The “Drone” Lexicon

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The literature on the ethics of remote warfare—some might say “drones”—has suffered from an unfortunate lexicon. Many of the terms that repeatedly arise in the literature are often misunderstood. I have addressed some of these, namely “bugsplat,” “squirter,” and “Hellfire” elsewhere (Chapa 2017, 2018). Conceptions of “distance,” “courage,” “combat,” and “precision” have also undergone some evaluation and revision in the literature (Fitzsimmons and Sangha 2013, Kirkpatrick 2015a, 202-219, Sparrow 2015, 220-227, Kirkpatrick 2015b, 228-231, Swarts 2016, Kaag and Kreps 2014, 12). Here I have a concern about even more fundamental nomenclature. The very term, “drone,” might have outlived its usefulness. Here I argue that “drone” is often unhelpful and is useful only to the degree that those who use it clarify the sub-categories within it that are actually at stake in any given claim. These subcategories should be understood in terms of a number of axes along which the set of drones extends: (1) function, (2) cost—as a proxy for technological sophistication—and (3) as a techno-social system.

First, I take for granted that “drone” refers to an aircraft that does not have a human pilot or operator on board. To show just how crowded the category of “drones” has become, I appeal to the wide array of remote warfare systems employed in the conflict in Yemen. Then I develop a positive argument for how the broad category of “drones” might be structured to enable a more fruitful and less confused discussion going forward. I argue that we should categorize these systems (1) according to their operational function—for example, there is an important difference between intelligence, surveillance, and reconnaissance (ISR) functions and strike functions. (2) We should also look at systems’ monetary cost, which often correlates with technological sophistication. A $650 quadcopter and a $100 million Global Hawk (2014, 36) are worlds apart in this regard. (3) Finally, we should evaluate these remote weapons as techno-social systems—we should ask about the degree of interaction between the human pilot or operator and the technology.

Drones in Yemen

Remote warfare activity in the conflict in Yemen has been significant, not just owing to its duration and regularity (Brunstetter and Braun 2011, 340, Pincus 2002, Bergen, Sterman*, et al.* 2019, Tayler 2013, Reinl 2019), but because such a wide array of remotely controlled weapons have been employed. According to numerous reports, in addition to US Reaper operations (Brown 2019a, 2019b), both Saudi and UAE forces fly the Chinese-made Wing Loong II armed remotely piloted aircraft (Turak 2019). These two sets of aircraft and the forces that fly them represent the first level of complexity of remote weapons in Yemen. Between the first US Predator strike in Yemen in 2002 and 2015, when Saudi Arabia first acquired the Chinese CH-4—predecessor to the Wing Loong (Mizokami 2015)—reports of “drone strikes” in Yemen implied strikes by US Predator, and later Reaper, aircraft. But this is no longer the case. “Drone strike” might now refer at least to a US, Saudi, or UAE strike.

One question that should arise given the proliferation of this class of aircraft—sometimes called “medium-altitude, long-endurance” aircraft—is about aircrew training. One important element in the employment of remote weapons is the professional standards to which crews are trained and held accountable. This facet of remotely piloted aircraft is under-researched in the literature. During the years that the US and its close allies had a monopoly on this class of weapons system, questions about aircrew training and aviation standards might have been less pressing. This is owing, in part, to the fact that the nations that import US combat remotely piloted aircraft—specifically, the UK, France, Italy, Australia, and The Netherlands—also send their aircrews to conduct training alongside US Air Force

crews (Tran 2015, Murray 2013, Stevenson 2015, Fiorenza 2019). Moreover, because these nations employ the same technological systems as the US, there should be no appreciable difference in technological precision. But the increasing proliferation of Chinese-made systems and the dearth of information on aircrew training on these systems[i] should raise questions about both training and technological precision

In addition to the confluence of the Reaper and the Wing Loong II, in the context of Yemen, "drone" now refers also to the Houthis' small, commercially available quadcopter drones (Reinl 2019). Public awareness of combat quadcopters grew following the 2014 reports that ISIS had used commercially available quadcopters for propaganda videos and intelligence, surveillance, and reconnaissance (ISR) operations. By 2015, ISIS was dropping explosives from the same DJI Phantom (Gillis 2017, Rassler 2018) and X-8 (Clover and Feng 2017) quadcopters. The Houthis in Yemen likewise employ small quadcopters carrying "bombs wrapped in ball bearings" to target Saudi coalition forces (Reinl 2019). As a result, the very term "drone strike," once uniquely associated with US combat airpower, is now deeply ambiguous.

The application of the term, "drone," in Yemen is broader still. In addition to Saudi coalition and US combat remotely piloted aircraft and Houthi quadcopters, the Houthis also employ the Qasef-1. This system is much smaller and lighter than both the Reaper and Wing Loong II and is comparatively "low tech." Its two-piston combustion engine powers a pusher prop that drives the system along pre-programmed GPS coordinates until it arrives at the target area and glides to the target (Stein 2019, 2017). Though the Houthi's claim to have developed the technology in-house, many have argued that these are Iranian-made weapons, smuggled into Yemen via Oman (Reinl 2019, Diamond 2017, 2017, Knights 2018). Since 2018, the Houthi's have also used the more advanced "UAV-X," similar in scale to the Qasef-1, but capable of ranges up to 1500 kilometers. Some believe that these might have been among the weapons used in the 14 September 2019 attacks on two Saudi oil fields (Tenbarge 2019, Himmiche, Carvajal*, et al.* 2019).

The Qasef-1 and UAV-X muddle the discussion—and manifests the unfortunate lexicon—in two ways. First, they add an additional layer of complexity to the term, "drone," that is already stretched rather thin. But because these systems fall between the quadcopters and combat remotely piloted aircraft (e.g., the Reaper) with respect to size, payload, and cost, we can sidestep this issue for the moment. The more significant concern is that it is not clear whether aircraft like the Qasef-1 and UAV-X ought to be considered "drones" at all. They fly prescribed flight paths based on preprogrammed GPS waypoints and, rather than releasing munitions, they impact their targets and detonate. Surely such a system is more cruise missile than aircraft.

If they are to be considered "drones" rather than cruise missiles, surely their distinctive feature is that, rather than releasing munitions to strike targets, they impact the targets themselves. But the available lexicon is not sufficient to acknowledge this distinction.[ii] In the aftermath of the 14 September attack on Saudi oil production facilities, commentators grappled with this problem. The attack was called every thing from a "drone attack," to a "cruise missile strike," and even an "attack by a swarm of explosive drones" (Altaher, Hauser*, et al.* 2019, Connett 2019, Tharoor 2019) Later commentators acknowledged a combination of drones and cruise missiles (Johnsen, Maloney *et al.* 2019), but, given the ambiguity in how these terms might apply to the various weapons systems above, this claim is difficult to parse.

In an attempt to categorize this sub-class of "drones," some have borrowed a term from local participants in the conflict: "kamikaze drone." Other commentators have called them "suicide drones" see (2017, Gettinger and Holland Michel 2017). These weapons are so-called because their function is to "ram" enemy radar systems by "crashing the [unmanned aerial vehicles] into," for example, Saudi forces' Patriot surface-to-air missile batteries (CAR 2017, Diamond 2017). But these terms—though they acknowledge important features about the weapons systems—are not ideal. The terms "kamikaze" and "suicide" are morally weighted precisely because they imply the agent's foreseeable or intentional death in the attack—foreseeable in kamikaze attacks and intentional in suicide attacks. "Kamikaze" and "suicide" are bizarre terms for missiles, but perhaps even more so for drones—a category defined by the physical absence of a human pilot or operator.

A Techno-social System

Amidst these confused categories, one feature of remote weapons that is often unfortunately overlooked is the relationship between pilot or operator and machine. Remotely piloted aircraft like the Predator and Reaper, unlike autonomous systems, are crucially dependent upon human inputs. They are "techno-social systems" in that the technology and the human operate in concert.[iii] Not only to does the human influence the technology, but over time, the technology begins to influence the social groups of humans that employ it. Just as technology, in its own right, develops over time, socio-technological systems also develop over time. As David Mindell suggests, this conception of pilot and aircraft as a techno-social system is not new.

> Of all of the Wright brothers' contributions [to aviation], their greatest was simply their idea that an airplane should be a machine under active control of a person. … The airplane pilot [is the] master of the machine, traveler in an unstable element, and surveyor of human life below (Mindell 2015, 77).

Throughout its more than 100 year history, the language used to describe these "masters of the machine" developed as the socio-technological system developed. At the dawn of heavier-than-air aviation, those in search of a nomenclature reached for the language of aviation's closest relative: maritime operations. Though "pilot" now refers to those in control of air- and spacecraft, we borrowed that term first from sailors (2010).

The current US Air Force title, "remotely piloted aircraft pilot" (USAF, 2019) was not originally granted to Predator pilots. When the program first began, there was some debate as to whether these ground-based officers who flew aircraft remotely warranted the lofty title of "pilot." When the US Air Force took control over the Predator program from the US Army, the then Air Force Chief of Staff General Ron Fogleman decided that Air Force officers assigned to fly the Predator would officially be called "Air Vehicle Operators" (AVOs), and yet insisted that they must have "pilot skills." In 2009, the Air Force formally reversed the decision when it created a new officer career field called "remotely piloted aircraft pilot" (Lee 2016, 156-157)

The claim that those who fly US Air Force Predator and Reaper aircraft should be called "pilots" is not strictly a claim about the weapons system nor about its technological capabilities. Instead, it is a claim about the socio-technological environment the US Air Force and others have built around this family of weapons systems. It is about, among other things, aircrew training.

Regardless of what terms we use to describe them, one important distinction between the various categories of "drone" depends upon the degree to which a human has influence, control, and authority over the aircraft and its systems—including its weapons. I think it is a conceptual error to consider "kamikaze" or "suicide" systems to be drones rather than cruise missiles. But if this nomenclature is widely adopted, those who use these terms must recognize the vastly different role of the human operator in each case—the techno-social differences. Our conception of the extensive category of "drones" must include variations on the techno-social axis.

Conclusion: Toward a Better Taxonomy

"Drone" is an expansive term and it promises to become even more expansive as technology develops. Autonomous test aircraft are already being referred to as "drones," adding an additional layer of complexity to this already unwieldy term (Mizokami 2019). That does not, by itself, mean that "drone" is a useless term. Its usefulness, though, will depend upon whether those who use it adequately account for just how broad it is and how well those who hear it are able to structure its constituent elements—how we collect and divide the various species that belong to the genus. Though there may be others, this brief look at remote weapons in the context of the conflict in Yemen suggests at least three axes across which the term "drone" extends. If a "drone" is an aircraft without a pilot or other operator on board, then to distinguish one sub-category from another, we should ask about (1) the aircraft's function, (2) the aircraft's cost as a proxy for technological sophistication, and (3) the aircraft and its crew or operator as a techno-social system.

I lack the space to develop a thorough taxonomy here, but we can already begin to see the application of these three axes to the context of the conflict in Yemen. For instance, the Reaper and Wing Loong II are similar in function and cost, but there are open questions about how they compare as techno-social systems. How much authority does a

Wing Loong II pilot have? Is she trained to the international, professional aviation standards? Does she have the authority to abort a strike? Likewise, we might compare the Houthi Qasef-1 to the Reaper. The two differ in cost and as techno-social systems, even if both can function as attack aircraft. Again, we might ask, can the Qasef-1 operator impose real-time inputs to the aircraft's target or to its flight path; or is it a "fire and forget" weapon? Finally, we might compare the quadcopter to the Reaper. The financial costs stand in stark contrast even if they are both capable of releasing weapons. That cost difference undoubtedly results in a technological disparity. And surely the level of training of the average Reaper crew is much higher than that of the average quadcopter operator.

These questions remain open as long as we lack information about the various systems that proliferate in the region. But they are the questions we must eventually answer if we are to understand just how broad the term "drone" is and how complicated its sub-categories are. I opened with a mention of the ethics literature and it seems fitting to close on that note. We cannot have a meaningful conversation about the ethics, legality, or prudence of "drones." The category has become far too broad. Instead, we must have a discussion about the ethics, legality, and prudence of individual systems as operated by specific states and non-state organizations. And to do that, we will have to put some thought into the various axes across which the category of "drones" extends.

Notes

[i] There is publicly available information about the capabilities of, for example, China's Wing Loong II (or "Yilong-2"). Determining the level to which crews are trained, however, is difficult. According to Elsa Kania, "It is difficult to determine the level of sophistication of the instruction that students in these programs receive, which likely varies across programs and specialties." Kania, E. 2018. The PLA's Unmanned Aerial Systems: New Capabilities for a "New Era" of Chinese Military Power. *In:* Mulvaney, D. B. S. (ed.) *China Aerospace Studies Institute.* Montgomery: Air University.

[ii] There is some irony here in that, as the US military sought to arm the Predator with Hellfire missiles beginning in 2000, there was some concern as to whether arming the Predator would violate the 1987 Intermediate Range Nuclear Forces Treaty banning the development of new ground-launched cruise missiles." Thus, the ambiguity is much older than the present context. Lee, C. 2016. *The Culture of US Air Force Innovation: A Historical Case Study of the Predator Program.* PhD, King's College, London.

[iii] I owe the application of the term "techno-social system" to remotely piloted aircraft to Dave Blair.

References

2010. Oxford English dictionary : the definitive record of the English language. *OED.* Oxford: Oxford University Press.

2014. Selected Acquisition Report (SAR): RQ-4A/B Global Hawk Unmanned Aircraft System (RQ-4A/B Global Hawk). *In:* Defense, D. O. (ed.). Washington.

2017. Iranian Technology Transfers to Yemen: 'Kamikaze' drones used by Hothi forces to attack Coalition missile defence systems. *Frontline Perspectives.* London: Conflict Armament Research.

2019. Manpower and Organization. *Air Force Instruction 38-101.* United States.

Altaher, N., Hauser, J. & Kottasová, I. 2019. Yemen's Houthi rebels claim a 'large-scale' drone attack on Saudi oil facilities. *CNN*, 25 Sept.

Bergen, P., Sterman, D. & Salyk-Virk, M. 2019. Drone Strikes: Yemen. *In Depth: America's Counterterrorism Wars.* Washington: New America.

Brown, L. C. E. "CENTCOM investigates reports of Houthi-claimed attack on UAS." news release, 21 Aug, 2019a, ht tps://www.centcom.mil/MEDIA/STATEMENTS/Statements-View/Article/1939864/centcom-investigates-reports-of-

houthi-claimed-attack-on-uas/.

Brown, L. C. E. "Statement from US Central Command on attacks against U.S. observation aircraft." news release, 16 June, 2019b, https://www.centcom.mil/media/statements/statements-view/article/1877252/statement-from-us-central-command-on-attacks-against-us-observation-aircraft/.

Brunstetter, D. & Braun, M. 2011. The Implications of Drones on the Just War Tradition.*Ethics & International Affairs,* 25**,** 337-358.

Chapa, J. O. 2017. 'Drone Ethics' and the Civil-Military Gap. *War on The Rocks,* 2018.

Chapa, J. O. 2018. The Ethics of Remote Weapons: Reapers, Red Herrings, and a Real Problem. *In:* Jackson, C. J. E. (ed.) *One Nation under Drones: Legality, Morality, and Utility of Unmanned Combat Systems.* Annapolis: US Naval Institute Press.

Clover, C. & Feng, E. 2017. Isis use of hobby drones as weapons tests Chinese makers. *Financial Times.*

Connett, D. 2019. Drone attacks on Saudi plant could hit global oil supplies. *The Guardian*, 15 Sept.

Diamond, C. 2017. Report: Houthi rebels flying Iranian-made 'Kamikaze drones' into surveillance radars.*Defense News*, 28 March.

Fiorenza, N. 2019. RNLAF Reaper operators train in US. *Jane's Defence Weekly*, 21 Jan.

Fitzsimmons, S. & Sangha, K. 2013. Killing in High Definition: Combat Stress among Operators of Remotely Piloted Aircraft. *International Studies Association Annual Meeting.*

Gettinger, D. & Holland Michel, A. 2017. Loitering Munitions. The Center for the Study of the Drone.

Gillis, J. 2017. In over their heads: U.S. ground forces are dangerously unprepared for enemy drones.*War on The Rocks,* 2019.

Himmiche, A., Carvajal, F. R., Paes, W.-C., Thompson, H. & Tougas, M.-L. 2019. Final report of the Panel of Exerpts on Yemen. United Nations.

Johnsen, G., Maloney, S., Gross, S. & Anderson, S. R. 2019. The Attack in Saudi Arabia.*In:* Wittes, B. (ed.) *The Lawfare Podcast.* Washington: The Lawfare Blog.

Kaag, J. J. & Kreps, S. E. 2014. *Drone warfare,* Cambridge, Polity.

Kania, E. 2018. The PLA's Unmanned Aerial Systems: New Capabilities for a "New Era" of Chinese Military Power. *In:* Mulvaney, D. B. S. (ed.) *China Aerospace Studies Institute.* Montgomery: Air University.

Kirkpatrick, J. 2015a. Drones and the Martial Virtue Courage. *Journal of Military Ethics,* 14**,** 202-219.

Kirkpatrick, J. 2015b. Reply to Sparrow: Martial Courage – or Merely Courage? *Journal of Military Ethics,* 14**,** 228-231.

Knights, M. 2018. The Houthi War Machine: From Guerrilla War to State Capture.*Combatting Terrorism Center Sentinel,* 11**,** 15-23.

Lee, C. 2016. *The Culture of US Air Force Innovation: A Historical Case Study of the Predator Program.* PhD, King's College, London.

Mindell, D. A. 2015. *Our robots, ourselves: Robotics and the myths of autonomy*, Viking Adult.

Mizokami, K. 2015. For the First Time, Chinese UAVs Are Flying and Fighting in the Middle East. *Popular Mechanics.* Hearst Magazines.

Mizokami, K. 2019. Air Force Tests New "Loyal Wingman" Sidekick Drone for Combat. *Popular Mechanics.* Hearst Magazines.

Murray, A. S. C. L. "Italians learn to fly RPAs at Holloman." news release, 13 June, 2013, https://www.holloman.af.mil/Article-Display/Article/317370/italians-learn-to-fly-rpas-at-holloman/.

Pincus, W. 2002. U.S. Strike Kills Six in Al Qaeda. *The Washington Post*, 5 Nov.

Rassler, D. 2018. The Islamic State and Drones: Supply, Scale, and Future Threats. West Point: Combating Terrorism Center at West Point.

Reinl, J. 2019. Cheap drones are changing the calculus of war in Yemen. *Public Radio International*, 3 June.

Sparrow, R. 2015. Martial and Moral Courage in Teleoperated Warfare: A Commentary on Kirkpatrick. *Journal of Military Ethics,* 14**,** 220-227.

Stein, A. 2019. Low-Tech, High-Reward: The Houthi Drone Attack. *Middle East Program.* Foreign Policy Research Institute.

Stevenson, B. 2015. RAAF begins Reaper training in USA. *Flight Global*, 23 Feb.

Swarts, P. 2016. Stateside Air Force drone pilots can now log combat time for overseas flights. *Air Force Times*, 16 April.

Tayler, L. 2013. *" Between a Drone and Al-Qaeda": The Civilian Cost of US Targeted Killings in Yemen* , Human Rights Watch.

Tenbarge, K. 2019. These 'kamikaze' drones were claimed to be the culprits of the attacks on 2 Saudi oil fields. Here's what we know about them. *Business Insider.*

Tharoor, I. 2019. An attack on the Saudi oil empire clouds Trump's possible Iran meeting. *The Washington Post*, 16 Sept.

Tran, P. 2015. UK, France Discuss Reaper Pilot Training. *Defense News*, 3 June.

Turak, N. 2019. Pentagon is scrambling as China 'sells the hell out of' armed drones to US allies. *CNBC*, 21 Feb.

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