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Drone Power: Atmospheric Assemblages in Conservation, Humanitarianism, Policing and War

Introduction

Like cartography, Nadar's balloons, kite photography, pigeon cameras, surveillance airplanes, geostationary satellites, Hasselblad cameras in the hands of Apollo 11 astronauts, and other technologies for viewing-from-above, the drone is linked with its capacity to look down--an ability usually associated with either the military's domination of the strategic high ground or an effort that embodies the "god trick" of the objective "conquering gaze from nowhere" (Haraway, 1988: 581). Yet the drone is more than a camera on high. It is a complex assemblage of humans, nonhumans, processes, institutions, environments, imaginaries and discourses, performatively produced. While intimately related to the militarised history of the aerial view (Kaplan, 2018), the drone exceeds military technology. It can give as well as take life, empower as well as oppress, and open up new potentials for justice as well as enclose and control. Far from objective, the drone's split viewpoint, self-powered mobility and sensorial multiplicity destabilizes relations between views from above, beside, and

below (McCosker and Wilken, 2020). The drone, then, is a class of physically mobile, software-driven, sensorially-extending, elementally-constrained and material-discursively constructed technologies, inseparable from situated practices of operation and observation, and their political, cultural and ecological entanglements. In the decade or so since militarized drones burst into academic discourse, an unruly yet increasingly cohesive body of scholarship has pursued it. While the question remains whether or not the drone constitutes a sufficient locus for a coherent field of scholarship, this article brackets those questions and proposes that we give the name of ‘drone studies’ to the emergent field of scholarly inquiry into the drone assemblage. Rather than describing and prescribing the research of that field, this article instead seeks to chart the flightways of drones as they take off from distinct points of origin and yet find themselves entangled in new elementalities, materialities and practices. Our contention is that drone flightways are always flights into power, but power interconnected with processes of technological existentialism, performativity and entrapment.

We borrow and adapt the term *flightways* from van Dooren (2014), who ethnographically investigated the consequences of extinction for the evolutionary paths of endangered Pacific albatrosses (*Phoebastria*), Indian vultures (*Gyps*), little penguins (*Eudyptula minor*), whooping cranes (*Grus americana*) and Hawaiian crows (*Corvus hawaiiensis*). His “flight ways” trace the history of entanglements of these Aves on the existential edge with humans and our technologies of conservation in order to be sensitive to their future--or its absence. In our adaptation, we expand the ambit of the term to include technological flight. In our reading, flightways references not only the

historical trajectory of human and more-than-human encounters but also the thermodynamics of flight. The wings of flightways generate vortexes that draw others in, they create slipstreams that carry others on, they are marred by atmospheric turbulence. Flightways offers a more-than-human, elemental, technological, and temporal framework for tracing the narrative, scholarly, and practical trajectories of drones. In this article, we set out flightways for the drone based on the tracing of four genealogies of power: environmentality, humanitarianism, securitization and militarization. Read as academic discourses, these genealogies are complemented by empirical research drawn from fieldwork, interviews with drone professionals and insights from leaked documents.

“Airplanes fly by the laws of Bernoulli, not Marconi” a drone pilot pointed out to anthropologist Marcel LaFlamme (2017: 690). He was partially correct. Enactments of power results from the drone’s mobility and vision, itself an exploit of the physics of flight and light, elemental lift and electromagnetic conductivity and technical knowledge and technological acumen. Most often, drone scholarship within military and security studies conceives of this power within a Foucauldian biopolitical framework, in which bodies are governed as populations through the distributed, technical and discursive mechanisms of the state and its organs, whereas more positivist research in conservation science and humanitarianism bears the implicit stamp of a Weberian model of power, flowing from the top through technology, institutions and the state. More rarely, but also more productively, an undercurrent within drone studies conceives of power in more radically distributed, new materialist terms. *Environmentality*, or the

making-environmental of power, is both sustained and subverted by conservation drone practices, yet drone research in this space often repeats the state-centric conception of power it claims to critique. *Humanitarianism*, or the deployment of drones in response to disaster, tends to be conflated with militarism in existing drone studies research, which obscures the dynamic practices in sites across the planet. *Securitization*, or the enframing of civic drones into security discourses, is often folded into dystopian imaginaries of yet-to-be-seen technologies, which risks obscuring liberatory activist uses of drones. *Militarization*, or the capture of drone technologies within military practices, can lead to critical frameworks that theorize drone power into an all-encompassing totality that hides the faults, fissures and insurgent adaptations of drones in violent contests. From these critical genealogies, we propose interdependent flightways that launch drone studies along trajectories defined by the transversal concepts of existential technology, drone power, drone performativity and entrapment.

The emergence of non-war drone applications constitutes a technological paradox which allows for both the life-giving and life-taking functions of drones to exist simultaneously (Feenberg, 2010). In this we follow McLuhan who “showed that paradox, like metaphor, establishes the ratios of a truth, for truth cannot be just one thing, nor can reality, under electric conditions” (McLuhan and Zingrone, 1995: 7). The paradox can be explained through an examination of existence itself, or more specifically, existential technology and how it configures both hegemonic and counter-hegemonic power. Existential technology is bound up with questions of existence, of life and death, world-making and world-destroying. The ancient Greek distinction of *zoê*

and bios helps define existential life in drone studies. For Agamben (1998) this distinction is crucial because it exposes the flattening of different forms of 'life' within the single contemporary term. In his account, *zoê* describes biological life -- what Rabinow (1999: 15) calls "the simplest fact of being alive"— while bios refers to qualified or political life. Agamben argues that sovereignty is increasingly addressed to bare life to the neglect of political life because sovereignty is not concerned with the quality of life or how it is lived, but rather with exerting control over the bare life of *zoê*. Technologies that are frequently harnessed by the state, such as the drone, are instruments targeted on bare life, seeking to know, surveil, contain or kill. Since *zoê* includes nonhuman life (Braidotti 2016), technologies that target bare life can also be technologies of multispecies entanglement. Yet drones also resist and even escape the bounds of sovereign control. Drone existentialism broadly focuses on *zoê*—including nonhuman life. But our argument is that this relation to life -- to sheer existence -- does not lead inevitably to an exclusively biopolitical analysis. Drone power is more complex, more intimately involved at an existential level. In this sense, existential technologies are technologies that make and end existence; they come into being through practices in the world.

Drone practices constitute and are constituted by drone power. Neither reductively biopolitical nor purely statist, drone power is the capacity to act as existential technologies. As the four genealogies reveal, drone power escapes the conceptual frameworks imposed by scholars from the outside and suggests the need for building theories that arise from the material operations of drones, whether in lethal strikes

against people racialized, gendered and transformed into threats by militarized surveillance or in ecological programs to conserve species on the edge of extinction. The conception of drone power offered here is grounded in existing theories of biopower (Foucault, 2003) but takes flight into vitalism (Massumi, 2015), and new materialism (Barad, 2007), to offer a distributed and material-discursive conception of power that is inseparable from the existential technology of the drone. This conception of power is latent within scholarship on drones, hiding at times in the inconsistencies and incapacities of ready-made concepts, to connect across the mortal complications of drones in war, conservation, humanitarianism and policing.

Drones become through their posthuman performativity, a concept reinterpreted by Barad (2003) to account for the interdependent causal relationship between matter and discourse. Developing but also departing from earlier work by Foucault (1970) and then Butler (1993), Barad argues that matter and discourse are neither reducible to nor external from one another, but are intra-actively co-constitutive (2003: 818). Barad's posthuman performativity places human and nonhuman agency in differential but non-hierarchical relation at the constitutive level of becoming-in-the-world. Rejecting the given-ness or transparency that is privileged in representational conceptions of performativity, Barad's approach offers a dynamic understanding of how drones entangle life and death, human and nonhuman. Drone performativity offers a conceptual framework to ask *how* drone technologies, human bodies and nonhuman entities compose one another in and between sites and acts of destruction and preservation, domination and liberation.

Drone performativity occurs in and through time. Add temporality to an entanglement of humans, technologies and others and it tightens or disentangles. Drones are on the former trajectory. Like other technologies of semi-autonomy and computer vision with applications for artificial intelligence, drones are increasingly cemented into zoê. As such, drone entanglements become drone entrapments, “accelerators and decelerators of mutuality or estrangement” (Jimenez and Nahum-Claudel, 2019: 397). Accelerating global forces of chaos and containment—mass extinction, expanding inequality, surveillance capitalism and attempted ubiquitous computing and planetary programming (Gabrys, 2016)—tighten this imbroglio with technologies that promise accuracy and autonomy. These traps threaten to accelerate economies towards implosion and species’ decline to the point of erasure. Drones and their study emerged in this epoch of irrevocable entrapment—entrenched neoliberalism, cascading climatic synergies, trophic oceanic and terrestrial decay, and robotic and autonomous warfare. Ours is a world trapped by the entropy of the crash: failing ecosystems, boom and bust economies, collapsing infrastructures and overreaching and glitchy technologies (Fish, 2021). Drones are existential technologies that variously attempt, succeed and fail to contain or control zoê at key throughput nodes within convoluted global assemblages (Collier and Ong, 2007). Drone performative logics and affordances contribute to the calcification of systemic technological path-dependencies (Hodder, 2018). This is the trap of existential technologies.

The four genealogies that follow examine the flows of power within emblematic texts and then identify countering voices that articulate more diffused conceptions of power. In doing so, the genealogies show how drones are existential technologies, mediators of life and death, through a distinct form of drone power performed within co-constituting discourses and materialities that together enable the entrapment of human and more-than-human life, committing beings and things to one another. These genealogies are the launch sites of four flightways--existential technology, drone power, drone performativity and entrapments--that reconceive the drone and its onto-epistemological agency in transversal terms that bridge the analytical divides that stem from focusing tightly on war, policing, humanitarianism or conservation.

Drone Genealogies

“Four genealogies, like quadrosopic-lensed eyes, can provide complementary vision: cultural skeins and sensibilities; social worlds and institutions; technoscientific proving grounds; and spatially distributed, culturally heterogeneous, configurations of technoscientific assemblages” (Fischer, 2007: 580)

Environmentality

One of the most dynamic applications for drones has been in biodiversity conservation. Drones map, monitor, track and count most large land and sea mammals and many species of birds and reptiles on all continents (López and Mulero-Pázmány,

2019; Johnston, 2019). This is biological science in the genre of logical positivism. The social science of conservation drones, however, focuses on how their use threatens not the endangered species but rather vulnerable humans. Sandbrook argues that conservation drones violate human privacy, safety, mental health, data security and understanding of conservation (Sandbrook, 2015: 636). In his analysis, people are not agents but unwilling recipients of vertical domination under the guise of animal preservation. Poor villagers surrounding conservation areas are persuaded into “conspiracy theories, suspicions, and fantasies, particularly when [drones] are used in remote areas in developing countries which have little prior exposure to electronic devices” (Sandbrook, 2015: 647). Tanzanians, for example, might confuse the drone with a mythic “supernatural creature [that] swoops down and rapes them” or Nigerians might conceive the drone as a weapon for forced sterilization (2015: 647). This patronizing notion of dominating power is influenced by Sandbrook’s Foucaultian approach to governmentality, or control through self-governance, as applied in a multispecies context. This example of conservation governance defines “environmentality” or the technoscientific control of ecological biopower (Luke 1995).

Sandbrook’s suggestion for improving the social implications of conservation drones is to “adopt a policy of self-regulation” (2015: 643). Conservation pilots should restrict their use of drones to certain applications, and because it is so alarming, “the use of the word ‘drone’” should be avoided in regulation “given its militaristic associations” (Sandbrook 2015: 644). In this manner, Sandbrook’s conception of governmentality advocates for self-control and places limits on discursive utterances.

Adams (2017), another critic of drone conservation, also sees drones in terms of coercion, capitalization and algocratic power. The use of drones “has outstripped institutional frameworks for its *governance*” (Adams, 2017: 341, our emphasis). Like Sandbrook, what Adams requires is the *right kind* of governance: governance by internalized discipline (Foucault, 1977).

Others see less self-discipline and more agency across drone conservation. Millner’s (2020) research into drone environmental activism in the Petan region of Guatemala emphasizes how “humans, nonhumans, and technologies are entangled into agential circuits” (2020: 2). Millner asks us to think “beyond the militarised, securitised, and neoliberalised vision of conservation” (2020: 8, 12). Likewise, drone environmental countermapping experiments in Kalimantan, Indonesia embody counterpower in environmental work (Radjawali et al., 2017). A citizen countermapping project consisting of 30 individuals (women and men, Dayak and Malay, young and old) used drones to map deleterious environmental effects of bauxite mining in their customary forests. Here we have, as seen from above, elemental extraction, forest ecologies and diverse communities wrestling with open source hardware and software. The organiser of the project, Dr. Irendra Radjawali, explained to us: “We used drones to build maps to show that the smelter had expanded outside of its legal boundaries. To build the arguments for the court we had one of the indigenous community leaders give testimonies paired with drone-made maps. This is the first case. Not just in Indonesia, but also in the world, that a map made by drones was used in court” (Dr. Irendra Radjawali, 2017, personal communication). By building precise drone maps, adopting

the cartographic epistemology of the state and working through the courts, the drone environmentalists destabilised the state's monopolisation of environmentality.

Verticality, colonial cartographies and eco-power were temporarily subverted through drone countermapping. Activist drones are one small filament intertwining with the world's entrapping dependency on raw metals, in this case Indonesian bauxite.

Within drone environmentality are flightways that contain and constrain people, technologies and endangered species and landscapes. In South Africa's Kruger National Park, for instance, anti-poaching conservation is militarized by patrols with surveillance drones and with the authority to return fire on poachers. Some claim that the drone represents a technological fix that occludes the underlying reason for poaching: structural economic inequality (Lunstrum, 2014). Here, the drone is one controversial tool within a disputed "green militarization" that is catching precarious humans and endangered nonhumans in tightening knots (Lunstrum, 2014). This entrapment includes subjects of self-governance as well as nonhuman others. The consequences are existential.

Drones are actants within a dangerous and lethal entrapment which sutures endangered species, impoverished villagers and armed paramilitaries in a process that is delaying or creating extinction, as is the case for the endangered white rhinoceros (*Ceratotherium simum*) in South Africa, or preserving ecological and indigenous lifeways in Guatemala and Indonesia. For these indigenous people, and hopefully also for the rhinoceros, the drone is a survival technology, contributing to life's continuity.

Cross-cultural and cross-species reliance upon mobile, networked and optical technologies for survival is growing and strengthening. As such, the drone is a force multiplier for domination and latent resistance; hardening nature/culture and species/technology synergies. Within environmentality as well as the humanitarian drone genealogy that follows, the apex of this force is existence itself: the end or continuity of zoê. These socio-technical entrapments include both self-governing subjects as well as nonhuman others.

Humanitarianism

From the delivery of blood and medicine in Rwanda, to crisis mapping after the 2015 earthquake in Nepal, humanitarian applications of drones have proliferated. For many practitioners, the humanitarian drone provides inexpensive and safe health services in dangerous and inhospitable times (WeRobotics Labs, 2020, personal communication). Academic scholarship is less optimistic. Sandvik and Lohne (2014) argue that the humanitarian drone perpetuates pre-existing “institutional power” (2014: 148) linked to war and state surveillance. There is no “war dividend,” no knock-on positive humanitarian consequence, they argue (2014: 149). The “surgical precision” of the “drone stare” alarms these scholars (2014: 153). Greater optical resolution means missions are executed from increasing distances. This expanding interspace results in less hapticality, embodied connectivity and empathic connection to those in need. Like the conservation drone above, the humanitarian drone, in other words, cannot escape

the militarized imaginary; it is always already tainted by association with violence, disconnection and surveillance.

A more diffuse notion of the relationship between power, vision and connection is discovered through empirical research. Fieldwork with drone humanitarian workers undertaken by one of the authors (Fish) during the Mt. Agung eruption and evacuation on the Indonesian island of Bali in 2018 revealed the proximity of drone humanitarianism. This work was not from afar. Flights of drones were only 20-40 minutes, with the crafts usually remaining near line-of-sight. Deploying humanitarian drones requires hours of consultation with politicians, community leaders, emergency and crisis responders and air traffic regulators. Storms, insects, glitches, regulations and drones that crash into volcanoes are some of the contingencies. “Geofencing” software updated by the manufacturer can create an impenetrable virtual boundary around properties, limiting where the pilot can fly. Flights are tense affairs of technological and elemental coordination observed by community leaders, employers and other influential individuals. Days and often nights are spent with impacted communities, waiting for calm weather, preparing, flying, analyzing and dismantling (insert Image 1). Far from an isolated example, this description of drone humanitarianism is common as confirmed by interviews with drone humanitarians in Asia, Europe and the Americas (Fish, 2021). Contrary to Sandvik and Lohne’s argument (2014), seeing-from-afar does not separate the drone pilot from dull, dirty and dangerous work. The long, hard hours worked by drone pilots within the affected

communities increases situatedness, commitment, collaboration and care. From the ground looking up, it is more intimate and proximal than top-down power from afar.

Other scholars agree. Peckham and Sinha (2019) see power within humanitarian drones as “entangled in social, material and technological processes” (2019: 1211). They analyzed the way in which drones were used to investigate how deforestation in Malaysia forced humans, macaques and the parasites (*Plasmodium knowlesi*) they carry, into complicated relationships of response-ability. They conclude that the humanitarian drone “and the assemblage to which it belongs” represents an “anarchitecture” or “archipelagic” approach to health and crisis (2019: 1206). These roughly structured and islanded assemblages enact a diffracted sovereignty with its own “equivocal enclaves and extended corridors that reflect a new configuration of power” (2019: 1211). The largely unregulated environment within which humanitarian drones often operate is not an exploitative arrangement for prototyping profitable technologies, as Sandvik argues regarding the humanitarian drone trials in deregulated states like Rwanda (Sandvik, 2015), but instead represent a flexible approach to health experimentation across a distributed assemblage of nonhuman worlds. Peckham and Sinha’s (2019) drone humanitarianism is not enforced, but emergent. Not universally consistent but geographically specific. It is not looking down from above but grasping up from the grassroots. Drone power is not centered and elite but distributed and diffuse. Conceived in this way, the humanitarian drone is not a tool of domination but of potential—a claim which need not be blindly technoliberal in nature, nor deaf to the concerns of militarization.

Visioning infrastructures are increasingly important in humanitarian interventions, assisting in life preserving logistics and situational awareness. Human geographic information as images, maps and metadata is required to deliver fluids, food and medicine. Involving asymmetrical relations, temporarily exacerbated by crisis in addition to algorithmic sorting systems and their politics, the hegemonic potentials of drone power is clear. In practice however, in conservation and humanitarian drones alike, drone power is fleeting and mobile, often involving localization, geographical formation *in situ*. For instance, in the WeRobotics' Flying Labs—a consortium of 28 humanitarian drone organizations—the leaders interviewed in Kenya, Nigeria, Tanzania, Spain and Nepal emphasized domesticated technologies, regional expertise, cultural understanding and ethical frameworks (WeRobotics Labs, 2020, personal communication). The power of these drones to see is not predicated on bridging vast distances or pinpoint precision, but is situated within community aspirations, ecological constraints, and elemental potentialities whose introduced complexities lead to imprecise applications and obfuscating data streams. What is evident is a trajectory from internationalization to local sedimentation, from technological reliance to increasing entrapment, a growing dependency on atmospheric infrastructure and accrued information in humanitarian crises. Endangered people, like endangered species, are becoming reliant upon drone power and the linked global assemblages of laws, corporations and state forces.

Securitization

Police forces are at the forefront of the civic deployment of drones, rapidly adopting small drones into their arsenal. In the USA, over 1,100 law enforcement agencies across every state now own drones (Gettinger, 2020), but no American police departments have disclosed the acquisition of large-scale militarized drones such as General Atomics MQ-1 Predators or MQ-9 Reapers. US Customs and Border Protection, however, deploys Predators equipped with persistent, wide-area surveillance systems to monitor the border with Mexico and has repeatedly used them over US cities, most prominently during Black Lives Matter protests in Minneapolis following the murder of George Floyd (Customs and Border Protection 2012, Cox, 2020). This suggests that while securitization and militarization are often overlapping and interrelated processes, close attention to the technologies used and the differences in their associated objectives, applications and outcomes makes clear the analytical value in maintaining a distinction between them in relation to drones. Also absent, at least for now, are the swarms of dystopian drone theory, which tends to conceive of power as an all-encompassing bio- or necropolitics. Despite Shaw's attention to justice and incisive dissection of militarized drone systems (2016b), his writing (2016a) on police drones and drone delivery adopts a totalizing perspective on drones and power. In Shaw's control society, drones monitor and indeed eliminate members of a "surplus population" who, having lost their jobs to robots, have also forfeited their value in a capitalist economy (2016a: 22). This idle population needs policing, and Shaw imagines an atmosphere saturated with "*police swarms*" and "nano-drones" targeting and ultimately killing (Shaw, 2016a: 24, emphasis in original). This vision aligns with the

maximalist biopolitical conception of power common to this mode of drone studies. In such accounts, drones are securitizing technologies, transforming situations into instances requiring the logics and tactics of security interventions (Buzan, et al., 1998).

Drone securitization, however, is not solely a state project: “flocks of private security drones” will do the bidding of industry, it is thought (Shaw, 2017: 883). Delivery drones will “orbit the towering skyscrapers of a capsularized elite” serving the wishes of Amazon, Facebook and Google (Shaw, 2017: 894). Thankfully, this future is far from actualized. Facebook’s drone program went defunct in 2018. Air Prime, Amazon’s drone delivery service has yet to arrive seven years after beginning. Alphabet has limited approval for rural and hospital deliveries in the US (Levin, 2019) and isolated projects have had little, tangible and scalable consequences. Crucial to the stalled status of delivery drones is the state exercising its Weberian monopoly over airspace through safety laws, limiting the drone delivery industry to proposals, prototypes and prophecies. A “totalitarianism of the skies” and “everywhere atmospheric war” would be terrifying—if it existed (Shaw, 2017: 899). Shaw asserts “[t]here are fewer reasons to doubt” this future (2016a: 25). But there are. While it is true that police, violence and technology form a tightening entrapment, this drone dystopia is too teleological. It assumes a trajectory of technology and power that cannot be arrested, diverted or subverted, in which drones are securitized and understood exclusively within the framework of security discourses.

In practice, activist and other fugitive uses of drones reveal something other than this dystopian imaginary. Like its regulatory control over the delivery drone industry, it is again the state that holds power over political drone activism. The contestation over the Dakota Access Pipeline (DAPL) is illustrative. From 25 October to 4 November 2016, a temporary flight restriction (TFR) was established by the US Federal Aviations Administration over the cultural territories of the Standing Rock Sioux Tribe, where the Indigenous community and their allies (who identify as “water protectors”) were attempting to stop the Dakota Access Pipeline (DAPL) bulldozing through never-ceded tribal territories, threatening to contaminate the Missouri River (Brown, et al., 2017). The TFR targeted Indigenous activists using drones to document and monitor the actions of police and private security, who were exempt from the order. According to leaked documents (Brown, et al., 2017), private security firm TigerSwan was also deploying drones, including a Predator on loan from an undisclosed third party (TigerSwan, 2016). In this manner, both security forces and Indigenous activists were entangled in drone entrapments. Water protector drones were shot at and shot down, their pilots interrogated and arrested while the footage helped keep activists out of prison (Kaplan, 2020). Eschewing both the totalizing Foucauldian biopolitical critique of Shaw as well as the statist mode of power evident in state controls over airspace, Kaplan sees drone power as potential. Like the conservation drone operators in Guatemala and Indonesia, and the humanitarian drone pilots in Malaysia, drone power within this Native American atmospheric activism is diffuse and open. Drones are weapons *and* harbor possible, albeit temporary, liberation. Considering this troubling double, Kaplan calls for a shift in relationality, an “ontological intensification of the

relationships between technologies and the worlds they make known as well as ambiguous or impossible to perceive, order, or control” (Kaplan, 2020: np).

Deployed by activists and stymied by the slow pace of regulation, drones continue to fall short of enclosing life--despite activist, humanitarian and conservation drones attempting to use drones to protect life. Drones at Standing Rock were sent on flights to protect the life of nonhumans, water and tradition. This is existential: the Souixan prayer at Standing Rock was Mní Wičóŋi or “Water is Life.” The drone pilot Shiyé Bidzííl renamed his DJI Phantom 3 drone “High Hawk” and its flights were considered a “vision” that would sousveil paramilitary forces guarding the pipeline or “black snake” (Dronegear, 2016). This linguistic détournement was spiritual and also tactical: “so when [the police] try to infiltrate us and antagonize us about who is flying these drones, when we speak that language they won’t understand us” (Dronegear, 2016). The existential efforts of water protectors like Bidzííl, and his discursive reimagining of technology and petrochemical infrastructure, invites potentials for drones to unshackle from settler colonial and military inscriptions and applications.

The figure of the drone contains within it a dual potential; a capacity for both freedom and oppression. Its aeromobility constitutes its power, which makes it dangerous to people, especially the already marginalized—but also to the state institutions that instrumentalize it for social control and surveillance. If dystopian futures remain possible, so too do messy and contested alternatives, those in which the securitized drone is able to turn against its own securitization, or securitize what

dominators require to be insecure and vulnerable. What the practices of activist insurgencies might make possible in the space of politics remains emergent, still taking flight from the yet-to-be analyzed performativity of the securitized drone. Analysis of drone power can remain open to an “airspace as elemental and life-giving infinitude” (Kaplan, 2020: np) while maintaining an incisive critique of drone securitizations.

Militarisation

Militarism haunts the discourse of conservation drones, challenges the benevolent practice of humanitarian drones, energizes police drones, literally stalks activist drones, and is rooted in actual drone warfare and surveillance. Chamayou's (2015) polemical critique of drone warfare identifies its capacity to project power remotely as marking an important break in the history of military violence. Framed through a discourse of technologized precision, drone warfare becomes the humanitarian alternative to mass death and indiscriminate bombing, but it does so only through the capacity to render anyone, anywhere, killable. This new form of lethal violence is actualised in the killbox, a technical designation by which the US military determines that within a specific volume of space the capacity to kill is pre-authorized. Drone power thus defines an emerging sovereign tendency towards total pursuit, an imaginary that transforms the planet into a hunting ground. Chamayou's critique thus mirrors the strategic military imaginary: the capacity to collapse time and space in the projection of lethal power with planetary reach and computational precision. Yet in actually existing drone warfare, errors abound, drones crash, targets are misidentified

and drones are not always in the air when needed. This is not to suggest that Chamayou is wrong about the dangers of this form of violence, but rather, like Shaw, his discursive emphasis and apocalyptic imaginary risks reifying drone war as an all-encompassing, all-powerful system. In doing so, these scholars obscure warfare's uneven implementation and repeated failures. More problematically, it delimits or eliminates agencies within the drone system, whether human or otherwise. The consequence is the performative "militarization" of conservation, humanitarian, police and activist drones, when in fact, other more radical potential abounds.

If power's exercise is unilateral, as drone militarisation, humanitarian and securitization critics would have us believe, what do we make of the faults and failures of drone warfare in practice, the adoption of drone technologies by insurgencies, or the participation of other species in counter-insurgency? Two hobby drones exploded in the air above Venezuelan President Nicholas Maduro during a public address on August 4, 2018, harming nobody (Koettl and Marcolini, 2018). Houthi strikes on a Saudi Arabian oil facilities on September 14, 2019 featured 10 small drones, and drone use in an attack on a Yemeni military parade in January, 2019 killed five soldiers (El-Haj, 2019). None of these attempts featured the technological sophistication or global information networks of state militaries. No artificial intelligence, facial recognition, morphically resonating swarms, or other advanced properties were required as the drones were "dumb" delivery devices for incendiary. Designed to maximize spectacle, the assassination attempts were made during live television broadcasts and insurgent strikes publicized on social media. In this manner, the drone can be more a symbol in a

“pseudo-event” (Boorstin, 1962) of a propaganda battle than an effective weapon of the future. Other actants further complicate a hegemonic theory of military drone power. For example, in the Netherlands and France European golden eagles (*Aquila chrysaetos chrysaetos*) are trained track and take-down insurgent drones with Kevlar-gloved talons (Selk 2017). Thus, the potentials of the drone are not contained within state militaries or their critics and bleed into environmental, police, humanitarian, activist, and posthuman applications with unpredictable potentials.

While state-centric conceptions of power (Gregory, 2011) have had generative influence, other conceptions are emerging. Preempting arguments made above by humanitarian drone advocates (Peckham and Sinha, 2019) and conservation drone practitioners (Radjawali et al., 2017), Parks and Kaplan (2017) understand drones “as biopolitical machines...for studying how power works through human-technical assemblages” (2017: 10). Something similar might be said of recent work which melds biopolitical conceptions of power with feminism, posthuman and critical race theory (Wilcox, 2017), media and cultural studies (Richardson, 2020), science and technology studies (Suchman et al., 2017), or queer and aesthetic theory (Kapadia, 2019). In terms echoed above by conservation drone scholar Millner (2020), Holmqvist (2013) points out that “the complex assemblage of virtual and material experiences that drone warfare produces might have its very own repercussions...far exceeding, war itself” (2013: 543). Fine-grained attention to the affective, discursive, technical and cultural dynamics of drone warfare has led to more subtle, distributed and agential conceptions of power as well as the imaginaries and war-fighting practices that sustain it.

These distributed agencies of drone warfare emerge in provocative form in the critique of drone power found in contemporary art. While the view from the drone camera has been normalised within cinema, television, music videos, journalism and social media video (Christiansen 2017, 2020; Chamberlain 2017), far more critically engaged works by Trevor Paglen, Laura Poitras, James Bridle, Omar Fast, Mahwish Chishty and many others has established art made by or about drones as a distinct aesthetic field. Stubblefield argues that drone art captures the ambivalence of its subject. For example, Paglen's now-famous *untitled [Reaper]* photographic series, in which the drone hovers as an indistinct speck against enchanting pastel skies, reveals its desire for invisibility but offers no clear critique as such. Yet "the apparent passivity of this genre is not only a conscious response to the specific conditions of drone power, but in fact the means for reimagining its relations of violence" (Stubblefield, 2020: 2). Drone art and its corresponding critical commentary makes clear that both artists and critics alike are in search of flightways that allow them to grapple with the militarized drone as an elusive, distributed and mediating assemblage that entangles life and death.

Militarized drones operate at the sharp edge of existence, transforming life into death through the operational logics, algorithmic encodings, mediated realisms, legal strictures and fleshly bodies that orbit these biopolitical machines. But the military drone apparatus is far from homogenesis, nor are its entrapments as totalizing as the rhetoric that surrounds them in both military institutions and critical scholarship alike.

For all its terrible capacity to turn living bodies into ruined flesh (Pugliese, 2016) and its tendency towards planetary enclosure (Richardson 2018), drone warfare remains on the threshold, rife with traumatised pilots, slaughtered innocents and mediatised crashes. Embedded in global infrastructures of satellite networks, data centers, manufacturing hubs and diplomatic agreements to allow airbases and signals operations, drone warfare reveals both the technological dependence and economic fraying of contemporary empire: it is at once the performative evolution of war and its fraying as a mass endeavour. If drone power is mobile, distributed and fleetingly instantiated, it is also always becoming-violence, held in the potential of the performativity of killing. It is this military drone mystique that colors the performative potentials of conservation, securitizing and humanitarian drones. As less developed and financed infrastructures, these drone genealogies remain in the discursive shadow of the warmaking drone.

Flightways

Existential Technologies

Understanding drones means pursuing processes of enlivenment, senescence and entropy across complex systems and phenomena. Drones are embedded in acts of life giving and ending within environmental and conservation management of endangered species and critical situational awareness within humanitarian emergencies. Drones enable police forces and their resisters to surveil and counter-surveil within a nexus of biopower domination and resistance. Most obviously, military

drones kill, inform killing and claim to save lives in a brutal calculus of corporeal and economic cost. “Existence precedes essence,” as Sartre (1946/2007) differentiates existentialism from preceding philosophies obsessed with the relationship between godly essence (*ousia*) and godly embodiment in the Trinity. Heidegger rejects the search for immutable nature by emphasizing Dasein—presence over essence (Heidegger, 1962: 67). This sentiment is shared with new materialism, which also rejects essentialism in favour of the continual becoming of materiality. As Barad writes: “Matter is agential, not a fixed essence or property of things” (2007: 137) In these formulas, existence is mutable and defined by achievements during finite life. Power, then, is the capacity to self-preserve, overcome others and resist or embrace perishment. Existential power, thus, is the struggle over life and death in a determinate world of animate human and nonhuman others. For Heidegger (1977), technologies not only make but are of the world—with important qualifications. Drone research has suffered from what Heidegger identified as the way in which technologies invite reductive instrumentalities—but they are not mere instruments. Technologies are a power “that human beings cannot master of their own accord” (Heidegger, 1966: 9). Across its diverse applications, the drone’s simplest operation is the generation of data for effective action. These logical aims are complicated by the ongoing moment of interstate, political, climactic and ecological instability. The drone’s positivistic ambitions as a weapon of surgical lethality or an instrument for the quantification of endangered species meets the ambiguities of an existential realism that foils historical continuity, social normativity, goal-orientation, and *longue duree* evolution. Instead of stabilizing certainties through optical epistemology the drone does the opposite, uncovering

“fundamental uncertainties in the cosmos and within the Earth and life” (Rose, 2012: 46). By propagating both connectivity and uncertainty, networked technologies such as drones contribute to multispecies existentialism (Rose, 2012: 42). This is our lot, for to be alive is to be socially and ecologically entangled and to be human is to technologize. Technologies that mediate life such as drones are both “ecological and existential” writes Peters, “they are our conditions, our fate, our challenge. Without [such] means, there is no life” (Peters 2015: 52). Technology, thus, in an Heideggarian formula, is a pseudo-instrument engaged in making, transcending or ending life. Life extends and ends in specific wedded interactions with drones and their powers.

Drone Power

Understanding drones as existential technologies makes clear the need for a theory of power that both synthesizes and departs from the Foucauldian and Weberian models that have dominated the field. How power manifests through biopower and control is but a mechanism for power over (something like) what Agamben (1998) calls “bare life,” or pre-political biological life in which human and animal are necessarily blurred. Drones not only make *live* in the sense described by Foucault (2003), they make *life* through acts such as conservation and humanitarianism. Nor are military and security drones contained neatly within the frame of biopower. Critics of military drones see them as not only biopolitical, but necropolitical: harnessing statistical and surveillant tools and techniques of biopower for the purpose of determining death (Allinson, 2015). However, their advocates see weaponized drones as preservers of life: pairing the

twinned capacities for the precise projections of life force with persistent intelligence, surveillance and reconnaissance means less death, not more. If moral questions over the militarized drone are bracketed, these contradictions cannot be resolved: they present a paradox at the most fundamental level of drone power in war. But that very paradox is loaded with productive potential because it makes possible a transversal theory of power that can be traced in emergent forms across diverse drone practices. This transversal theory of drone power shares much with what Massumi calls *ontopower*, the power to bring into being, “to incite and orient emergence that insinuates itself into the pores of the world where life is just stirring, on the verge of being what it will become, as yet barely there” (2015: viii). Drone power is thus not anti-Foucauldian, but rather extends Foucault’s recognition of power as affirmative as well as negative into the material agencies and environmental/humanitarian effects of the mobile, networked and mediating terrain of remote sensing technologies. It is power that converges on the bare activity of life and death as they arise and take flight, inseparable from one another. But *ontopower*, in Massumi’s reckoning, is bound up with logics of preemption, and while drones operate according to a preemptive logic in certain military contexts, they also evade this logic in humanitarian, ecological and activist applications. Drone power, then, is something not yet accounted for—and yet entangled with wider ecologies of powers. Following Barad, drone power arises through recursive material-discursive intra-activity rather than linear causality (2007: 236). The bodies of the drone apparatus are both human and nonhuman. Drone power is transient, materially distributed, socio-technically assembled and concerned with the spectrum of existence that traverses life, death and the bare activity of things coming into being.

Drone Performativity

Across the genealogies of environmentality, humanitarianism, securitization and militarization, the discourses and imaginaries that coalesce around drones recur as vital sites of scholarly inquiry. Discourse, understood as the statements through which knowledge, subjects and power relations are constituted (Foucault, 1970), has material consequences, but remains separate from materiality itself. Imaginaries, understood in the sociotechnical sense of collective and stable visions of desired futures (Jasanoff and Kim, 2015), bring discourse and imagination into conjunction with the material, but do not grant the latter agency. Neither discourse nor imaginaries give sufficient attention to the agency of the drone itself or its sites, geographies, nonhuman animals, technical systems and other such entities. Within drone assemblages composed of human and more-than-human agencies, subordinating the material to language obscures the dynamism and crucial operations of matter, whether in technical systems or environments. Drone performativity thus describes how human and nonhuman, material and discourse, come together to forge drone assemblages from the doings and practices that take place in the world—and in doing so refuse to privilege discourse or the human, recognizing instead that matter matters outside its diffraction in language (Barad, 2003). Militarized drones come into being not only in the claims of General Atomics, the axioms of networked war theories, the iterative innovations of aeronautical engineers, or even in the act of surveilling and doing. Rather, militarized drones are forged in the intra-active co-composition of all performative doings—and one task of

drone studies is to delve into the pseudo-instruments, apparatuses and specific practices that make this becoming possible. So too for conservation, humanitarian, activist and policing drone assemblages, in which testing, constructing, policymaking, experiencing and the technics of the drone system itself co-produce a host of actants as materially meaningful and meaningfully material. If drone power is predicated on the mediation of life and death, it is only made possible by drone performativities. Understood in the context of the entangled and agential nature of existence, drone performativities bind together the materialities, discourses and imaginaries that animate drone assemblages.

Entrapments

Drone power makes, breaks and transcends mortality. It entangles, entraps and disentangles formerly knotted kin. Militaries, conservationists, humanitarians, police, industry and their co-actants are lured by the drone's relative affordability in contrast to satellites, safety in contrast to helicopters, ease-of-use and semi-autonomy, flexible deployability, vertical and volumetric viewpoint, atmospheric and elemental mobility, sensorial modularity and computer vision and machine learning complementarity. Drones are protagonists and antagonists in some of the world's most existential entrapments: fixations on raw metals, reliance upon violence, dependence on oil, desire for technological solutions to intractable problems, the allure of surveillance capitalism. As drones and similar semi-autonomous technologies of sensing, tracking and transforming embed and sediment deeper into the internetworks of people, things and

natureculture, these agents become increasingly path-dependent. A co-reliant trap involving humans and nonhumans and our technologies of governance, policing, management, protection and extermination is emerging, but not yet to the dystopian degree envisioned by many drone scholars. Entrapments are tempered by realism and empiricism, failure and decay, but they remain important futures. Military drone violence remains a mode of aerial control and technologized maiming or death that perpetuates the colonial present: disregarding or minimizing this would pull drone studies away from justice, not towards it. Totalizing theory has done crucial work to set out the stakes of drone violence but the specific methods through which the necropolitics of entrapment takes place now need closer attention. Weaponized and surveillant drones do very different work in Gaza than in Yemen, surveillance drones achieve different goals in humanitarian crises and anti-poaching interdiction. Yet entrapment within drone worlds is not only a question of technics, but of politics and its absence. Entrapment plays out at multiple levels and sites of analysis, even as drone systems fail to capture environments in their totality.

Conclusion

Conceptualising the drone within situated contexts has enormous value. As we have shown through four genealogies, the drone phases into view in different ways when encountered as counter-mapping agents rather than as weaponized surveillance systems. Transposing frames of analysis from one site to another without due care can obscure the intimate, granular details of how Water Protectors resisted state police and private security in the struggle against the Dakota Access Pipeline, for instance. Yet

our reading of an eclectic array of practices, sites and technics makes clear that connective concepts are crucial to develop a rigorous yet flexible account of drone technologies. Examined in transversal terms by finding those points of intersection and departure across multiple practices, ecologies and assemblages, the drone and its complex entanglements can be reconceived in generative terms that do not foreclose its futures solely because there are things called drones that are used to police, control and kill. We have argued that drones are existential technologies that entangle human and nonhuman bodies, processes, environments, discourses, affects, imaginaries and materialities. Through the production and exercise of drone power, performatively made possible, these existential technologies tend towards entrapments, constraining their actants. Across the four genealogies of environmentality, humanitarianism, securitization and militarization, we have shown how power radiates through drone studies, but that its workings within drone practices are not always readily grasped within biopolitical and statist conceptions of power. Attending to the distributed, fluid and ephemeral workings of power in drone practices enables more finely attuned perception of how drone ecologies are co-constituted by human and nonhuman agents. Drone flightways launch in company with the emergent phenomenon of the drone itself, charting new trajectories into the atmospheric zones that have already become sites of infrastructure, governance and existential possibility.

Biographical Note

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Image 1. This crowd density was constant throughout drone humanitarian work during the Mt. Agung volcano eruption, Bali, Indonesia, 2018. Photo of Feri Ametia Pratama, Director, Aeroterrascan in grey shirt and spectacles.