Pilot/Air Operations Planner
U.S. Air Force Lieutenant Colonel, RC-135 Pilot/Air Operations Planner
U.S. Air Force Lieutenant Colonel, RC-135 Pilot/Chief Combat Plans Division
U.S. Air Force Major, RQ-4 Global Hawk Pilot/Combat Operations Planner
U.S. Air Force Major, Space Operations/NATO Planner
U.S. Air Force Major, Intelligence
U.S. Air Force Captain, Communications Officer
U.S. Air Force Captain, Communications Officer
U.S. Air Force Chief Master Sergeant, Intelligence
U.S. Air Force Master Sergeant, MQ-1/9 Maintainer
U.S. Air Force Master Sergeant, Communications Specialist
U.S. Air Force Senior Airman (Former), Intelligence
U.S. Air Force Civilian, Intelligence Planner
U.S. Air Force Civilian, Airspace Operations Planner
U.S. Air Force Civilian, Airfield Operations Planner
U.S. Air Force Civilian, Future Operations Planner
U.S. Air Force Civilian, Lessons Learned Planner
U.S. Air Force Civilian, Country Director (Office of Deputy Secretary of the Air Force)

Europe

Estonian Air Force Lieutenant Colonel Pilot
Estonian Navy Commander, Surface Warfare Officer
Croatian Air Force Colonel (Retired), Logistics/Acquisitions
German Army Lieutenant Colonel, Airpower Strategist
German Navy Commander, Surface Warfare Officer
Italian Air Force Major, Intelligence/Drone Operations

Latvian Army Colonel, Intelligence
Latvian Ministry of Defence, Senior Official
Polish Army Colonel, Infantry
Swedish Air Force Lieutenant Colonel, Pilot
United Kingdom Ministry of Defence Official
United Kingdom Royal Air Force Air Vice Marshal, Fighter Pilot
United Kingdom Royal Air Force Group Captain, Fighter Pilot
United Kingdom Royal Air Force Wing Commander, MQ-9 Pilot
United Kingdom Royal Air Force Wing Commander, Intelligence
United Kingdom Royal Air Force Wing Commander, Intelligence
United Kingdom Royal Air Force Wing Commander (Retired), Fighter Pilot
Douglas Barrie, IISS Senior Airpower Fellow

Israel

Jacob Amidror (Retired Major General), National Security Advisor (2011-2013)
Former Deputy National Security Advisor for Foreign Policy and International Affairs
Brigadier General Uzi Eilam
IAF Brigadier General (Reserve), Former UAV Base Commander
IAF Brigadier General (Reserve), Pilot
IDF Brigadier General (Reserve), Former Director of IDF Strategic Planning Division
IDF Colonel (Retired), Former Deputy Head of Combat Intelligence
IDF Colonel (Reserve), Infantry Officer/Senior Planner
IAF Lieutenant Colonel (Retired), Cyber Operations
IDF Officer (Reserve), Intelligence
Professor IDF Command and Staff College
Professor IDF Command and Staff College
Israeli Space and UAV Analyst
Israeli Defense Reporter/Defense Expert

Other

People's Liberation Army (China), Senior Colonel (Retired)
United Nations Office of Disarmament Affairs, Political Affairs Officer

Appendix B

Wargame Vignettes

Wargame Prep Material: The Road to Crisis

The Republic of Katunia

The Republic of Katunia is located in Central Asia and is bordered by Uzbekistan, Kazakhstan, Tajikistan, and Dakastan. Katunia is a former Soviet Republic and has been led by President Kanat Burkhazov since December 1991.

Elections plagued by fraud are held every five years. Burkhazov has secured more than 96-percent of the vote in each election. He appoints all government ministers and governs the country in an autocratic style, with heavy executive controls over the media and judiciary. Burkhazov promotes a cult of personality and hopes to make Katunia a regional power.

Katunia possesses substantial fossil fuel reserves and mineral deposits, and is a major exporter of copper and zinc. Katunia also has a sizeable agricultural sector featuring livestock and grain. Over the last two decades, the Katunian government has attempted to diversify its economy and has developed robust pharmaceutical and petrochemical processing sectors. Katunia trades extensively with Kazakhstan and Russia, and its economy has fared reasonably well despite the decline of the Russian economy in the mid 2010s.

The Katunian population has a near universal literacy rate (99.8%) and a relatively high life expectancy (78.8 years). The government provides high quality public schooling and medical care to all Katunian citizens.

The Armed Forces of the Republic of Katunia consist of the Army, Aerospace and Air Defense Force, and the Special Republican Guard. Income from oil and gas exports has enabled Katunia to modernize its military in recent years. The military imports aircraft and advanced weaponry from Russia, China, and France, but maintains no formal military alliances. Katunia's most recent acquisitions are Sukhoi Su-30 fighters and Chinese-built Type 96 Main Battle Tanks.

Katunia has maintained relatively peaceful relations with its neighbors since becoming an independent state in 1991. Katunia had a minor border dispute with Dakastan in 1994, but this was settled peacefully through bilateral negotiations that formalized the Katunia-Dakastan border.

The Republic of Dakastan

The Republic of Dakastan is located in Central Asia and is bordered by Kazakhstan, Katunia, Tajikistan, and Russia. Dakastan is a former Soviet Republic and Saken Tasmatov has served as President since 2014. Tasmatov maintains close ties with the United States and supports the presence of US air and special operations forces at Khanastov Air Base in southern Dakastan.

Elections are held every six years. While election fraud and police crackdowns on opposition protests occurred during the most recent presidential election, several non-governmental organizations have assessed human rights conditions in Dakastan to be improving. President Tasmatov abolished capital punishment in 2016, the judicial system was revamped in 2012, and more than 40 independent newspapers and news outlets have been established since 2010.

Dakastan has a near universal literacy rate (99.6%) and a high life expectancy (78.3 years), due in part to the state's strong public school and health system.

Like its neighbor Katunia, Dakastan also has significant fossil fuel reserves and mineral deposits. Dakastan has the fifth-largest gold deposits in the world and mines more than 73 tons of gold each year. The country also has large untapped reserves of natural gas. In recent years, a burgeoning tech sector has emerged, with Dakastan producing computer chips and other computer components. Most of these components are exported to Russia and the European Union.

The Defense Forces of the Republic of Dakastan consist of the Ground Forces, Air Force, and Joint Special Operations Force. The defense force is well trained and equipped with an increasing amount of western equipment. Since 2002, the United States has maintained a significant presence at Khanastov Air Base in northern Dakastan. The base serves as a logistics hub for US Air Forces Central and hosts US Air Force mobility and reconnaissance aircraft. Bombers also routinely rotate through the base. Special Operations Command Central also maintains a presence at the base. As part of the US-Dakastan security partnership, the US provides air defense of the region surrounding Khanastov Air Base and conducts training with Dakastani forces.

Recent Katunia-Dakastan Tensions

Tensions between Katunia and Dakastan increased significantly following the discovery of oil reserves along the border in late 2013. Katunian President Burkhazov has repeatedly accused Dakastan's government of using slant drilling to "illegally steal Katunia's rightful property" and has ordered Dakastan to halt their oil extraction efforts. International organizations have confirmed that Dakastan is not employing slant drilling and Dakastani President Saken Tasmatov has refused to halt oil exploration. Two or three times each year, Katunian Special Republican Guard units cross into Dakastan to harass oil field workers. In March 2017, a Dakastani oil pipeline was severely damaged in a bomb attack, halting oil flow for three months. A previously unknown group, "The Dakastan People's Army", claimed responsibility for the attack. Dakastani intelligence services believe the group is directed and funded by the Katunian government. Throughout summer and fall 2017, Katunian ground and air forces have exercised in the border region.

Vignette 1: Initiation (Presented to all Participants)

Over the past two months, Katunia has increased the intensity of its military exercises near the contested oil reserves. In September, the Katunian Air Force conducted a week-long close air support exercise. In early October, the Katunian Army and Special Republican Guard participated in large-scale air assault exercises. Katunian President Burkhazov continues to demand that Dakastan halt oil extraction in the contested region. Burkhazov has also announced that any Dakastani or US military aircraft or personnel that approach the contested area are subject to "emergency defensive actions" by Katunian forces. In late October, Katunia deployed short-range air defense systems on the Katunian side of the border. As a result, the U.S. assesses a medium-level of risk to air operations in the Katunia-Dakastan border region.

Dakastan has bolstered its military presence along the border, but has called for a peaceful resolution to the crisis.

In early November, Dakastani and U.S. intelligence services received human intelligence reporting that the Katunian Special Republican Guard was training Katunian personnel to carry out terrorist attacks on Dakastani oil infrastructure and Khanastov Air Base under the banner of the Dakastan People's Army. According to credible sources, training is being conducted at a camp in a mountainous region near the northern Katunia-Dakastan border (see map below).

Task: You are members of a planning team at the 609th Combined Air Operations Center at Al-Udeid Air Base in Qatar, which is responsible for air operations in Central Asia. US Central Command has directed your team to develop a plan to assess whether terrorist training is occurring at the camp. Specifically, your team has been asked to select an aircraft to fly a reconnaissance mission along the border to collect imagery of the site.

Because of resource constraints, you are limited to the two types of US Air Force reconnaissance aircraft based at Khanastov Air Base. You may select from an unarmed remotely piloted MQ-1 Predator Remotely Piloted Aircraft or the unarmed inhabited MC-12 Liberty. Both aircraft have similar intelligence collection capabilities.

Vignette 2: Amplified Aggression – Manned Aircraft Treatment

Air surveillance radars at Khanastov Air Base detect a foreign aircraft on a direct course toward the base. The aircraft is approximately 100 miles west of the base and is traveling at approximately 250 knots (287mph). The aircraft is not responding to radio calls. Air surveillance technicians have determined the aircraft is a Katunian Aerospace Force Su-25 ground attack aircraft that took off from Varyaz Air Base in Katunia. The jet has already made several low altitude passes over Dakastani military outposts near the Katunia-Dakastan border.

Dakastani Air Forces have sounded air raid sirens in the communities surrounding Khanastov Air Base and have asked the U.S. to carry out its obligations to provide integrated air defense of the Khanastov Air Base region.

The bilateral Dakastani-U.S. rules of engagement provide the air defense commander with significant discretion in situations like this. The air and missile defense plan allows the air defense commander to employ U.S. Air Force F-16s, Dakastan Air Force MiG-21 fighters (Dakastan's MiG-21s are on alert and can be scrambled in 10 minutes), Patriot missile batteries deployed near Khanastov Air Base, and/or Dakastan Air Force Anti-Aircraft Artillery deployed near the air base. These assets can be used to intercept intruding aircraft, fire warning shots, or to destroy intruding aircraft.

<u>Task</u>: You are members of the 609th Combined Air Operations Center integrated air and missile defense team who are forward deployed as liaisons at Khanastov Air Base. The 609th Air Operations Center at Al-Udeid Air Base in Qatar is responsible for air operations in Central Asia. Please identify the best course of action to respond to the intruding aircraft.

Su-25 Frogfoot Attack Aircraft

Vignette 2: Amplified Aggression – Drone Treatment

Air surveillance radars at Khanastov Air Base detect a foreign aircraft on a direct course toward the base. The aircraft is approximately 100 miles west of the base and is traveling at approximately 250 knots (287mph). The aircraft is not responding to radio calls. Air surveillance technicians have determined the aircraft is a Katunian Aerospace Force CH-4 remotely piloted attack aircraft (RPA) that took off from Varyaz Air Base in Katunia. The RPA has already made several low altitude passes over Dakastani military outposts near the Katunia-Dakastan border.

Dakastani Air Forces have sounded air raid sirens in the communities surrounding Khanastov Air Base and have asked the U.S. to carry out its obligations to provide integrated air defense of the Khanastov Air Base region.

The bilateral Dakastani-U.S. rules of engagement provide the air defense commander with significant discretion in situations like this. The air and missile defense plan allows the air defense commander to employ U.S. Air Force F-16s, Dakastan Air Force MiG-21 fighters (Dakastan's MiG-21s are on alert and can be scrambled in 10 minutes), Patriot missile batteries deployed near Khanastov Air Base, and/or Dakastan Air Force Anti-Aircraft Artillery deployed near the air base. These assets can be used to intercept intruding aircraft, fire warning shots, or to destroy intruding aircraft.

Task: You are members of the 609th Combined Air Operations Center integrated air and missile defense team who are forward deployed as liaisons at Khanastov Air Base. The 609th Air Operations Center at Al-Udeid Air Base in Qatar is responsible for air operations in Central Asia. Please identify the best course of action to respond to the intruding aircraft.

CH-4 Remotely Piloted Attack Aircraft

Vignette 3: Restrained Retaliation – Manned Aircraft Treatment

A U.S. Air Force MC-12 Liberty Intelligence, Surveillance, and Reconnaissance (ISR) aircraft is flying a mission to monitor the Katunian military buildup along the Katunia-Dakastan border. The MC-12 is operating in Dakastani airspace and is on a track (flight path) that runs parallel to the border. One hour into its mission, the Katunian Aerospace Force downs the MC-12 using a surface-to-air missile fired from an SA-8 SAM site. The four U.S. Air Force crewmembers are killed in the shootdown. Part of the MC-12 wreckage and the remains of the U.S. aircrew fall in Katunian territory. Images of the wreckage and crew's remains are broadcast on Katunian state television.

Shortly after the incident, Katunia's Minister of Defense publicly announces that, "Katunian forces acted valiantly to eliminate a threat to Katunia's national security and sovereignty."

<u>Task</u>: You are members of a planning team at the 609th Combined Air Operations Center. While she awaits political/strategic guidance from higher headquarters, the Commander of U.S. Air Forces Central directs your team to begin developing response options. These plans will enable her to provide feedback/inputs to higher headquarters. Specifically, she wants a recommendation for 1) how to handle the wreckage in Katunian territory and 2) what retaliatory measures – if any – are most appropriate for this situation.

MC-12 Liberty

Vignette 3: Restrained Retaliation – Drone Treatment

A remotely piloted U.S. Air Force MQ-1 Predator Intelligence, Surveillance, and Reconnaissance (ISR) aircraft is flying a mission to monitor the Katunian military buildup along the Katunia-Dakastan border. The MQ-1 is operating in Dakastani airspace and is on a track (flight path) that runs parallel to the border. One hour into its mission, the Katunian Aerospace Force downs the MQ-1 using a surface-to-air missile fired from an SA-8 SAM site. Part of the MQ-1 wreckage falls in Katunian territory. Images of the wreckage are broadcast on Katunian state television.

Shortly after the incident, Katunia's Minister of Defense publicly announces that, "Katunian forces acted valiantly to eliminate a threat to Katunia's national security and sovereignty."

<u>Task</u>: You are members of a planning team at the 609th Combined Air Operations Center. While she awaits political/strategic guidance from higher headquarters, the Commander of U.S. Air Forces Central directs your team to begin developing response options. These plans will enable her to provide feedback/inputs to higher headquarters. Specifically, she wants a recommendation for 1) how to handle the wreckage in Katunian territory and 2) what retaliatory measures – if any – are most appropriate for this situation.

MQ-1 Predator

Appendix C

Wargame Participant Demographics and Treatment Schedule

Rank	
Enlisted	50% (14)
Junior Officer (O-1 to O-3)	28.6% (8)
Field Grade Officer (O-4 to O-6)	21.4% (6)
Service	
U.S. Army	46.4% (13)
U.S. Navy	10.7% (3)
U.S. Marine Corps	3.6% (1)
U.S. Air Force	35.7% (10)
Department of Defense	3.6% (1)
Specialized Experience	
Remotely Piloted Aircraft	35.7% (10)
Air Defense	39.3% (11)

Team	Pre-Game	2nd Round	3rd Round	Post-Game
1	Preparatory Reading	Intrusion Drone	Shootdown Manned	Team Debrief
2		Shootdown Drone	Intrusion Drone	
3		Shootdown Drone	Intrusion Manned	
4		Intrusion Manned	Shootdown Manned	
5		Intrusion Drone	Shootdown Manned	
6		Shootdown Drone	Intrusion Drone	
7		Shootdown Drone	Intrusion Manned	

Appendix D

Main Survey Instrument (Public Sample)

Question 1: (Restrained Retaliation)
Respondents are randomly assigned to receive one of the eight variants of Question 1.

[Manned Aircraft, Pilot Killed Variant, Weak Adversary]
A rival country shot down a manned U.S. Air Force U-2 reconnaissance aircraft using a surface-to-air missile. Leaders of the rival country have publicly claimed that the U-2 was a threat to their national security. The U-2 was on a routine mission and was operating in international airspace at the time of the shoot down. The U-2 was destroyed and the American pilot was killed. The adversary is a militarily weak regional power.

[Manned Aircraft, Pilot Captured Variant, Weak Adversary]
A rival country shot down a manned U.S. Air Force U-2 reconnaissance aircraft using a surface-to-air missile. Leaders of the rival country have publicly claimed that the U-2 was a threat to their national security. The U-2 was on a routine mission and was operating in international airspace at the time of the shoot down. The U-2 was destroyed and adversary forces are currently holding the American pilot as a prisoner. The adversary is a militarily weak regional power.

[Manned Aircraft, Pilot Rescued Variant, Weak Adversary]
A rival country shot down a manned U.S. Air Force U-2 reconnaissance aircraft using a surface-to-air missile. Leaders of the rival country have publicly claimed that the U-2 was a threat to their national security. The U-2 was on a routine mission and was operating in international airspace at the time of the shoot down. The U-2 was destroyed and U.S. forces rescued the American pilot shortly after the shoot down. The adversary is a militarily weak regional power.

[Remotely Piloted Aircraft Variant, Weak Adversary]
A rival country shot down a remotely piloted U.S. Air Force Global Hawk reconnaissance drone using a surface-to-air missile. Leaders of the rival country have publicly claimed that the Global Hawk was a threat to their national security. The Global Hawk drone was on a routine mission and was operating in international airspace at the time of the shoot down. The Global Hawk drone was destroyed and there was no loss of U.S. life because no pilot is onboard the Global Hawk. The adversary is a militarily weak regional power.

[Manned Aircraft, Pilot Killed Variant, Strong Adversary]
A rival country shot down a manned U.S. Air Force U-2 reconnaissance aircraft using a surface-to-air missile. Leaders of the rival country have publicly claimed that the U-2 was a threat to their national security. The U-2 was on a routine mission and was operating in international airspace at the time of the shoot down. The U-2 was destroyed and the American pilot was killed. The adversary is a militarily strong regional power.

[Manned Aircraft, Pilot Captured Variant, Strong Adversary]
A rival country shot down a manned U.S. Air Force U-2 reconnaissance aircraft using a surface-to-air missile. Leaders of the rival country have publicly claimed that the U-2 was a threat to their national security. The U-2 was on a routine mission and was operating in international airspace at the time of the shoot down. The U-2 was destroyed and adversary forces are currently holding the American pilot as a prisoner. The adversary is a militarily strong regional power.

[Manned Aircraft, Pilot Rescued Variant, Strong Adversary]
A rival country shot down a manned U.S. Air Force U-2 reconnaissance aircraft using a surface-to-air missile. Leaders of the rival country have publicly claimed that the U-2 was a threat to their national security. The U-2 was on a routine mission and was operating in international airspace at the time of the shoot down. The U-2 was destroyed and U.S. forces rescued the American pilot shortly after the shoot down. The adversary is a militarily strong regional power.

[Remotely Piloted Aircraft Variant, Strong Adversary]
A rival country shot down a remotely piloted U.S. Air Force Global Hawk reconnaissance drone using a surface-to-air missile. Leaders of the rival country have publicly claimed that the Global Hawk drone was a threat to their national security. The Global Hawk drone was on a routine mission and was operating in international airspace at the time of the shoot down. The Global Hawk drone was destroyed and there was no loss of U.S. life because no pilot is onboard the Global Hawk. The adversary is a militarily strong regional power.

Which of the following U.S. actions would you be most supportive of in response to the shoot down?

a. No action
b. Formal diplomatic protest
c. Economic sanctions against the rival country
d. Show of U.S. military force in vicinity of the rival country
e. Limited airstrike against the missile site that downed the aircraft

Question 2: (Restrained Retaliation: Microfoundations)

Please write a sentence or two telling us why you chose this response.

Question 3: (Treatment Check)

What happened to the pilot in the scenario?

a. Pilot was killed
b. Pilot was captured
c. Pilot was rescued
d. There was no pilot onboard

Question 4 (Initiation)
Respondents are randomly assigned to receive one of the six variants of Question 4.

[Ground Force Variant, Low Likelihood of Success]
Credible intelligence reports indicate that a rival state has started developing chemical weapons. The rival state has previously threatened to use chemical weapons against its neighbors. The United States plans to deploy ground forces to destroy the rival state's chemical weapons production facility. There is a 50-percent chance the adversary will attack the U.S. ground forces during the mission. There is a low likelihood the mission will succeed.

[Manned Aircraft Variant, Low Likelihood of Success]
Credible intelligence reports indicate that a rival state has started developing chemical weapons. The rival state has previously threatened to use chemical weapons against its neighbors. The United States plans to deploy manned bomber aircraft to destroy the rival state's chemical weapons production facility. There is a 50-percent chance the adversary will attack the U.S. bomber aircraft during the mission. There is a low likelihood the mission will succeed.

[Remotely Piloted Aircraft Variant, Low Likelihood of Success]
Credible intelligence reports indicate that a rival state has started developing chemical weapons. The rival state has previously threatened to use chemical weapons against its neighbors. The United States plans to deploy remotely piloted drone aircraft to destroy the rival state's chemical weapons production facility. There is a 50-percent chance the adversary will attack the U.S. drones during the mission. There is a low likelihood the mission will succeed.

[Ground Force Variant, High Likelihood of Success]
Credible intelligence reports indicate that a rival state has started developing chemical weapons. The rival state has previously threatened to use chemical weapons against its neighbors. The United States plans to deploy ground forces to destroy the rival state's chemical weapons production facility. There is a 50-percent chance the adversary will attack the U.S. ground forces during the mission. There is a high likelihood the mission will succeed.

[Manned Aircraft Variant, High Likelihood of Success]
Credible intelligence reports indicate that a rival state has started developing chemical weapons. The rival state has previously threatened to use chemical weapons against its neighbors. The United States plans to deploy manned bomber aircraft to destroy the rival state's chemical weapons production facility. There is a 50-percent chance the adversary will attack the U.S. bomber aircraft during the mission. There is a high likelihood the mission will succeed.

[Remotely Piloted Aircraft Variant, High Likelihood of Success]
Credible intelligence reports indicate that a rival state has started developing chemical weapons. The rival state has previously threatened to use chemical weapons against its neighbors. The United States plans to deploy remotely piloted drone aircraft to destroy the rival state's chemical weapons production facility. There is a 50-percent chance the adversary will attack the U.S. drones during the mission. There is a high likelihood the mission will succeed.

What is your opinion of the government's plan to handle the situation?

a. Strongly Disapprove
b. Disapprove
c. Neither Disapprove nor Approve

d. Approve
e. Strongly Approve

Question 5: (Initiation: Microfoundations)

Please write a sentence or two telling us why you disapproved or approved of the government's plan to handle the situation.

Question 6: (Treatment Check)

What type of U.S forces will carry out the operation?
a. Ground Forces
b. Manned Bomber
c. Remotely Piloted Drone

Question 7: (Deterrence Response)
Respondents are randomly assigned to one of the two variants of Question 7.

[Manned Aircraft Variant]
In response to a routine U.S. military patrol through a contested region, a rival state demands the immediate removal of U.S. forces. The rival also flies several threatening missions near the U.S. patrol using manned attack aircraft. The U.S. government is considering removing the patrol.

[Remotely Piloted Aircraft Variant]
In response to a routine U.S. military patrol through a contested region, a rival state demands the immediate removal of U.S. forces. The rival also flies several threatening missions near the U.S. patrol using remotely piloted attack drone aircraft. The U.S. government is considering removing the patrol.

How likely are you to support the withdrawal of U.S. forces from the region?
a. Strongly Disapprove
b. Disapprove
c. Neither Disapprove nor Approve
d. Approve
e. Strongly Approve

Question 8: (Treatment Check)

What type of forces carried out the operation?
a. Manned Attack Aircraft
b. Remotely Piloted Attack Drone

9. Please tell us how much you agree with this statement:

"The United States should play an active role in solving conflicts around the world."

a. Strongly Disagree
b. Disagree
c. Neither Disagree nor Agree
d. Agree
e. Strongly Agree

10. What is your gender?

a. Female
b. Male

11. What is your age?

Free Response

12. What is your race? (Select all that apply)

a. White
b. Black or African American
c. American Indian or Alaska Native
e. Hispanic
f. Native Hawaiian or Other Pacific Islander
g. Asian
h. Mixed
i. Other (Fill In)

13. What is the highest level of education you have completed?

a. Less than high school (Grades 1-8 or no formal schooling)
b. High school incomplete (Some high school, but no diploma)
c. High school graduate (or GED certificate)
d. Some college, no degree
e. Associate degree
f. Bachelor's degree (e.g., BS, BA, AB)
g. Some postgraduate or professional schooling, no postgraduate degree
h. Postgraduate or professional degree (e.g., MA, MS, JD, PhD, MD

14. In general, would you describe your political views as:

a. Very liberal
b. Liberal
c. Moderate
d. Conservative
e. Very Conservative

15. Are you currently serving, or have you ever served, in the United States military?

a. No
b. Yes

16. What is your annual household income?

a. Less than $10,000
b. $10,000-$24,999
c. $25,000-$49,999
d. $50,000-$74,999
e. $75,000 or more

Appendix E

Follow Up Survey Instrument (Public Sample)

Question 1 (Amplified Aggression)
Respondents are randomly assigned to receive one of the two variants of Question 3.

[Manned Aircraft Variant]
Air surveillance radars have detected an adversary's manned Su-25 attack aircraft approaching a coalition base in the Middle East. Over the past week, adversary aircraft have approached the base on five separate occasions. Today, the Su-25 has approached closer to the coalition base than previous flights. The aircraft has not responded to coalition radio calls.

[Remotely Piloted Aircraft Variant]
Air surveillance radars have detected an adversary's remotely piloted Shahed 129 attack aircraft (RPA) approaching a coalition base in the Middle East. Over the past week, adversary aircraft have approached the base on five separate occasions. Today, the Shahed 129 RPA has approached closer to the coalition base than previous flights. The aircraft has not responded to coalition radio calls.

What do you believe is the *highest* level of U.S. response appropriate in this situation?

a. No action
b. Intercept with fighter jets
c. Warning shots
d. Down the aircraft (using fighter jets or surface-to-air missiles)
e. Other (Please specify)

Question 2 (Amplified Aggression: Microfoundations)

Please write a sentence or two telling us why you chose this response.

Question 3 (Amplified Aggression: Treatment Check)

What type of military aircraft did the rival employ?

a. Manned Attack Aircraft
b. Remotely Piloted Attack Drone

Question 4 (Deterrence Response)
Respondents are randomly assigned to one of the two variants of Question 6.

[Manned Aircraft Variant]
In response to a routine U.S. naval patrol through contested waters, a rival state demands the immediate removal of U.S. naval forces. The rival also flies several threatening missions near the U.S. ships using manned attack aircraft. The U.S. government is considering removing the ships.

[Remotely Piloted Aircraft Variant]
In response to a routine U.S. naval patrol through contested waters, a rival state demands the immediate removal of U.S. naval forces. The rival also flies several threatening missions near the U.S. ships using remotely piloted attack aircraft (RPAs). The U.S. government is considering removing the ships.

How likely are you to support the withdrawal of U.S. forces from the region?

a. Strongly Disapprove
b. Disapprove
c. Neither Disapprove nor Approve
d. Approve
e. Strongly Approve

Question 5 (Deterrence Response: Treatment Check)

What type of forces carried out the operation?

a. Manned Attack Aircraft
b. Remotely Piloted Attack Drone

Question 6 (Initiation)
Respondents are randomly assigned to receive one of the three variants of Question 11.

[Ground Force Variant, Moderate Likelihood of Success]
Credible intelligence reports indicate that a rival state has started developing chemical weapons. The rival state has previously threatened to use chemical weapons against its neighbors. The United States plans to deploy special operations forces to destroy the rival state's chemical weapons production facility. There is a 50-percent chance the adversary will attack the U.S. special operations forces during the mission. There is a moderate likelihood the mission will succeed.

[Manned Aircraft Variant, Moderate Likelihood of Success]
Credible intelligence reports indicate that a rival state has started developing chemical weapons. The rival state has previously threatened to use chemical weapons against its neighbors. The United States plans to deploy manned bomber aircraft to destroy the rival state's chemical weapons production facility. There is a 50-percent chance the adversary will attack the U.S. bomber aircraft during the mission. There is a moderate likelihood the mission will succeed.

[Remotely Piloted Aircraft Variant, Moderate Likelihood of Success]
Credible intelligence reports indicate that a rival state has started developing chemical weapons. The rival state has previously threatened to use chemical weapons against its neighbors. The United States plans to deploy remotely piloted drone aircraft to destroy the rival state's chemical weapons production facility. There is a 50-percent chance the adversary will attack the U.S. drones during the mission. There is a moderate likelihood the mission will succeed.

Do you think the United States should launch this operation?

a. Launch Operation
b. Do Not Launch Operation

<u>Question 7</u> (Initiation: Microfoundations)

Please write a sentence or two telling us why you disapproved or approved of the plan to handle the situation.

8. Please tell us how much you agree with this statement:

"The United States should play an active role in solving conflicts around the world."

a. Strongly Disagree
b. Disagree
c. Neither Disagree nor Agree
d. Agree
e. Strongly Agree

9. What is your gender?

a. Female
b. Male

10. What is your age?

Free Response

11. What is your race? (Select all that apply)

a. White
b. Black or African American
c. American Indian or Alaska Native
e. Hispanic
f. Native Hawaiian or Other Pacific Islander
g. Asian
h. Mixed
i. Other (Fill In)

12. What is the highest level of education you have completed?

a. Less than high school (Grades 1-8 or no formal schooling)
b. High school incomplete (Some high school, but no diploma)
c. High school graduate (or GED certificate)
d. Some college, no degree
e. Associate degree
f. Bachelor's degree (e.g., BS, BA, AB)
g. Some postgraduate or professional schooling, no postgraduate degree
h. Postgraduate or professional degree (e.g., MA, MS, JD, PhD, MD

13. In general, would you describe your political views as:

a. Very liberal
b. Liberal
c. Moderate

d. Conservative
e. Very Conservative

14. Are you currently serving, or have you ever served, in the United States military?

a. No
b. Yes

15. What is your annual household income?

a. Less than $10,000
b. $10,000-$24,999
c. $25,000-$49,999
d. $50,000-$74,999
e. $75,000 or more

Appendix F

Main Survey Instrument (Military Sample)

Question 1 (Deterrence)

In the year 2025 a rogue nation test fires its latest nuclear-capable intercontinental ballistic missile. The test missile lands in the Indian Ocean approximately 300 miles off the coast of Mumbai. In response, the Pentagon orders a show of force mission through international airspace near the rogue nation to demonstrate U.S. resolve.

What type of aircraft would you task for this mission?

a. New remotely piloted bomber with capabilities similar to B-2
b. Manned B-2 bomber

Question 2 (Deterrence: Microfoundations)

Please write a sentence or two telling us why you chose this aircraft.

Question 3 (Amplified Aggression)
Respondents are randomly assigned to receive one of the two variants of Question 3.

[Manned Aircraft Variant]
Air surveillance radars have detected an adversary's manned Su-25 attack aircraft approaching a coalition base in the Middle East. Over the past week, adversary aircraft have approached the base on five separate occasions. Today, the Su-25 has approached closer to the coalition base than previous flights. The aircraft has not responded to coalition radio calls.

[Remotely Piloted Aircraft Variant]
Air surveillance radars have detected an adversary's remotely piloted Shahed 129 attack aircraft (RPA) approaching a coalition base in the Middle East. Over the past week, adversary aircraft have approached the base on five separate occasions. Today, the Shahed 129 RPA has approached closer to the coalition base than previous flights. The aircraft has not responded to coalition radio calls.

What do you believe is the *highest* level of U.S. response appropriate in this situation?

f. No action
g. Intercept with fighter jets
h. Warning shots
i. Down the aircraft (using fighter jets or surface-to-air missiles)
j. Other (Please specify)

Question 4 (Amplified Aggression: Microfoundations)

Please write a sentence or two telling us why you chose this response.

<u>Question 5</u> (Amplified Aggression: Treatment Check)

What type of military aircraft did the rival employ?

c. Manned Attack Aircraft
d. Remotely Piloted Attack UAV

<u>Question 6</u> (Deterrence Response)
Respondents are randomly assigned to one of the two variants of Question 6.

<u>[Manned Aircraft Variant]</u>
In response to a routine U.S. naval patrol through contested waters, a rival state demands the immediate removal of U.S. naval forces. The rival also flies several threatening missions near the U.S. ships using manned attack aircraft. The U.S. government is considering removing the ships.

<u>[Remotely Piloted Aircraft Variant]</u>
In response to a routine U.S. naval patrol through contested waters, a rival state demands the immediate removal of U.S. naval forces. The rival also flies several threatening missions near the U.S. ships using remotely piloted attack aircraft (RPAs). The U.S. government is considering removing the ships.

How likely are you to support the withdrawal of U.S. forces from the region?

a. Strongly Disapprove
b. Disapprove
c. Neither Disapprove nor Approve
d. Approve
e. Strongly Approve

<u>Question 7</u> (Deterrence Response: Treatment Check)

What type of forces carried out the operation?

a. Manned Attack Aircraft
b. Remotely Piloted Attack Drone

<u>Question 8</u> (Restrained Retaliation)
Respondents are randomly assigned to receive one of the four variants of Question 8.

<u>[Manned Aircraft, Pilot Killed Variant, Strong Adversary]</u>
A rival country shot down a manned U.S. Air Force U-2 reconnaissance aircraft using a surface-to-air missile. Leaders of the rival country have publicly claimed that the U-2 was a threat to their national security and that their air defense forces took appropriate defensive actions. The U-2 was on a routine mission and was operating in international airspace at the time of the shoot down. The U-2 was destroyed and the American pilot was killed. The adversary is a militarily strong regional power.

<u>[Manned Aircraft, Pilot Captured Variant, Strong Adversary]</u>

A rival country shot down a manned U.S. Air Force U-2 reconnaissance aircraft using a surface-to-air missile. Leaders of the rival country have publicly claimed that the U-2 was a threat to their national security and that their air defense forces took appropriate defensive actions. The U-2 was on a routine mission and was operating in international airspace at the time of the shoot down. The U-2 was destroyed and adversary forces are currently holding the American pilot as a prisoner. The adversary is a militarily strong regional power.

<u>[Manned Aircraft, Pilot Rescued Variant, Strong Adversary]</u>
A rival country shot down a manned U.S. Air Force U-2 reconnaissance aircraft using a surface-to-air missile. Leaders of the rival country have publicly claimed that the U-2 was a threat to their national security and that their air defense forces took appropriate defensive actions. The U-2 was on a routine mission and was operating in international airspace at the time of the shoot down. The U-2 was destroyed and U.S. forces rescued the American pilot shortly after the shoot down. The adversary is a militarily strong regional power.

<u>[Remotely Piloted Aircraft Variant, Strong Adversary]</u>
A rival country shot down a remotely piloted U.S. Air Force Global Hawk reconnaissance aircraft (RPA) using a surface-to-air missile. Leaders of the rival country have publicly claimed that the Global Hawk was a threat to their national security and that their air defense forces took appropriate defensive actions. The Global Hawk drone was on a routine mission and was operating in international airspace at the time of the shoot down. The Global Hawk was destroyed and there was no loss of U.S. life because no pilot is onboard the Global Hawk. The adversary is a militarily strong regional power.

Which of the following U.S. actions would you be most supportive of in response to the shoot down?

f. No action
g. Formal diplomatic protest
h. Economic sanctions against the rival country
i. Show of U.S. military force in vicinity of the rival country
j. Limited airstrike against the missile site that downed the aircraft

<u>Question 9</u> (Restrained Retaliation: Microfoundations)

Please write a sentence or two telling us why you chose this response.

<u>Question 10</u> (Restrained Retaliation: Treatment Check)

What happened to the pilot in the scenario?

a. Pilot was killed
b. Pilot was captured
c. Pilot was rescued
d. There was no pilot onboard

<u>Question 11</u> (Initiation)
Respondents are randomly assigned to receive one of the three variants of Question 11.

<u>[Ground Force Variant, Moderate Likelihood of Success]</u>
Credible intelligence reports indicate that a rival state has started developing chemical weapons. The rival state has previously threatened to use chemical weapons against its neighbors. The United States plans to deploy special operations forces to destroy the rival state's chemical weapons production facility. There is a 50-percent chance the adversary will attack the U.S. special operations forces during the mission. There is a moderate likelihood the mission will succeed.

<u>[Manned Aircraft Variant, Moderate Likelihood of Success]</u>
Credible intelligence reports indicate that a rival state has started developing chemical weapons. The rival state has previously threatened to use chemical weapons against its neighbors. The United States plans to deploy manned bomber aircraft to destroy the rival state's chemical weapons production facility. There is a 50-percent chance the adversary will attack the U.S. bomber aircraft during the mission. There is a moderate likelihood the mission will succeed.

<u>[Remotely Piloted Aircraft Variant, Moderate Likelihood of Success]</u>
Credible intelligence reports indicate that a rival state has started developing chemical weapons. The rival state has previously threatened to use chemical weapons against its neighbors. The United States plans to deploy remotely piloted drone aircraft to destroy the rival state's chemical weapons production facility. There is a 50-percent chance the adversary will attack the U.S. drones during the mission. There is a moderate likelihood the mission will succeed.

You are assigned as a planner in the operations division (J3) of this geographic combatant command. The J3 asks whether you would launch this operation.

a. Launch Operation
b. Do Not Launch Operation

<u>Question 12</u> (Initiation: Microfoundations)

Please write a sentence or two telling us why you disapproved or approved of the plan to handle the situation.

<u>Question 13</u> (Initiation: Treatment Check)

What type of U.S forces will carry out the operation?

a. Ground Forces
b. Manned Bomber
c. Remotely Piloted Drone

<u>Question 14</u> (Service)

What is your branch of service?

a. US Army
b. US Navy

c. US Marine Corps
d. US Air Force
e. US Coast Guard
f. Other (free response)

Question 15 (Rank)

What is the highest pay-grade you have attained?

a. O-1
b. O-2
c. O-3
d. O-4
e. O-5
f. O-6
g. O-7 and above

Question 16 (Gender)

What is your gender?

a. Female
b. Male

Question 17 (Aviator)

Are you a rated officer (pilot, CSO, NFO, ABM) or involved in air defense operations?

a. No
b. Yes

Question 18 (RPA)

Have you ever been involved with remotely piloted aircraft (RPA) operations?

a. No
b. Yes

Appendix G

Respondent Demographics

Main Experiment, Public Sample (July 2017)

	Main Experiment Sample	National Sample[1]
Gender		
Male	45.6%	49.2%
Female	54.4%	50.8%
Race		
White alone	78.6%	73.0%
Black alone	6.9%	12.6%
American Indian or Alaska Native, alone	0.25%	0.8%
Native Hawaiian and Other Pacific Islander, alone	0.12%	0.2%
Asian	6.9%	5.4%
Hispanic	4.9%	17.6%
Mixed/Other	2.3%	
Age		
Median Age (Years)	33	37.8
Education		
High School or Higher	99.4%	87.3%
Bachelor's Degree or Higher	57.0%	30.9%
Annual Household Income		
Less than $10,000	5.8%	6.7%
$10,000-24,999	15.2%	14.9%
$25,000-49,999	30.3%	22.5%
$50,000-74,999	23.4%	17.7%
$75,000+	25.2%	37.5%
Military Veteran		
Yes	10.0%	7.7%
No	90.0%	92.3%

1. Data from 2017 American Community Survey 1-Year Estimates

Follow-up Experiment, Public Sample (January 2019)

	Main Experiment Sample	National Sample[1]
Gender		
Male	54.45%	49.2%
Female	45.54%	50.8%
Race		
White alone	75.58%	73.0%
Black alone	10.6%	12.6%
American Indian or Alaska Native, alone	1.3%	0.8%
Native Hawaiian and Other Pacific Islander, alone	0.33%	0.2%
Asian	5.28%	5.4%
Hispanic	5.28%	17.6%
Mixed/Other	1.65%	
Age		
Median Age (Years)	34	37.8
Education		
High School or Higher	98.02%	87.3%
Bachelor's Degree or Higher	54.12%	30.9%
Annual Household Income		
Less than $10,000	3.96%	6.7%
$10,000-24,999	14.52%	14.9%
$25,000-49,999	29.37%	22.5%
$50,000-74,999	27.06%	17.7%
$75,000+	25.08%	37.5%
Military Veteran		
Yes	16.5%	7.7%
No	83.5%	92.3%

1. Data from 2017 American Community Survey 1-Year Estimates

Main Experiment, Military Sample (October 2018)

	Experiment Sample
Gender	
Male	80.5%
Female	18.2%
No Response	1.3%
Service	
Army	2.6%
Navy	1.3%
Marine Corps	1.3%
Air Force	92.2%
Other	2.6%
Rank	
Major/Lieutenant Commander	67.5%
Lieutenant Colonel/Commander	19.5%
Colonel/Captain	7.8%
General/Flag Officer	1.3%
Other (i.e. Civil Servants)	3.9%
Air Defense Experience/ Aviator	
Yes	45.45%
No	54.54%
Remotely Piloted Aircraft Experience	
Yes	37.66%
No	62.34%

Appendix H: Balance Tables and Regression Analysis

1 Survey Experiment: Response to Intrusion (Deliberated Defense)

1.1 Military Sample

Balance Table

	Manned	RPA
Service	3.949 (0.051)	4 (0.182)
Rank	4.359 (0.13)	4.763 (0.176)
Gender	1.846 (0.059)	1.974 (0.199)
Aviator or Air Defense Experience	1.462 (0.081)	1.658 (0.212)
RPA Experience	1.359 (0.078)	1.579 (0.213)

Randomization Check (Assignment to Treatment), Military Sample

	Dependent variable:
	Intruder Type (1= Manned, 2 = RPA
Service	−0.038
	(0.093)
Rank	0.112
	(0.070)
Gender	−0.072
	(0.125)
Aviator or Air Defense Experience	0.029
	(0.117)
RPA Experience	0.052
	(0.105)
Constant	1.151***
	(0.401)
Observations	77
R^2	0.051
Adjusted R^2	-0.016
Residual Std. Error	0.507 (df = 71)
F Statistic	0.764 (df = 5; 71)
Note:	*p<0.1; **p<0.05; ***p<0.01

Mean Response Level to Intruder, Military Sample

	Dependent variable:	
	Intruder Response	
	(1)	(2)
RPA Intruder (Intercept)	3.205***	4.032***
	(0.150)	(0.772)
Manned Intruder	−0.872***	−0.900***
	(0.213)	(0.222)
Service		−0.201
		(0.174)
Rank		−0.100
		(0.133)
Gender		0.075
		(0.234)
Aviator or Air Defense Experience		0.078
		(0.219)
RPA Experience		0.133
		(0.196)
Observations	78	77
R^2	0.181	0.226
Adjusted R^2	0.170	0.160
Residual Std. Error	0.939 (df = 76)	0.948 (df = 70)
F Statistic	16.805*** (df = 1; 76)	3.406*** (df = 6; 70)
Note:		*p<0.1; **p<0.05; ***p<0.01

1.2 Civilian Sample

Balance Table

	Manned	RPA
Interventionism	3.212 (0.093)	3.059 (0.092)
Gender	1.51 (0.041)	1.579 (0.04)
Age	36.887 (0.978)	36.796 (0.98)
Race	1.642 (0.123)	1.724 (0.127)
Education	5.464 (0.123)	5.368 (0.117)
Political Ideology	2.636 (0.085)	2.75 (0.085)
Veteran	1.126 (0.027)	1.204 (0.033)
Income	3.662 (0.094)	3.434 (0.089)

Randomization Check (Assignment to Treatment), Civilian Sample

	Dependent variable:
	Intruder Type (1= Manned, 2 = RPA)
Interventionism	−0.032
	(0.026)
Gender	0.062
	(0.059)
Age	0.001
	(0.002)
Race	0.006
	(0.019)
Education	0.002
	(0.021)
Political Ideology	0.025
	(0.028)
Veteran	0.142*
	(0.078)
Income	−0.045*
	(0.027)
Constant	1.389***
	(0.215)
Observations	303
R^2	0.034
Adjusted R^2	0.007
Residual Std. Error	0.499 (df = 294)
F Statistic	1.275 (df = 8; 294)
Note:	*p<0.1; **p<0.05; ***p<0.01

Mean Response Level to Intruder, Civilian Sample (OLS)

	Dependent variable:	
	Intruder Response Level	
	(1)	(2)
RPA Intruder (Intercept)	2.980***	2.578***
	(0.076)	(0.405)
Manned Intruder	−0.464***	−0.482***
	(0.108)	(0.108)
Interventionism		0.142***
		(0.048)
Gender		−0.054
		(0.109)
Age		0.005
		(0.005)
Race		0.014
		(0.035)
Education		0.015
		(0.040)
Political Ideology		0.062
		(0.053)
Veteran		−0.165
		(0.146)
Income		−0.060
		(0.050)
Observations	303	303
R^2	0.058	0.102
Adjusted R^2	0.055	0.075
Residual Std. Error	0.938 (df = 301)	0.928 (df = 293)
F Statistic	18.525*** (df = 1; 301)	3.710*** (df = 9; 293)
Note:		*p<0.1; **p<0.05; ***p<0.01

2 Survey Experiment: Response to Shoot down (Restrained Retaliation)

2.1 Military Sample

Balance Table

	Manned, Pilot Killed	Manned, Pilot Captured	Manned, Pilot Rescued	RPA
Service	4.25 (0.244)	3.895 (0.105)	3.789 (0.164)	3.947 (0.195)
Rank	4.85 (0.319)	4.316 (0.134)	4.421 (0.159)	4.632 (0.205)
Gender	2.15 (0.363)	1.842 (0.086)	1.895 (0.072)	1.737 (0.104)
AviatiorAirDefense	1.85 (0.383)	1.579 (0.116)	1.368 (0.114)	1.421 (0.116)
RPAExpertise	1.75 (0.387)	1.263 (0.104)	1.421 (0.116)	1.421 (0.116)

Randomization Check (Assignment to Treatment), Military Sample

	Dependent variable:
	Type of Aircraft Shot Down
Service	−0.080
	(0.210)
Rank	0.027
	(0.158)
Gender	−0.108
	(0.282)
Aviator or Air Defense Experience	−0.206
	(0.266)
RPA Experience	0.154
	(0.237)
Constant	2.979***
	(0.907)
Observations	77
R^2	0.038
Adjusted R^2	-0.030
Residual Std. Error	1.148 (df = 71)
F Statistic	0.555 (df = 5; 71)
Note:	*p<0.1; **p<0.05; ***p<0.01

Mean Response to Shootdown (OLS), Military Sample

	Dependent variable:	
	SD_Response	
	(1)	(2)
RPA (Intercept)	3.105***	2.685***
	(0.263)	(0.980)
Manned, Pilot Killed	1.133***	1.038***
	(0.363)	(0.376)
Manned, Pilot Captured	0.632*	0.608
	(0.372)	(0.387)
Manned, Pilot Rescued	0.579	0.508
	(0.372)	(0.382)
Service		−0.150
		(0.214)
Rank		0.147
		(0.162)
Gender		0.457
		(0.288)
Aviator or Air Defense Experience		−0.117
		(0.273)
RPA Experience		−0.208
		(0.243)
Observations	78	77
R^2	0.116	0.162
Adjusted R^2	0.081	0.064
Residual Std. Error	1.147 (df = 74)	1.156 (df = 68)
F Statistic	3.249** (df = 3; 74)	1.646 (df = 8; 68)
Note:		*p<0.1; **p<0.05; ***p<0.01

2.2 Public Sample

Balance Table

	Pilot Killed, Weak Rival	Pilot Killed, Strong Rival	Pilot Captured, Weak Rival	Pilot Captured, Strong Rival	Pilot Rescued, Weak Rival	Pilot Rescued, Strong Rival	Drone, Weak Rival	Drone, Strong Rival
Interventionism	3.13 (0.072)	3.158 (0.079)	3.099 (0.075)	3.16 (0.071)	3.114 (0.07)	3.059 (0.074)	2.97 (0.079)	3.039 (0.075)
Gender	1.53 (0.035)	1.546 (0.036)	1.547 (0.035)	1.56 (0.035)	1.517 (0.035)	1.626 (0.034)	1.522 (0.035)	1.502 (0.035)
Age	35.915 (0.772)	35.832 (0.85)	36.325 (0.788)	35.535 (0.746)	34.488 (0.786)	35.355 (0.84)	36.842 (0.86)	34.877 (0.772)
Race	1.795 (0.12)	1.821 (0.13)	1.724 (0.111)	1.635 (0.11)	1.637 (0.107)	1.788 (0.122)	1.67 (0.107)	1.645 (0.108)
Education	5.48 (0.106)	5.49 (0.105)	5.478 (0.101)	5.505 (0.104)	5.343 (0.11)	5.379 (0.104)	5.424 (0.104)	5.527 (0.106)
Political Ideology	2.54 (0.077)	2.699 (0.078)	2.601 (0.076)	2.715 (0.078)	2.657 (0.075)	2.749 (0.077)	2.685 (0.077)	2.67 (0.077)
Veteran	1.11 (0.022)	1.102 (0.022)	1.089 (0.02)	1.135 (0.024)	1.09 (0.02)	1.103 (0.021)	1.094 (0.02)	1.079 (0.019)
Income	3.42 (0.088)	3.383 (0.091)	3.517 (0.081)	3.5 (0.088)	3.438 (0.075)	3.502 (0.085)	3.502 (0.085)	3.488 (0.079)

Randomization Check (Assignment to Treatment), Public Sample

	Dependent variable:
	treatment_retaliate
Age	−0.003
	(0.005)
Gender	−0.022
	(0.116)
Education	−0.019
	(0.041)
Income	0.053
	(0.051)
Ideology	0.062
	(0.053)
Veteran	−0.176
	(0.192)
Race	−0.039
	(0.036)
Interventionist	−0.099*
	(0.055)
Constant	4.995***
	(0.440)
Observations	1,609
R^2	0.005
Adjusted R^2	0.0003
Residual Std. Error	2.291 (df = 1600)
F Statistic	1.050 (df = 8; 1600)
Note:	*p<0.1; **p<0.05; ***p<0.01

Mean Response to Shootdown (OLS), Public Sample

	Dependent variable:	
	Shootdown_Response	
	(1)	(2)
Drone, Strong Rival (Constant)	2.498***	1.053***
	(0.079)	(0.203)
Drone, Weak Rival	0.138	0.145
	(0.111)	(0.108)
Pilot Killed, Weak Rival	1.002***	1.006***
	(0.112)	(0.109)
Pilot Killed, Strong Rival	0.982***	0.953***
	(0.112)	(0.109)
Pilot Captured, Weak Rival	1.020***	1.017***
	(0.111)	(0.108)
Pilot Captured, Strong Rival	0.862***	0.824***
	(0.112)	(0.109)
Pilot Rescued, Weak Rival	0.771***	0.766***
	(0.112)	(0.109)
Pilot Rescued, Strong Rival	0.680***	0.649***
	(0.111)	(0.109)
Gender		0.144***
		(0.055)
Education		0.038**
		(0.018)
Ideology		0.172***
		(0.025)
Interventionist		0.143***
		(0.026)
Veteran		0.116
		(0.091)
Observations	1,609	1,609
R^2	0.100	0.151
Adjusted R^2	0.096	0.144
Residual Std. Error	1.123 (df = 1601)	1.092 (df = 1596)
F Statistic	25.375*** (df = 7; 1601)	23.597*** (df = 12; 1596)
Note:		*p<0.1; **p<0.05; ***p<0.01

3 Survey Experiment: Initial Deployment (Increased Initiation)

3.1 Experiment 1: Military Sample

Balance Table

	Ground forces	Manned bomber	RPA
Service	4.208 (0.204)	3.808 (0.136)	3.926 (0.14)
Rank	4.708 (0.267)	4.385 (0.137)	4.593 (0.162)
Gender	2.042 (0.309)	1.885 (0.064)	1.815 (0.076)
Aviator or Air Defense Experience	1.625 (0.327)	1.5 (0.1)	1.556 (0.097)
RPA Experience	1.583 (0.328)	1.462 (0.1)	1.37 (0.095)

Randomization Check (Assignment to Treatment), Military Sample

	Dependent variable:
	Onset_Type
Service	-0.175
	(0.152)
Rank	-0.004
	(0.114)
Gender	-0.159
	(0.204)
Aviator or Air Defense Experience	0.241
	(0.192)
RPA Experience	-0.063
	(0.171)
Constant	2.775^{***}
	(0.655)
Observations	77
R^2	0.041
Adjusted R^2	-0.027
Residual Std. Error	0.829 (df = 71)
F Statistic	0.602 (df = 5; 71)
Note:	*p<0.1; **p<0.05; ***p<0.01

Support for Onset by Treatment (Onset Type), Military Sample

	Dependent variable:	
	Onset Approval (Yes = 1, No = 2)	
	(1)	(2)
Ground Forces (Intercept)	1.920***	2.337***
	(0.085)	(0.371)
Manned Bomber	−0.228*	−0.268**
	(0.120)	(0.125)
RPA	−0.550***	−0.598***
	(0.119)	(0.122)
Service		−0.131
		(0.080)
Rank		0.045
		(0.059)
Gender		−0.056
		(0.105)
Aviator or Air Defense Experience		0.079
		(0.100)
RPA Experience		−0.062
		(0.088)
Observations	78	77
R^2	0.225	0.284
Adjusted R^2	0.205	0.211
Residual Std. Error	0.427 (df = 75)	0.427 (df = 69)
F Statistic	10.912*** (df = 2; 75)	3.906*** (df = 7; 69)
Note:		*p<0.1; **p<0.05; ***p<0.01

3.2 Experiment 1: Civilian Sample

Balance Table

	Ground forces	Manned bomber	RPA
Interventionism	3.373 (0.106)	3.125 (0.113)	2.914 (0.116)
Gender	1.559 (0.049)	1.594 (0.05)	1.486 (0.049)
Age	38.667 (1.334)	35.906 (1.056)	35.924 (1.16)
Race	1.667 (0.148)	1.719 (0.172)	1.667 (0.14)
Education	5.647 (0.149)	5.26 (0.138)	5.333 (0.15)
Political Ideology	2.667 (0.106)	2.792 (0.101)	2.629 (0.105)
Veteran	1.206 (0.04)	1.156 (0.037)	1.133 (0.033)
Income	3.618 (0.115)	3.573 (0.114)	3.457 (0.109)

Randomization Check (Assignment to Treatment), Civilian Sample

	Dependent variable:
	Onset_Type_Civ
Interventionism	-0.111^{***}
	(0.042)
Gender	-0.115
	(0.096)
Age	-0.007
	(0.004)
Race	0.0004
	(0.031)
Education	-0.026
	(0.035)
Political Ideology	-0.004
	(0.047)
Veteran	-0.144
	(0.128)
Income	-0.020
	(0.044)
Constant	3.165^{***}
	(0.352)
Observations	303
R^2	0.049
Adjusted R^2	0.024
Residual Std. Error	0.818 (df = 294)
F Statistic	1.914^{*} (df = 8; 294)
Note:	$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Support for Onset by Treatment (Onset Type), Civilian Sample

	Dependent variable:	
	Onset Approval (Yes = 1, No = 2)	
	(1)	(2)
Ground Forces (Intercept)	1.392***	1.868***
	(0.049)	(0.220)
Manned Bomber	0.087	0.070
	(0.071)	(0.069)
RPA	0.036	−0.009
	(0.069)	(0.068)
Interventionism		−0.087***
		(0.025)
Gender		0.038
		(0.056)
Age		0.002
		(0.002)
Race		0.012
		(0.018)
Education		0.010
		(0.020)
Political Ideology		−0.063**
		(0.027)
Veteran		−0.220***
		(0.075)
Income		0.010
		(0.026)
Observations	303	303
R^2	0.005	0.101
Adjusted R^2	-0.002	0.071
Residual Std. Error	0.497 (df = 300)	0.478 (df = 292)
F Statistic	0.764 (df = 2; 300)	3.297*** (df = 10; 292)
Note:		*p<0.1; **p<0.05; ***p<0.01

Effect of Treatment (Onset Type) on Interventionist Attitude, Civilian Sample

	Dependent variable:
	Interventionism_Civ
Ground Forces (Intercept)	3.373***
	(0.111)
Manned	−0.248
	(0.160)
RPA	−0.458***
	(0.156)
Observations	303
R^2	0.028
Adjusted R^2	0.021
Residual Std. Error	1.123 (df = 300)
F Statistic	4.311** (df = 2; 300)
Note:	*p<0.1; **p<0.05; ***p<0.01

3.3 Experiment 2: Civilian Sample

Balance Check: Assignment to Onset Treatment Conditions (Experiment 2, Civilian Sample)

	Dependent variable:					
	Ground_.LowLike	Ground_HighLike	Manned_LowLike	Manned_HighLike	RPA_LowLike	RPA_HighLike
	(1)	(2)	(3)	(4)	(5)	(6)
Age	0.0005	−0.0004	−0.0004	0.001	−0.0005	0.0003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Gender	0.026	−0.014	0.007	0.003	0.010	−0.032*
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Education	−0.0002	0.001	0.006	−0.016**	0.003	0.006
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Income	−0.006	−0.013	−0.007	0.005	0.019**	0.003
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Ideology	−0.005	−0.010	0.010	0.001	0.003	0.001
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Veteran	0.025	−0.014	0.018	−0.042	0.038	−0.026
	(0.032)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Race	−0.006	0.008	−0.007	0.003	0.001	0.0003
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Constant	0.131*	0.272***	0.122*	0.252***	0.034	0.188***
	(0.069)	(0.069)	(0.068)	(0.068)	(0.069)	(0.069)
Observations	1,609	1,609	1,609	1,609	1,609	1,609
R^2	0.003	0.005	0.003	0.005	0.006	0.003
Adjusted R^2	-0.001	0.001	-0.002	0.001	0.001	-0.001
Residual Std. Error (df = 1601)	0.376	0.373	0.369	0.371	0.373	0.375
F Statistic (df = 7; 1601)	0.705	1.185	0.645	1.207	1.293	0.764
Note:						*p<0.1; **p<0.05; ***p<0.01

Initiation Models (OLS with Covariates and Select Interaction Effects, Experiment 2)

	Dependent variable:			
	Approval_Onset			
	(1)	(2)	(3)	(4)
Ground LowLike (Intercept)	2.241***	0.838***	1.959***	1.704***
	(0.066)	(0.196)	(0.171)	(0.194)
Ground_HighLike	1.046***	1.019***	1.079***	0.267
	(0.094)	(0.089)	(0.241)	(0.281)
Manned_LowLike	0.204**	0.170*	−0.007	−0.038
	(0.095)	(0.090)	(0.249)	(0.277)
Manned_HighLike	1.285***	1.278***	1.208***	0.750***
	(0.094)	(0.089)	(0.245)	(0.269)
RPA_LowLike	0.633***	0.622***	0.438*	0.242
	(0.094)	(0.089)	(0.245)	(0.274)
RPA_HighLike	1.671***	1.643***	1.648***	0.894***
	(0.094)	(0.089)	(0.250)	(0.284)
Gender		−0.012		
		(0.052)		
Education		−0.005		
		(0.018)		
Ideology		0.123***	0.107*	
		(0.024)	(0.060)	
Interventionist		0.311***		0.176***
		(0.025)		(0.060)
Veteran		0.063		
		(0.086)		
Income		0.027		
		(0.023)		
Race		0.009		
		(0.016)		
Ground_HighLike:Ideology			−0.010	
			(0.085)	
Manned_LowLike:Ideology			0.073	
			(0.086)	
Manned_HighLike:Ideology			0.027	
			(0.085)	
RPA_LowLike:Ideology			0.070	
			(0.085)	
RPA_HighLike:Ideology			0.007	
			(0.088)	
Ground_HighLike:Interventionist				0.240***
				(0.086)
Manned_LowLike:Interventionist				0.074
				(0.085)
Manned_HighLike:Interventionist				0.175**
				(0.083)
RPA_LowLike:Interventionist				0.129
				(0.085)
RPA_HighLike:Interventionist				0.245***
				(0.087)
Observations	1,609	1,609	1,609	1,609
R^2	0.226	0.312	0.241	0.304
Adjusted R^2	0.223	0.306	0.235	0.299
Residual Std. Error	1.095 (df = 1603)	1.035 (df = 1596)	1.086 (df = 1597)	1.040 (df = 1597)
F Statistic	93.444*** (df = 5; 1603)	60.183*** (df = 12; 1596)	45.975*** (df = 11; 1597)	63.428*** (df = 11; 1597)
Note:				*p<0.1; **p<0.05; ***p<0.01

Effect of Treatment on Interventionist Attitudes (Experiment 2)

	Dependent variable:
	Interventionist Attitude
Ground LowLike (Intercept)	3.051***
	(0.064)
Ground_HighLike	0.117
	(0.091)
Manned_LowLike	0.068
	(0.091)
Manned_HighLike	0.002
	(0.091)
RPA_LowLike	−0.014
	(0.091)
RPA_HighLike	0.067
	(0.090)
Observations	1,609
R^2	0.002
Adjusted R^2	-0.001
Residual Std. Error	1.056 (df = 1603)
F Statistic	0.644 (df = 5; 1603)
Note:	*p<0.1; **p<0.05; ***p<0.01