The Conduct of War in the 21st Century

Kinetic, Connected and Synthetic

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Chapter 1

Introduction

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Part I

Introduction

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The *Conduct of War in the 21st Century* offers significant changes to the framework of thinking about armed conflict in three respects. First, it updates current thinking on warfighting, weaving together different strands of thought that have emerged in the wake of the conflicts in Afghanistan, Iraq, Libya, and Syria which occurred between 2001 and 2020. Second, it expands upon the conduct of the 21st-century style of war that includes both kinetic and non-kinetic approaches, which is waged both in traditional and in new domains, and which occurs in developed as well as developing polities. Third, it offers new insights into the impact new technologies are having on the conduct of war, including cyber and information, artificial intelligence (AI), unmanned and semi-autonomous systems, satellites, and a new generation of missiles.

This volume is not about the future of war but provides a clear assessment of the lessons that can be derived from the conduct of war in various theatres around the world. The different parts touch on key manifestations of strategy, technology, air power, war from the ground up, law, and decision-making. These salient themes in the execution of contemporary warfare are further explored in chapters that place the relevant developments over the last two decades within the context of the intellectual challenge of thinking about war. The volume thereby examines key dimensions in the conduct of war (the human, the technological, the strategic-operational-tactical, the procedural, and the legal), and shows that our thinking about war, particularly what it is and how it is fought, needs to be updated.

The three cross-cutting key terms around which the volume coheres are *Kinetic*, *Connected*, and *Synthetic*. We examine war as a kinetic activity, applying the original Greek meaning of *kinesis* as pressure, flow, and force, since electronic warfare, just like its physical equivalent, depends on each of these qualities. We investigate the impact of the connected element of war – between peoples, between ideas, through systems, communications, networks, and even across time. Finally, we examine the extent to which war is synthetic, that is seemingly dominated by artificial and manufactured elements, but with an enduring role of the human.

This volume therefore marks a new departure in the study of contemporary war, in that it concentrates on the solutions that have been advanced in theory and practice to deal with the challenges wars have posed in the first decades of the 21st century. It charts the new agenda that has emerged. It is specifically an inter-disciplinary work, brought together by the common and urgent demands created by armed conflict. It is neither a specialised survey of all technologies, nor a staff college guide to current warfighting, since these professional studies already exist. It does not seek to provide an exhaustive overview of all aspects relevant to the conduct of contemporary war. It is, instead, a problematised selection which offers a framework of thinking in combination with critical analyses of the dominant elements that characterise the conduct of war of the first quarter of the 21st century.

Military professionals and scholars share an interest in how to identify and assess change in armed conflict, and, at war colleges across the Western world, they study with great intensity its ways, that is, the actual conduct of war. They are concerned with legal and ethical considerations, the relative utility of force compared with other instruments of power, and new technologies and their impact on how fighting forces and irregular actors make use of them. In 2010, the Oxford Changing Character of War scholars published a volume with Oxford University Press to examine the character of war in past and present conditions, and what emerged was that, despite some changes in the types of actors and their practices (such as the employment of cyber systems), there were striking continuities.[1] In that year, with significant insurgencies against the Western powers and their allies underway, there was perhaps a stronger focus on the violent non-state actor. In the years that followed there were further technological innovations and considerable political and economic changes. These have driven an evolution in the character, if not the nature, of war. At the beginning of the third decade of the 21st century, we are eager to assess what has changed in the conduct of war, and get a better understanding of its emerging characteristics.

A centennial of thinking about the conduct of war

The inspiration for this volume is the work of the inter-war years theorists, between 1919 and 1939, who had begun their deliberations in the aftermath of a significant global war a century ago. They were compelled to reflect on what had occurred but also to consider what lay ahead. Was there a future where international institutions could regulate and even prevent war, or was there the prospect of new and barbaric forms of conflict? They speculated about the impact of new technologies, such as armour, aviation, and wireless communications, and how to harness them. There was widespread concern about the use of poison gas, the prospect of heavy casualties in mechanised land battles, and the widespread destruction of cities by air bombardment. Crucially, these analysts offered a framework of thinking about the conduct of war during a time of considerable political and technological change.

The starting point for this volume, therefore, is J.F.C. 'Boney' Fuller, who was, like some of our authors, a military officer, historian of war, strategic thinker, and advocate of new technological solutions. In 1926, he tried to codify the conduct of war based on an analysis of the global armed conflict that had such a significant impact on his generation, and, two years later, he considered the longer term future of warfare.[2] In most of his 45 books, written across his career, he believed that the purpose of new technologies and original techniques was to create a psychological effect. Herein lies our first connection with the present, for what we see, especially in terms of new technologies, at first seems to herald some breakthrough or a 'revolution in military affairs'. Instead, what is striking is that the use of those technologies is still targeted at, and dependent upon, the endurance, skills, and psychological resilience of the human.

Writing in the Interbellum, Fuller was eager to clarify what could be learned, and applied, from the conduct of war in his own time, and his principles, with some modification, remain in use with modern Western armies. He summed up these principles in three groups: *Control* (the direction of operations and mobility), *Pressure* (concentration of force, surprise, and offensive action), and *Resistance* (distributed forces, endurance, and security). Our approach, building on Fuller, therefore advocates the idea that the character of the current conduct in war is kinetic, connected, and synthetic, with humans still at its core. Fuller's control, pressure, and resistance are applicable to all three of our trinitarian elements. 'Control', in the form of direction, leadership, communications, allocation of resources, or an economy of effort, can be found in each of our elements – in the kinetic aspect of operations, in the connected nature of it, and in the synthetic. Ethical and legal norms considered are all elements of control, and feature in debates on the use of automated systems. Equally, for 'Pressure', we find characteristics in all three of our elements, including the concentration of force in precision kinetic air strikes, in connected cyber disruption operations, and in coercive policies in the so-called grey zone. 'Resistance' appears in all three elements too, in physical kinetic resistance, in connectivity, and in the use of synthetic systems. In other words, we imagine two trinities, one superimposed upon the other, each applicable to the other. We have therefore created a set of three observable characteristics to add to Fuller's original conception, arguing that, in the context of the early 21st century, the grammar of war is kinetic, connected, and synthetic.

Conceptual clarification of the military-human implications of technological change is a connection with this volume, since the advent of new technologies and systems today has created a degree of confusion and uncertainty. This is reflected not only in debates concerning the rules and regulations guiding legitimate conduct *in* war in new domains. State actors' exploitation of an unwillingness to cross the threshold of war, while using violence, disruptive deception, and the speed accorded by information operations, constitutes a serious challenge to the strategic balance.

Considerable strategic experimentation of the past decade, both by state and non-state actors, heralded new forms of contestation, including legal and information contexts, that involve state instruments of influence deployed on and off the battlefield. The accelerated battle rhythm of the second decade of the 20th century also spurred the emergence and the adoption of new forms of command and control that seamlessly exploit high tech tools combined with low tech social forms of organisational adaptation.

The other link between Fuller and our work is manifest as a warning. In Fuller's day, the full potential of the new technologies and the techniques that would optimise them were not embraced by the Western democratic powers but were utilised by their enemies. In Fuller's case, it was the German armed forces that adopted his ideas.[3] It seems clear that a failure to grasp the implications of new technology and the systems that accompany them could profit those who seek to disrupt and defeat the West, and the values the West seeks to uphold, and thus destroy all that was so hard won in the 20th century.

Despite our obsession with the latest technologies and their potential, war is still driven by humans. It is the human dimension that will surely assert itself in war in the near future just as it does in the present. There are plenty of critics of this view. Some technologists and philosophers warn that we may be approaching the end of a period when humans could make the critical decisions, since AI-enabled robotics may have the capacity to replace us. But another way to see this is to remember that humans are a form of technology, that is bio-technology, and it is conceivable that we will see a merging of hardware, software, and human tech, in the same way that humans embraced aviation or mechanisation, creating an almost seamless military instrument in the process. Much of this remains speculation but academic research, as in this volume, can help us navigate these issues based on analyses of how the interaction between human and machines is already reshaping the conduct of war.

Kinetic actors and new strategies: regulars, irregulars, and great powers

The volume reflects on the conflicts of the first two decades of the century. One important element here has been the military role in counterinsurgency and counterterrorism. The 'global war on terror' was led by the military, but critics suggest it should perhaps have been intelligence-led, or law-enforcement led (with extraditions and the co-operation of local security forces), or solely *by, with, and through* local nationals. Direct military intervention by Western armed forces produced protracted insurgencies against perhaps democratically elected, but frail governments fostered by Western powers in Baghdad and Kabul that were unable to establish control over the territories under their nominal dominion. The very small footprint of

Western intervention forces in Iraq following the US withdrawal in 2011 meant that there was little to stop abuses of power, prevent armed unrest, or halt the rise of the so-called Islamic State (IS) in 2014. The insurgent movements that sprung up had draconian rules and systems of governance and could only be halted by force. However, it also became clear that local partners of the West had their own agendas, even when they claimed to be battling a common enemy, showing how the use of locals as surrogates for Western military power can sometimes be misplaced. Yet, the notion that governments of the global south, facing insurgency, can always manage alone also proved to be erroneous.

In the short term, it is governance that must be prioritised to defeat insurgency with the grievances that gave rise to the fighting addressed. The transformative change needed to expunge insurgency is a long-term endeavour, a form of 'nation (re)building', rather than limited 'state building' of institutions. The assistance that can be offered by external powers can take many forms, but the specific military contribution, known collectively as 'security force assistance' or 'security sector reform', has been shown to be far from straightforward. Moreover, offering assistance in the development of a domestic law enforcement or intelligence service has also proven to be problematic. The second decade of the 21st century saw the progressive internationalisation of intrastate conflicts – a quintupling according to Uppsala's Conflict Data Programme – in which external actors intervened in local conflicts for more explicit geopolitical objectives, shifting the focus from stabilisation missions to the strategic and moral vagaries involved in war by proxy.[4] This volume therefore examines how the dynamics of nation building and counterinsurgency missions of the 2000s have morphed into proxy conflicts in the 2010s and considers how third party – state and non-state – actors vie for influence, with deployed kinetic and non-kinetic instruments, to achieve their political objectives.

The 2010s were characterised by a shift towards interstate 'Great Powers' confrontation and the coercion of smaller states. Much would have been recognisable in Fuller's day, but new tools and contexts made the situation by 2020 extremely volatile. The United States and its Western allies have been driven to protect their interests, while China has been guilty of an over-optimism in its ambitions which was interrupted by the global covid pandemic. Russia's policies are driven more by anxiety than ambition, while the emerging countries of the global south are driven more by domestic pressures. While kinetic confrontations are rare, because of the risks involved, the major powers have made more extensive use of other tools to further their respective agendas, including cyber, information campaigns, proxy actors, and an arms race in new technologies. There has been some probing of Western resolve and its defensive systems, usually in situations where the West has failed to avoid resolute or clear responses. Yet there is no doubt that, by 2020, there was an evident confrontation with episodes of coercion underway.

Connected: command, control, communications, surveillance, and information

Command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) capabilities are essential to contemporary war fighting. Surprisingly, some aspects of how technological advances in C4ISR are changing the conduct of conflict, and disrupting tactical and strategic actions, remain understudied. Improvements in C4ISR have, for example, driven negative side effects of *strategic compression*, that is, the temptation for senior leaders to micromanage tactical activities on the one hand and the tendency to confuse tactical success with strategic effectiveness on the other. Communications and surveillance capabilities have also led to other developments. We have seen the extensive use of remote and persistently deployable, pervasive intelligence, surveillance, and reconnaissance which link higher headquarters to individual vehicles, airframes, vessels, and squads. Deployable systems with full network access across a greater bandwidth, with the ability to exploit granular data, have been increasingly evident in the battlespaces of the 2010s.

Parallel to this development, there has been renewed focus on information warfare and psychological messaging. In strategic terms, information operations are increasingly conducted against civilian populations through greater connectivity. In the battlespace, information warfare can affect the efficiency of command and control, situational awareness, and the morale of military personnel.

When communications, surveillance, connectivity, and information warfare are combined, they breed a more integrated system of sensors, enablers, and effectors. The boundaries between electronic, space, air, land, and sea domains are slowly but steadily broken down to the extent that all actions are simultaneously tactical and strategic, expanding what was known as the 'operational' dimension. The most prevalent doctrinal trend has been towards accelerated, multi-domain operations.

This has serious implications for the time available for commands. General James Cartwright, former US Vice Chair of the Joint Staff, predicted that 'the decision cycle of the future is not going to be minutes … The decision cycle of the future is going to be microseconds'.[5] Fears that humans will not keep up with the OODA (Observe, Orient, Decide, Act) loop of decision-making are often repeated.[6] The phenomenon has been described as 'hyper-war'.[7] There may be a requirement to devolve command to a far greater extent, to allow subordinates greater license to operate, so as to seize and exploit fleeting opportunities. Still, some tactical events have been conducted at rapid speeds, with negligible effects at the strategic level, and they have not always demanded responses at the same speed from more senior decision-makers. Indeed, tactical events, while moving quickly, can be set in motion to distract an enemy leader who has a preference for interventions in tactical decisions, and this can be subsequently exploited

with more strategic actions. Conceptually, these developments imply a significance for control, pressure, resistance, and flow, and these are perhaps most evident in cyber and electromagnetic operations.

Cyber and electromagnetic activity have been used extensively by state actors but also by violent non-state actors because of relatively low entry costs to achieve tactical effects from afar. This has given rise to more persistent cyber skirmishes, not just in a traditional military sphere, but across the fields of security and defence, which have been barely visible to the public eye, as well as meddling in national information domains, which has gained wider public attention.

In the first decades of the century, the priority has been to see where security might be enhanced against espionage, interference, sabotage by malware, as well as malign information campaigns. Where data is the currency of cyber, so criminal enterprises have sometimes linked up with malign state actors, which, in turn, made clear that extending coalitions and partnerships, across sectors (public and private, military and civilian, nationally and internationally) is the way forward. At the same time, the past period also exposed difficulties associated with speedy attribution of cyberattack and information attack as well as challenges related to containment and proportionate response, and the need to further develop 20th-century concepts of deterrence to make them effective in the cyber domain. These issues, including deterrence through the threat of retaliatory action, through attribution, preparation for certain common types of cyberattack, and the rules regulating targeting practices in cyber space in and outside of war, are examined in this volume.

The synthetic: robotics and artificial intelligence

Autonomous sustainment on land, in the sea, and in the air promises greater mobility and less dependence on lines of communication. Over the past two decades the use of robots and autonomous systems has become more prevalent in conflict theatres around the world. Over a hundred states possess military aerial drones for C4SIR purposes, while at least three dozen of them have weaponised remotely piloted air systems for strike purposes.[8] For ground manoeuvre, multi-role vehicles for clearance or fighting are being developed, while new variants of robotic counter-IED systems have emerged to defeat a new generation of mines. In protection, new armour and lightweight textiles, protective AAD, and counter UAV are already deployed. The implications are that many systems can be automated, reducing manpower demands in combat forces (although technical 'tails' tend to increase), while increasing the mobility and capability of units. Automation also assists in the virtual realm, generating materials, disabling networks, creating new or repairing old networks, enhancing situational awareness, generating deception (especially signals deception), and creating *noise* to conceal communications through replicating tasks.

It is widely believed that future conventional combat will consist of robotic battles, directed by humans.[9] The ability to exploit errors and vulnerabilities in enemy robotics or their command and communications systems will likely also generate precisely the same friction and chance as in previous wars, with episodes of great intensity and destruction followed by periods of stand-off or manoeuvre. Under certain conditions, robotics offer the opportunity to make stealthy insertions, reduce the risk of casualties, conduct persistent monitoring and surveillance. Self-directing underwater and air vehicles, with or without ordnance aboard, can enhance global reach and assist in manoeuvre. Air and ground systems can navigate complex urban terrain while simultaneously monitoring electronic and heat signatures, with greater degrees of accuracy and fidelity. But none of these systems are without technical vulnerabilities. Our volume looks at how unmanned systems and robots have been used in recent battle zones around the world including in the Middle East and North Africa and how they are impacting upon the conduct of war.

Alongside these implications for unmanned systems, the volume also considers how new technologies are reshaping decision cycles. One area of concern that attracts considerable attention is AI. Some see new military opportunities in these assets, while others are more alarmed by its disruption. In simple terms, basic AI is already in service, but strong or adaptive AI remains elusive.[10] AI already assists in identification, problem-solving, pattern recognition, and calculations. But intelligence is characterised as being reactive, predictive, and creative. Currently AI can sense and act, so it is reactive, but its predictive and creative capacities remain limited, especially in the battle space.

All technology is, of course, integral as a weapon or enabler in war but there is often a trade-off in its value and use. At the tactical level, there is evident utility in AI in situational awareness, monitoring, control of loitering systems, and analysis of vast data. The enhancement to analysis offered by AI and automation is well-established, and have immediate military applications in intelligence, navigation, targeting, fire control, communications, and transportation. However, humans are still required to provide the close support, or close quarter combat, of ground war, and will retain the decision-making capacity in most situations, even when AI applications can provide guidance. AI will require built-in safeguards to ensure that errors are minimised, and the ethical standards of war will still apply in situations where AI becomes pervasive. That said, some foresee that the introduction of more sophisticated AI will change the conduct of war, through speed of decisions, responsibilities, and ability to discriminate. Overall, the consensus so far is that AI should not be offered the role of judgement and value, unless risks are low, and judgement should be retained by humans. Our volume examines how military AI applications have reshaped OODA loops in recent conflicts, and how military strategists are pondering its future integration for competitive advantage.

It is striking that human decision-making features as prominently for our authors as the fascination with AI. The challenges of command at the operational and tactical level are well known, in classic warfighting or in problematic insurgencies where there are large numbers of civilians with uncertain allegiances or levels of participation in the conflict. At the strategic level there has been a preponderance of theory but strategic practice is a feature of this work, with studies of how decisions are actually made, including under conditions of deep uncertainty where even the fundamental parameters are not known. Contrasting themes reveal fascinating variations in how to assess and manage change and adaptation, and they tell us much about comparative approaches within Western professional military education.

Framing military thought on the conduct of war

In tracking change across the *kinetic*, the *connected*, and the *synthetic*, we should not forget those aspects of war that always assert themselves. Friction intervenes in conflict. Things go wrong, individuals fail, mechanical systems break down, and attrition imposes itself in all operations, leading to culmination. In its fundamental Clausewitzian elements, war consists of reason, passion, and chance, a 'wonderous' or 'remarkable' trinity in constant tension and therefore prone to unexpected outcomes. Wars involve a variety of actors, each with various agendas or ends which, in conflict, will generate a further set of dynamics. So much of war in the early 20th century would have been recognisable to JFC Fuller: with military personnel grappling with control, pressure, and resistance. In conflicts in the 2000s in Syria, Iraq, Libya, or sub-Saharan Africa, despite the novelty of new and emerging technologies, the elements of the nature of war were present. In Syria and Iraq, for example, the allegiance and the cohesion of the people were important, the political purpose of governance was still extant, and the conflicts were sacralised perhaps even more intensely than those of the 1990s. Did technology determine the outcomes of these conflicts? To some extent it did. Rebels in Syria were overmatched by precise and overwhelming fires, and the belligerents made use of new technological innovations. Yet, on the other hand, resistance to the Syrian regime was not driven by the issue of new technology alone. Few would deny that the human element was still the most significant single aspect of the conflict.

Amongst the comparisons that can be made between war in the industrial age and in the information age, there are several that are conceptually prominent. First, we can observe in particular how, in the past, major powers enjoyed technological supremacy over others, but, periodically, in the conflicts of the early 21st century, there was a degree of parity at the tactical level. Second, in industrial war, information operations were delivered to a well-defined and identifying audience confined to individual states, but in the 21st century the same information was available to a global, critical, and sceptical audience. Third, wars *for* the people now appear to be

wars *amongst* the people. Where wars were defined by allegiance or identity defined by nation states, with distinct ideologies, regionally defined, we now observe increasingly connected peoples, sharing transnational ideas globally, with mass appeal. Fourth, in industrial conflicts, human-speed decisions were the norm, but today, accelerated decisions through an integrated human-electronic interface are common. Finally, there is an emerging global surveillance array, and global strike, which those in previous eras would have found hard to conceive. Current cyber operations are facilitating espionage, disruption, and surprise, but we are seeing code wars with much greater effects, enhanced deception, and stealth, with significant consequences for civilian governance and state integrity.

What has survived from the past is the power of the cognitive and the emotional element in war – another theme reflected upon in this volume based on considerable progress in the cognitive and emotions sciences of the past two decades. The focus of much thinking about war today, just as in the inter-war years, is the psychological element, as influence, subversion, dissonance, or some more extreme shattering of morale.

One of the challenges for the West is how to manage a major operational setback caused by surprise. This is no idle concern: every major war has begun with a major setback for the Western powers. As the recent past indicates, we can anticipate more technological breakthroughs in the next few decades, in robotics, information technology, AI and cognitive science, and materials. These could be combined to achieve persistent C4ISR, deception, greater tactical speed and accuracy, better protection, and a stronger emphasis on air mobility (as other forms of mobility seem likely to remain relatively unchanged). If, however, enhanced fires and communications outstrip manoeuvre and protection, it could produce periods of stalemate and consequently greater attrition. In terms of expected effects, many predict the further compression of time, leaving less room for decision-making at the tactical level and hence a 'hyper war' of dependence on automated systems. Cyberattacks are limited today but it is easy to imagine a much more devastating role for cyber when more and more of the world is connected and dependent on linked systems. Indeed, new forms of connectivity could even promise a *Blitzkrieg* effect, as enemies are left with slow, human-speed systems. Connectivity also enhances the role of subversion and propaganda, eroding confidence in leaders or authorities.

Military thought from the past shows that, while technological-determinist interpretations of war are common, they are not enough to understand war and its evolution.[11] It is easy to refer to new developments in weapons as marking turning points in the conduct of war.[12] All too often, however, technological failures are overlooked.[13] Humans will also find ways to outwit robotics and AI systems, just as surely as they have taken on apparently superior military forces in the past.[14] The singularity of certain technologies or systems can lead to a dangerous over-dependence. For example, advanced air power, whilst influential, did not fulfil the expectations

of its advocates as a conflict-winning weapon system on its own, and 'joint' operations have invariably been the most effective, hence the American interest in 'multi-domain battle'. Technologies confer certain advantages, and may even be essential to selected outcomes, but they do not, on their own, constitute a solution in every case. Their combination with other systems (such as communications), personnel (specialists), techniques (such as tactics), and situation (in, for example, the common objective of a coalition, or part of a grand strategy) is a more certain guarantee of success. Above all, a clear set of goals and an adroit strategy remain fundamental.

The solution to so many of these apparently technical challenges is, as the classic authors of military thought have shown, to return to the centrality of the human in war. The human is the motive force and the point of vulnerability. Despite the advocates of a decisive battle in war, brought about through breaking an adversary, physically and morally, such an outcome is rare in practice and often very costly. Today, we might place greater emphasis on *compelling an enemy to change his mind*. This might be through paralysis, deterrence, disruption or his demoralisation, or might simply be by presenting choices and options, which are themselves shaped, offered, or limited, according to one's strategic intent.

There are measurable strategic designs to achieve the objective of compelling choice. The most obvious, and perhaps over-used as the luxury of the strong, is escalation, and its consequent focus on annihilation or attrition. An alternative is exhaustion (wearing out through time, resources, willingness, or containment). Another is inflexion (to tilt, to manoeuvre, or to seize an opportunity that changes the parameters for the enemy). Yet another is deception (with false fronts, obscuration, multiple axes), or contradiction (where ambiguity, harassment, and multi-tempo actions are used), or reflexion (where one uses the enemy's weight against him, or he is drawn in, goaded, or 'wrong-footed'). There may also be a strategy of persuasion, where allies, partners, and coalitions are formed, diplomacy exercised, and international bodies brought to bear.

To defeat the adversaries of the near future, military forces and their enablers will need to attack the central operating system, namely the mind, just as Fuller already suggested 100 years ago. The routes to do this, and thus compel the target to make a choice which is compliant, can be to induce hesitation or paralysis through fear or confusion; to deter by appealing to an adversary's risk-calculus; to demoralise by depriving the adversary of information, fuel, or health; or to create options that influence their choices and render them predictable. This volume will reiterate that war is a combination of the human, the physical tools, the environments, and the cognitive frameworks. In its conduct, it remains a kinetic activity, in the sense of both physical *force* and the *flow* of information and physical elements. It will certainly be characterised by new synthetic elements – AI, information deception, new materials, and virtual system. Above all, as in the past, war and politics will be about connectivity: human networks,

economic networks, and communicative networks. These elements will reappear in different forms in the future of war, but their nature remains extant. They can be tackled together, combined in various ways, or utilised individually to produce significant changes.

The unifying thread for this volume is therefore an intellectual framework for the *conduct* of war. It is concerned with *how* military and related actions are carried out and how they are understood. Whereas the kinetic, the connected, and the synthetic function as cross-cutting principles for thinking about war, this book, as aforementioned, is divided into different parts that each deal with a germane theme in the conduct of 21st-century war. To aid the reader, the individual chapters each follow the following format: (1) they state clearly the insight offered by the chapter in an opening paragraph, (2) they lay out the intellectual challenge of thinking about war in the context of the chapter, (3) they examine either the human dimension or the technological dimension, or both, and show how the thinking about war is changing, has changed, or requires change, and (4) they then offer concluding reflections that relate to the conduct of armed conflict to illustrate their specific context.

The chapters that follow are scholarly and authoritative, but not exhaustive or artificially theorised, in order to create an accessible interpretation of the conduct of war. They cohere to address the three most fascinating and disputed ideas which are subject to intense debate at this point in the century: namely, the relative impact of those elements of war which are kinetic, synthetic, and connected.

Notes

1 Hew Strachan and Sibylle Scheipers, eds., *The Changing Character of War* (Oxford: Oxford University Press, 2011).
2 J.F.C. Fuller, *The Foundations of the Science of War* (London: Hutchinson and Company, 1926), J.F.C. Fuller, *On Future Warfare* (London: Sifton, Praed & Company, 1928).
3 Fuller himself, no doubt flattered by the accolades he received, entertained proto-Nazi thinking. Fuller was therefore, to a large extent, discredited.
4 Tim Sweijs and Floris Holstege, *Threats Arms and Conflicts: Taking Stock of Interstate Military Competition in Today's World* (The Hague: HCSS, 2020), at https://www.hcss.nl/pub/2018/strategic-monitor-2018-2019/interstate-military-competition/ (Accessed 1 June 2020).
5 Cited in Peter W. Singer, 'Tactical Generals: Leaders, Technology, and the Perils', *Brookings*, 7 July 2009, https://www.brookings.edu/articles/tactical-generals-leaders-technology-and-the-perils/ (Accessed May 2018).
6 Thomas Adams, 'Future Warfare and the Decline of Human Decision-Making,' *Parameters* 31:4 (2001–2002), 57–71.
7 John R. Allen and Amir Husain, 'On Hyperwar,' *Naval Institute Proceedings*, 143:7 (2017).
8 Drones Archive, *Proliferated Drones*, http://drones.cnas.org/drones/ (Accessed 5 November 2019), Peter Bergen, Melissa Salyk-Virk, and David Sterman, 'Who Has What: Countries with Armed Drones', *New America*, https://www.newamerica.org/international-security/reports/world-drones/who-has-what-countries-that-have-conducted-drone-strikes (Accessed 29 June 2020).

9 Peter W. Singer, 'Robots at War: The New Battlefield', in Hew Strachan and Sybille Scheipers, eds., *The Changing Character of War* (Oxford: Oxford University Press, 2011), 333–353.

10 David Schatsky, Craig Muraskin, and Ragu Gurumurthy, 'Demystifying Artificial Intelligence', *Deloitte*, 4 November 2014, https://dupress.deloitte.com/dup-us-en/focus/cognitive-technologies/what-is-cognitive-technology.html (Accessed May 2018).

11 Jeremy Black, 'Determinisms and Other Issues', *Journal of Military History*, 68:4 (2004), 1217–1232.

12 E.C. Sloan, *The Revolution in Military Affairs* (Montreal: McGill University Press, 2002), William Owens, 'The Emerging US System of Systems', *National Defense University Strategic Forum* 63 (1996), W.H. Manthorpe Jr., 'The Emerging Joint System-of-Systems: A Systems Engineering Challenge and Opportunity for APL', *Johns Hopkins APL Technical Digest*, 17:3 (1996), 305–310.

13 Sydney J. Freedberg Jr., 'Artificial Stupidity: Learning to Trust Artificial Intelligence (Sometimes)', *Breaking Defense*, 5 July 2017.

14 Matt Reynolds, 'Sneaky Attacks Trick AIs into Seeing or Hearing What's Not There', *Daily News,* 27 July 2017, https://www.newscientist.com/article/2142059-sneaky-attacks-trick-ais-into-seeing-or-hearing-whats-not-there/ (Accessed May 2018).

References

Adams, Thomas, 'Future Warfare and the Decline of Human Decision-Making,' *Parameters* 31:4 (2001–2002), 57–71.

Allen, John R., and Husain, Amir, 'On Hyperwar', *Naval Institute Proceedings*, 143:7 (2017), https://www.usni.org/magazines/proceedings/2017-07/hyperwar

Bergen, Peter, Salyk-Virk, Melissa, and Sterman, David, 'Who Has What: Countries with Armed Drones', *New America*, https://www.newamerica.org/international-security/reports/world-drones/who-has-what-countries-that-have-conducted-drone-strikes (Accessed 29 June 2020).

Black, Jeremy, 'Determinisms and Other Issues', *Journal of Military History*, 68:4 (2004), 1217–1232.

Drones Archive, *Proliferated Drones*, http://drones.cnas.org/drones/ (Accessed 5 November 2019).

Freedberg Jr., Sydney, J., 'Artificial Stupidity: Learning to Trust Artificial Intelligence (Sometimes)', *Breaking Defense*, 5 July 2017.

Fuller, J.F.C., *On Future Warfare* (London: Sifton, Praed & Company, 1928).

Fuller, J.F.C., *The Foundations of the Science of War* (London: Hutchinson and Company, 1926), https://www.newscientist.com/article/2142059-sneaky-attacks-trick-ais-into-seeing-or-hearing-whats-not-there/ (Accessed May 2018).

Manthorpe Jr., W.H., 'The Emerging Joint System-of-Systems: A Systems Engineering Challenge and Opportunity for APL', *Johns Hopkins APL Technical Digest*, 17:3 (1996), 305–310.

Owens, William, 'The Emerging US System of Systems', *National Defense University Strategic Forum* 63 (1996), https://web.archive.org/web/20100105160638/http://www.ndu.edu/inss/strforum/SF_63/forum63.html

Reynolds, Matt, 'Sneaky Attacks Trick AIs into Seeing or Hearing What's Not there', *Daily News,* 27 July 2017, https://www.newscientist.com/article/2142059-sneaky-attacks-trick-ais-into-seeing-or-hearing-whats-not-there/

Schatsky, David, Muraskin, Craig, and Gurumurthy, Ragu, 'Demystifying Artificial Intelligence', *Deloitte*, 4 November 2014, https://dupress.deloitte.com/-dup-us-en/focus/cognitive-technologies/what-is-cognitive-technology.html (Accessed May 2018).

Singer, Peter W., 'Robots at War: The New Battlefield', in Hew Strachan, Sybille Scheipers, eds., *The Changing Character of War* (Oxford: Oxford University Press, 2011), 333–353.

Singer, Peter W., 'Tactical Generals: Leaders, Technology, and the Perils', *Brookings*, 7 July 2009, https://www.brookings.edu/articles/tactical-generals-leaders-technology-and-the-perils/ (Accessed May 2018).

Sloan, E.C., *The Revolution in Military Affairs* (Montreal: McGill University Press, 2002).

Strachan, Hew, and Scheipers, Sibylle, eds., *The Changing Character of War* (Oxford: Oxford University Press, 2011).

Sweijs, Tim, and Holstege, Floris, *Threats Arms and Conflicts: Taking Stock of Interstate Military Competition in Today's World* (The Hague: HCSS, 2020), https://www.hcss.nl/pub/2018/strategic-monitor-2018-2019/interstate-military-competition/ (Accessed 1 June 2020).