

BOOK REVIEW

The Drone Age: How Drone Technology Will Change War and Peace, Michael J. Boyle (2020) 387pp., US\$30 hardback, Oxford University Press, London, ISBN 9780190635862

The book title may be *The Drone Age*, but it is worth noting that drones are more accurately referred to as unmanned aerial vehicles (UAVs) or remotely piloted aircraft (alternatively aerial) systems (RPAS) by professional aviators and aviation organizations. Drones will become increasingly independent in their operations, as the sophistication of onboard sensors and the processing power of computer systems improves. This means an increasing proportion of their operation is effectively autonomous, with only occasional remote piloting intervention. Whatever the merits of the more technical aviation acronyms, it is the popular term ‘drone’ which dominates. Boyle notes that the term possibly originated from the name of an interwar (1930s) British model called the *Queen Bee* and this explanation is also supported by the Imperial War Museum in London. Therefore, despite some reservations, I will use the term drone, which has become normalized.

Something that Boyle uses to improve his storytelling is the setting of little scenes; some examples are detailed later. These vignettes are neat little observations that remind us that, despite all the technology, this is also a story about people, both heroes and villains. The featured individuals are not simple stereotypes, but characters who have a backstory, and these settings are also part of the overall story. The book opens with the scene of a man having breakfast, which develops into a description of how he was then hunted down by US drones. This is the kind of book that can, and does, bring in the likes of Marilyn Monroe, featured in a photograph with an early form of drone. That photographic opportunity was initiated by one Ronald Reagan, then a captain in the US Army. These are the kind of details that Boyle weaves in throughout the book in such a way as to add texture to what might have been a much drier text. Delicately balanced additions to the text that neither detract nor distract from the core themes of the book are little touches that make this book pleasing to read.

The book has an enticing introduction and a strong summary chapter. Between start and finish are a selection of clearly themed chapters. These make it easy to dip into the book and get a sense of the key arguments and how they fit into the overall narrative. One can read the book from start to finish, but if readers have thematic priorities, the middle chapters can be read out of order. The book contains a small number of black and white photographs, which reminds us that drones have developed a strong visual aesthetic in recent years. Images of drones have become iconic, being intrinsically linked to the contentious nature of drone operations. Images taken from drones have also transformed our view of the world, from the sheering verticality of modern cities to the video game aesthetic of digitally overlaid landscapes. As well as recognition of the visual aesthetics of the drone age, the author reminds us of the importance of language. Like a lot of emerging technologies, the field is full of insider terminology with deadly themes, such as ‘kill box’, ‘kill list’ and ‘targeted killing’ (while not unique to drones, they take the concept to new heights).

Drone technology presents new options for military commanders in the field and for politicians who may be watching in-theatre kills from comfortable offices in real-time. There may be dangers in the disinhibiting, disconnected, digitally mediated deaths portrayed by remotely deployed sensor technologies. The paradox of real-time sanitization of deaths may be accounted for by the pseudo-computer game visuals afforded by remote video feeds. Emulation in games and movies reinforces the disconnect between observers and actions – distant viewers of digitally rendered deaths taking place in real time. Counter to this are suggestions that drone pilots are subject to stress

by the immediacy of death, which can be exacerbated by long periods observing potential targets, and the lack of a clear divide between conflict zones and their civilian lives. A pilot might complete a lethal mission, leave his base and be back home within a very short time. Pilots can be based in the United States and experience stress arising from the disconnect between on and off duty times with minimal time to decompress after a stressful sortie.

Much of the book is focused on the use of military grade drones, the kind that resemble small fixed-wing aircraft, and with which television viewers are familiar. This makes the choice of book cover intriguing since it is an image of a quadcopter drone, more associated with hobbyists, or the weaponized versions adopted by irregular military outfits, including some terrorist groups. This may seem a minor point, but it sits within the whole realm of drone aesthetics, and perhaps even more importantly, reflects the choice of language used when discussing drones and the immediate mental images conjured up when drones are mentioned.

The airspace for academic books on drones is getting a little crowded, but this book is one I would recommend. Boyle walks a finely balanced tightrope between academic rigour and wider readability. If you already know a lot of about drones, this book will introduce relatively little in the way of new ideas. However, it will give you some much-needed affirmation of what you probably already know, and it will probably do it in a way that is more accessible than most authors can manage. This is perhaps the real strength of the book. This is a good story being well told by a knowledgeable and enthusiastic author. If you are new to drones you will learn a lot. If you have some expertise and knowledge, then this is the kind of book to recommend to others, new to the subject. This is an agile account of an increasingly important topic. Boyle expertly pilots readers through the intellectual airspace that is the emerging field of drones and the increasingly central part they play in military, civilian and hybrid roles. If you want to know 'How drone technology will change war and peace' (the subtitle of the book), this is a good place to start.

Chapter 1: the drone age

A man is finishing breakfast... This opening scene sets the tone for much of what is to follow. This could easily be the opening of a thriller, but Boyle uses the technique to draw readers into a well-researched and more traditional academic style of writing. We are introduced to predator and reaper military drones (familiar from news footage) and what they can do in tactical terms, thus hinting at their strategic potential as a tool of international relations. The concept of targeted killing is explained as this legal sleight of hand enables US presidents to kill US citizens without due process. The termination of targeted enemy combatants is a natural extension of this and is legally less problematic. Boyle analyses key arguments clearly and concisely, and sets out the key themes, the consequences for war and peace, and the increasingly fuzzy liminal space between states of war and peace.

Chapter 2: automated warfare

World War II saw the weaponization of aircraft, including converted multi-engine bombers. Early efforts were far from automated in the modern sense, but saw the use of radio to guide converted bombers to targets. These were hazardous adaptations for crew members on the explosive-laden plane for part of the flight. One famous victim was Joseph P. Kennedy Jr, older brother of John F. Kennedy, the future US president. Kennedy was killed, despite having the option to avoid such dangerous missions (p.30). Aircraft that more closely resembled modern drones, such as the radioplane, were also being developed as gunnery targets. This is the chapter that includes the photograph of Norma Jean Dougherty (or Marilyn Monroe as she came to be known) with a partially assembled radioplane (p.35). Boyle has the knack of dropping names like a stick of cultural ordnance.

Chapter 3: death from above

This chapter deals with post-millennium processes in drone warfare and the use of predator drones in Pakistan, including their first recorded targeted killing in that country. The practice of targeted

killing is discussed and Boyle details the use of Israeli aviation technology to carry out targeted killings. The argument that these are not assassinations is analysed. Given that religion is a driving factor behind some modern Middle Eastern conflicts, the language of predators and reapers unleashing hellfire missiles to send targets to their maker is a simplistic but ultimately poetic expression of a complex and violently contested political situation. The chapter covers drone developments, especially in relation to the strategic sinkhole that is Afghanistan. Boyle does a good job of summarizing various programmes and approaches under different presidents. He then moves on to consider the intimacy of long-distance killing where the presence of sensors and high-quality video feeds can bring the psychological impact of lethal interceptions close to home. The geography may be external, but the psychology is internal and pilots and other operators face mental rather than physical risks.

Chapter 4: eyes in the sky

The chapter opens on the eve of World War I and notes how quickly reconnaissance flights became integral to military operations with aerial surveillance becoming central to strategic and tactical decisions. Rudimentary at the outbreak of war, the technologies rapidly evolved, as can happen when monetary concerns are pushed to the margins by military and political imperatives. While aircraft were (inevitably?) weaponized, their true value lay in the information their pilots and observers provided to planners. Boyle has an apt quote from Orville Wright in support of this view – another instance of the author's use of illuminating quotes to add colour and human sensibilities to a topic that could be overwhelmed by technology, policy and statistics. The role of aerial reconnaissance in World War II is skipped, which is reasonable, given the focus of this book. Instead, the contemporary use of drones in this role is discussed in detail. Illustrations help communicate the range in size from large drones such as the Global Hawk, akin to a full-size piloted aircraft (p.106), to nano-drones such as the Black Hornet (p.112), which is seen in an operator's hand. The problems of indiscriminate information gathering are discussed: just because you can collect so much data does not mean you do not have to be clear why you are doing it. Rules of engagement and the tactical nuances drones afford commanders are also discussed. Advances in drone technology, combined with information dominance, whether real or illusory, have become key components of US strategy.

Chapter 5: terrorist drones

An actual earthquake opens this chapter, followed by a metaphorical earthquake where, eventually, an environmentally concerned citizen equips a drone with a radioactive payload. The threat is symbolic rather than serious, but it made headlines. This type of threat had morphed into an operational risk. Surely where a lone environmentalist had led organized terrorist groups would follow. Aerial platforms, whether drones or crop dusters, disseminating lethal material was no longer just a hypothetical concern. The use of drones for assassination attempts or as a means of inflicting damage on key infrastructure is now central to security discussions in many countries. Boyle offers detailed consideration of this issue, supported by the frequent use of examples. The use of drones by non-state actors and the growing counter-drone sector are duly noted and the complexities of countering drones are acknowledged.

Chapter 6: the all-seeing drone

The panoptic qualities of drones make them very attractive to the military, but also to law enforcement agencies. Surveillance need not be limited to the visual spectrum as suitably equipped drones can also see into the infra-red and monitor the wider electro-magnetic spectrum, including mobile phone and other radio transmissions. Boyle offers an interesting example from Baltimore, where citizens were being monitored by a Cessna light aircraft and their images shared with police. This is a classic case of rights versus wrongs: citizen's rights to privacy balanced against benefits from reducing crime. The panoptic possibilities of drones are immense, though proponents may be

disappointed to learn that those eyes in the sky may not be a panacea to perceived problems. Drones have been widely adopted by many police forces despite privacy concerns. Most are off the shelf domestic varieties (commonly small quadcopters), but fixed-wing and other larger, pseudo-military drones have also been deployed. The Baltimore case featured a crewed light aircraft, but this is just the kind of role for which drones are ideal. Police just love drones.

Chapter 7: dull, dirty and dangerous

Another chapter and another earthquake opener, this time in Kathmandu, where ‘domestic drones’ (non-military and available at a retailer near you) quickly proved their worth in rescue operations. Information from social media and 3D mapping software combined to offer a coherent collective response. Boyle refers to digital humanitarians who could offer time-sensitive high-quality data as an aid to disaster relief responders. Boyle delves into the specific benefits of drones in disaster zones and makes lots of useful observations with the frequent support of specific examples. This is all done while maintaining a coherent and pacy narrative style. The challenges of creating a usable information infrastructure are noted, with the video feeds and sensors of individual drones choreographed with other available data sources. From the reactive requirements of disaster responses, the book goes on to discuss search and rescue strategies and the contribution that drones might make.

Drones are already delivering medicines and other medical material, especially in Africa. This is helped by the availability of relatively large undeveloped open spaces close to population centres. Delivery by drone in large cities in Europe and the United States is hampered by heavily utilized airspace. The role of drones in peacekeeping is also considered; drones provide an attractive means of amplifying presence when used by United Nations forces in contested zones. Drones have a dual benefit in that they can help gather intelligence while their operational presence may also prove disruptive to the plans of groups under observation. The chapter concludes that the use of drones for ‘dull, dirty and dangerous missions’ (p.232) is a natural development, albeit one that needs careful monitoring and reflection. This use of drones fits into a wider pattern of assigning dangerous tasks to non-human entities, be they earth-bound robots or crewless space missions.

Chapter 8: the new race

Opening scene: Japanese F-15 fighter jets are scrambled to intercept an intruder over contested islands, intercepting not a manned aircraft but a sophisticated Chinese military drone. The interception of aircraft in national airspace zones is not uncommon, but a complicating factor here is the heavily contested claims to islands and the related airspace. China is currently making territorial claims and these involve drones. It will be interesting to see if this lowers or raises the likelihood of misunderstandings, given there are no aircrew to consider in risk calculations. No danger of downed pilots presented as trophies on television; no Gary Powers (Powers *et al.*, 2019), John McCain (McFadden, 2018) or John Nichols (Nichols and Peters, 1992).

Many countries are now operating drones of various types and an increasing number are also developing indigenous drone industries. This raises lots of interesting possibilities for the proliferation of drone technology as new players may be less scrupulous about their customers than experienced exporters of arms. Boyle devotes space to key players including the United States, Israel and China. Turkey also has an active drone industry and export programme (Iddon, 2020). Drones, whether weapon-carrying military models or modified civilian drones, even hobby-level drones, can have a major impact on the balance of power and on battlefield tactics.

Chapter 9: the future

The drone age evokes the stuff of both dreams and nightmares. They can be cheap, flexible and helpful, but also lethal. Drones are in some ways a highly democratizing technology, giving new

capabilities to a rapidly growing roster of socio-political actors. However, some actors are bad actors. There are concerns, principally among those who currently hold the whip hand, that drones will destabilize the established order and complicate the uncertainties of asymmetric warfare. Boyle addresses key debates around drones by experts in technologies and politics; and he takes the opportunity to remind the reader of key themes within the book while doing so. As he notes, drones are not an isolated technology, but part of a continuum of complex, and thus complicating, technologies. Artificial intelligence (AI) gets specific mention. He rightly notes the hype around AI, accentuated by perceptions of AI shaped in the cinema (e.g., HAL in *2001 A Space Odyssey* and the Terminator movies). Whatever the actual capabilities of AI, there is undeniably a set of technologies in development, even deployment, that offers a good impression of intelligence, even if experts question the nature of that intelligence. I sometimes use the term ‘analogous intelligence’ when teaching because AI may, or may not, be true artificial intelligence, but it is certainly something analogous to intelligence. As Boyle notes, advances in AI promise truly autonomous aerial platforms with no requirement for remote operators. When combined with communication networks, numerous sensor nodes, drone swarms and further advances in information processing and interpretation (even cognitive insights via AI), big changes are in the air.

Boyle ends the chapter, and the book, on a balanced note, acknowledging the tremendous positive potential of drones, while being wary of their disruptive and destructive potential. They are democratizing when it comes to the distribution of new capabilities, while being very destabilizing. Countries with advanced industrial bases have an advantage over less developed countries, or non-state actors, but that same industrial base is also vulnerable to drone and other attacks. Drones undoubtedly offer a way of narrowing the gap between top-tier military powers and those seeking to engage them. Crewed military aviation requires a support infrastructure beyond the resources of many potential adversaries, but military drones, or weaponized civilian drones, offer cheap and easy ways to close this gap. Counter-drone technologies are already a lucrative product, but defending against drones is not easy.

Arthur C. Clarke’s story, *Superiority*, first published in 1951, describes how a force is defeated by a technologically less advanced but numerous enemy (Clarke, 2001). The US has the resources to engage in the wide development and deployment of arms covering the technological spectrum, but other nations may struggle to do so. How will excellent but expensive systems cope with good enough and plentiful systems? The USS *Cole* incident in 2000 is a reminder of the effectiveness of low-technology approaches to damaging warships (Erickson *et al.*, 2020). The *Cole* attack was conducted by suicide bombers; just the kind of ‘dull, dirty, dangerous’ work where drones can replace humans. Drones will be both friend and foe: ‘The drone is a monster, capable of terrible acts; and it is a hero, uniting disparate technological forces into a power greater than the sum of its parts’ (Rothstein, 2015). Joseph Schumpeter coined the phrase ‘creative destruction’ in 1942 to describe severe economic disruption arising from innovation (Schumpeter, 1954). Drones have the potential to bring about a paradigm shift in our conception of warfare; the kind of shift conceptualized by Kuhn (2012) in terms of scientific progress. Drones will not deliver just another incremental improvement to the already familiar (a faster jet, a heavier payload, a smarter missile and so forth), and may generate a complete rethink of current strategies and technologies.

References

- Boyle, J. (2020) *The Drone Age: How Drone Technology will Change War and Peace*, Oxford University Press, New York.
- Clarke, A. (2011) *The Collected Stories*, Gollancz, London.
- Erickson, P., Loertscher, S., Lane, D. and Erickson, P. (2020) ‘Twenty years after the USS *Cole* attack: the search for Justice, *CTC Sentinel*, 13, 10, pp.46–54.

- Iddon, P. (2020) 'Turkey's drones are coming in all sizes these days', *Forbes*, available at <https://www.forbes.com/sites/pauliddon/2020/10/04/turkeys-drones-are-coming-in-all-sizes-these-days/> (accessed December 2020).
- Kuhn, T. (2012) *The Structure of Scientific Revolutions: 50th Anniversary Edition*, University of Chicago Press, Chicago.
- McFadden, R. (2018) 'John McCain, war hero, senator, presidential contender, dies at 81', *New York Times*, available at <https://www.nytimes.com/2018/08/25/obituaries/john-mccain-dead.html> (accessed November 2020).
- Nichols, J. and Peters, J. (1992) *Tornado Down*, Penguin Random House, London.
- Powers, F., Dunnavant, K. and Krushchev, S. (2019) *Spy Pilot*, Prometheus Books, New York.
- Rothstein, A. (2015) *Drone*, Bloomsbury, London.
- Schumpeter, J. (1954) *Capitalism, Socialism and Democracy*, Unwin University Books, London.

Philip Wane
Nottingham Trent University
philip.wane@ntu.ac.uk