The University of Hull

CLAUSEWITZIAN FUTURE: STRATEGIC THOUGHT AND THE NATURE OF WAR IN THE INFORMATION AGE

being a thesis submitted for the Degree of

PhD

in the University of Hull

by

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July 2001

Dedicated to the memory of

Minnie Lonsdale (1908-1998)

Acknowledgements

I would like to thank my supervisor Colin S. Gray, who has not only given me immeasurable support in the writing of this thesis, but also introduced me to the love of Strategic Studies. I am also indebted to my fellow doctoral candidates at the Centre for Security Studies, University of Hull, who it was a pleasure to work with. In particular, I would like to thank Adam Baddeley, Malcolm Davis, and James Kiras, for their long discussions that proved a constant source of joy and inspiration. I would like to express my gratitude to the staff in the Department of Politics at Hull, who provided me with much needed support during my research. The final stages of this thesis were made much easier thanks to the support of my new colleagues at the Joint Services Command and Staff College. In particular, I would like to thank Matt Uttley for his support and advice. Finally, and most importantly, I would like to express my sincere gratitude to my family, who have shown unfailing support throughout my academic career.

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INTRODUCTION

The proliferation of information technology, what Winn Schwartau describes as 'computers everywhere', [1] has spawned a profusion of speculations concerning the changing nature of societies and economies. Indeed, the period covering the late-twentieth century and the early years of the twenty-first is now commonly accepted as being the 'information age'. Running alongside the debate concerning the socio-economic implications of this new epoch, and often converging with it, is a field of literature ruminating over the impact the information age will have on war and strategy. The Revolution in Military Affairs (RMA) literature, which is both diverse and plentiful, discusses a plethora of changes to war in the future. [2] Within these visions information is the primary agent of change. This study begins from the premise that information represents an ever present dimension of warfare and strategy. Indeed, information warfare (IW), a dominant buzzword in the RMA literature, has been a constant feature of conflict. Field Marshall Slim's account of the Burma campaign indicates just how important information has been historically. Slim noted that a fundamental difference between the Japanese and Allied forces during the early Japanese successes, was that the Japanese possessed good information, whereas "It is no exaggeration to say that we had practically no useful or reliable information of the enemy strength, movements, or intentions." [3] Similarly, Napoleon's use of a cavalry screen and Hannibal's deception at Lake Trasimene are classic examples of information warfare, because they both involve the denial of information to the enemy. [4]

Though it is reasonable to suggest that the information age will affect the conduct of

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[1] Winn Schwartau, *Information Warfare: Cyberterrorism: Protecting Your Personal Security in the Electronic Age*, Second Edition, (New York, Thunder's Mouth Press, 1996), Chapter 2, pp71-86.

[2] In the context of this thesis, the term 'RMA Literature' is utilised to refer collectively to those works that generally subscribe to the notion that revolutionary change, fuelled by the information age, is occurring. Of course, within the broad church of the RMA literature there exists a range of views on the changes to come.

[3] Robert B. Asprey, *War in the Shadows*, (London, Little, Brown and Company, 1994) p419.

[4] David Chandler, *The Campaigns of Napoleon*, (London, Weidenfeld & Nicolson Ltd., 1966) p165, and Nigel Bagnall, *The Punic Wars: Rome, Carthage and the Struggle for the Mediterranean*, (London, Pimlico, 1999), pp180-183.

warfare and strategy, the advocates of the RMA are on less safe ground when they proclaim, as William E. Odom does, that "the very nature of war is changing.". [5] The grammar of war is mutable, its logic is not. [6] For the purposes of this study war is defined in Hedley Bull's language as "organised violence carried on by political units against each other." [7] In reference to strategy, Colin S. Gray defines it as: "the use that is made of force and the threat of force for the ends of policy." [8] Similarly, strategy is defined by Carl von Clausewitz as "the use of engagements for the object of the war." [9] Andre Beaufre, in his definition of strategy, focuses attention on the interaction between belligerents: "the art of the dialectic of two opposing wills using force to resolve their dispute." [10] An alternative definition which draws its inspiration from those of Clausewitz, Gray, and Beaufre, may describe strategy as *the art of using military force against an intelligent foe(s) towards the attainment of policy objectives.* To summerise: war is a purposeful act of actual or threatened physical violence which takes place within a dialectic relationship.

In general, the RMA literature implicitly suggests that the ever increasing use of advanced information systems in the battlespace, and the more general implications of the proliferation of information technology, indicate that information may be achieving a more direct and decisive role in warfare. This change to the character of war may be of such proportions that the nature of war itself is transformed. Primary exponents of such ideas are Alvin and Heidi Toffler. In their seminal work *War and Anti-war: Survival at the Dawn of the 21st Century*, the Tofflers declare that the coming change is a momentous one in human history. They postulate that

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[5] William E. Odom quoted in A. J. Bacevich, 'Preserving the Well-Bred Horse', *The National Interest*, No. 37, Fall 1994, p46. This proclivity to postulate that the nature of war is changing is widespread. See also Jeffrey McKitrick, James Blackwell, Fred Littlepage, George Kraws, Richard Blanchfield, and Dale Hill, 'The Revolution in Military Affairs', http://www.airpwr.maxwell.af.mil/airchronicles/battle/chap3.html Similarly, David C. Gompert makes the same claim. See David C. Gompert, 'The Information Revolution and US National Security', *Naval War College Review*, Autumn 1998, Vol. LI, No. 4, p29. Other examples can be found in Chapter 1, p1.

[6] For a discussion of the difference between the grammar and logic of war see Carl von Clausewitz, *On War*, trans. Michael Howard and Peter Paret, (London, David Campbell Publishers Ltd., 1993), p731.

[7] Hedley Bull, *The Anarchical Society: A Study of Order in World Politics*, (London, MacMillan, 1977), p184.

[8] See Colin S. Gray, *Modern Strategy*, (Oxford, Oxford University Press, 1999), p17.

[9] Clausewitz, p146.

[10] Andre Beaufre, *An Introduction to Strategy: With Particular Reference to the Problems of Defence, Politics, Economics, and Diplomacy in the Nuclear Age*, (London, Faber and Faber, 1965), p22.

humanity is entering its third wave of civilisation. In the wake of the agricultural and industrial waves, man is now entering the information wave of his existence. Both in the battlespace and within society at large, knowledge is becoming the central resource. At the heart of their work is the notion that the manner in which a society operates, and in particular how it produces wealth, will generally determine how it wages war. [11] The importance of this defence debate lies partially in the fact that the touch of information in warfare is ubiquitous. An exploration of information's role in warfare leads strategists into most of the dimensions concerning both the preparation for, and conduct of, war. Sections of the RMA literature even raise questions concerning the continuance of man's role in conflict. This latter point is superlatively underlined by J. F. C. Fuller's identification of what he defines as the hidden impulse in the technological epoch of war, which is: "The elimination of the human element both physically and morally, intellect alone remaining." [12]

Although it would be incorrect to note that a clear and unanimous definition of the nature of war exists, it is fair to note that the activity of warfare is generally understood to be constituted of certain characteristics. This subject will be addressed fully in Chapter One. At this stage, it is sufficient to note that war is generally perceived as a human contest in the pursuit of policy objectives, and is infused by chance, uncertainty, violence, and physical exertion. This description reflects the Clausewitzian paradigm, and is enshrined within a number of concepts to be found in *On War*. Of particular relevance are the 'trinity', 'climate of war', and 'friction'. [13] Taken together, these three concepts encompass the true nature of war.

Increasingly, concepts and capabilities associated with the information age, such as Dominant Battlespace Knowledge (DBK); the Mesh; Netwar; Strategic Information Warfare (SIW); standoff precision munitions; and Unmanned Aerial Vehicles (UAVs), are challenging some of the above established characteristics of the Clausewitzian world view. If the predictions

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[11] Alvin and Heidi Toffler, *War and Anti-war: Survival at the Dawn of the 21st Century*, (London, Little, Brown and Company (UK) Limited, 1994). An even more radical vision of the changes to come in both society and warfare is to be found in, Michael Vlahos, "The War after Byte City", *The Washington Quarterly*, 20, no. 2, spring 1997, 39-72.

[12] J. F. C. Fuller, *Armament and History: A Study of the Influence of Armament on History from the Dawn of Classical Warfare to the Second World War*, (London, Eyre and Spottiswoode, 1946), pv.

[13] Clausewitz, *passim*.

of the RMA enthusiasts come to pass, and Clausewitz's theories look increasingly jaded, then a gap will be left in the theoretical literature, which may be filled by another of the classical works, such as Sun Tzu's *The Art of War*. Alternatively, we may have to turn towards the writings of the information age to seek an understanding of the nature of war in the future. At minimum, strategists may have to supplement the established theories with more recent works which take greater account of the coming changes.

These thoughts are not merely idle academic theorising. Strategic Studies is a practical subject. An enhanced dimension of strategy, with its own grammar, offers new methods through which to pursue strategic objectives, and also creates new vulnerabilities. Any fundamental changes to the character of warfare will require appropriate alterations in how to prepare for, and fight, future conflicts. Likewise, a proper understanding of strategy in the information age may present actors with new and more effective ways to achieve their strategic goals. Gray summarises why this debate matters when he notes: "The Stakes are very high indeed.... the subject of the RMA is the prevention, conduct, and outcome of wars." [14] Bearing in mind the costs, including opportunity costs, and lead-time required for major defence development projects, a well-informed understanding of warfare in the information age is required now. How one adapts to an emerging RMA can have important consequences. German adaptation to armoured forces, wireless radio, and airpower, endowed them with a relative advantage which became evident in the years 1939-1941. However, this same example reveals how transitory such an ascendancy can prove to be, and how the operational superiority of an RMA does not automatically translate into a theory of strategic victory. Therefore, there are dangers both in not exploiting an RMA sufficiently, and also in placing all your strategic eggs in the RMA basket.

In light of the above remarks, it is the objective of this thesis to draw the implicit assumptions of the RMA literature into the open in a coherent manner, and from there, to test the hypothesis that the information age will witness a fundamental change to the nature of warfare.

The Information Age Warfare (IAW) debate encompasses a wide array of topics of

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[14] Colin S. Gray, 'A Contested Vision: The RMA Debate Today', (paper presented at The Royal Institute of International Affairs conference *"Revolution in Military Affairs? Challenges to Government and Industry in the Information Age."*, Chatham House, London, 21-22 May, 1997), p10.

strategic interest, therefore, the relevant literature covers a number of areas, and can be divided into a number of categories. Within the literature that deals explicitly with the conduct of warfare, three broad areas of debate can be identified. The first of these is concerned with information age warfare as it is applied to the battlespace. This covers the character of conflict, as well as the forces and operations that will characterise it. An associated area deals with issues of command in the information age. The subject of command is of particular interest to this thesis because it is an area in which the balance between the human dimension and the role of RMA technology, and the related organisational implications, is particularly important. Also, command presents us with Clausewitz's concept of the 'military genius', who excels in spite of the fog and friction of war.

Whilst not disregarding the battlespace literature, in fact often coalescing with it, a third section of the literature concentrates its focus upon what has been termed Strategic Information Warfare (SIW). In ways reminiscent of the early air power theorists of the interwar years, this section of the literature focuses upon 'strategic' war waged against information age infrastructures, both through cyberspace and with more traditional physical methods of attack. [15] As mentioned, this facet of the literature does not entirely ignore other forms of warfare. The methods employed in SIW can be utilised in an interdiction role, but the SIW literature often expresses the notion that SIW could be the dominant, perhaps decisive strategy of choice for the twenty-first century. Akin to the early air power theorists, some writers imply that a new centre of gravity has developed, which if targeted could produce decisive leverage. Alternatively, perhaps an old centre of gravity has been rediscovered. The centre of gravity in question is the interdependence of modern societies and economies. This time the reference is to information age societies rather than their industrial forerunners. The interdependencies and dependencies may be greater, the infrastructure could be more vulnerable, and the weapons more accurate and reliable. If this is the case, then the future of warfare may become increasingly characterised by SIW. However, whether this method of conflict has the potential for independent and decisive strategic effect will be explored in Chapter Four.

There is a distinct technological bent to much of the RMA literature. Consequently,

[15] See Chapter 4, pp140-142, for a discussion on the misuse of the term 'strategic'.

the debate over IAW has helped to refocus attention on the role technology plays in strategy. Opinion is sharply divided on this issue. At the one extreme, Fuller is unequivocal about the role of technology in deciding the outcome of a conflict: "Tools or weapons, if only the right ones can be discovered, form ninety-nine per cent of victory." [16] Whereas, although Martin van Creveld recognises that technology permeates all aspects of warfare, he suggests that its limitations are more important than its advantages. [17] For Michael Howard, the technological dimension of strategy is but one amongst four. The other dimensions in Howard's taxonomy are *operational, social, and logistical.* Howard argues that the relative dominance of each dimension is dependent upon circumstance. [18] Similarly, Gray asserts that as a dimension of strategy: "[t]echnology is important. But historical evidence suggests that the outcomes to none of the wars in modern history among the great powers have plausibly been determined by superiority in weapons technology." [19] Throughout this study, Gray's multidimensional approach is utilised as an antidote to the bouts of reductionism prevalent in some of the RMA literature.

Discourse on the information age RMA formed into its present manifestation after the 1991 Gulf War. However, the broader theoretical foundations of the debate, and the historical evolution of the technology and operations which form the core of IAW as it is applied to the battlespace, can be traced back much further. In this vein, in the mid-1980s the Soviet Marshal Nicolai Ogarkov began hypothesising about what he termed a 'Military Technical Revolution' (MTR). Ogarkov identified developments in computers, space surveillance, and long-range missiles as the defining characteristics of this MTR. [20] One can go even further back than this though. In a material sense, the Second World War bore witness to significant exploitation of the electromagnetic spectrum, long-range missiles, and the early development of precision munitions. [21] Alternatively, Jonathan Bailey posits that the genesis of the modern style of warfare - including

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[16] Fuller, *Armament and History*, pv.

[17] Martin Van Creveld, *Technology and War*, Revised and Expanded Edition, (New York, The Free Press, 1991).

[18] Michael Howard, 'The Dimensions of Strategy', in Lawrence Freedman (ed), *War*, (Oxford, Oxford University Press, 1994).

[19] Gray, *Modern Strategy*, p37.

[20] For a discussion of the development of the RMA, see James R. Blaker, *Understanding the Revolution in Military Affairs: A Guide to America's 21st Century Defense*, Progressive Policy Institute, Defense Working Paper 3, (Washington, DC, January 1997)

[21] See Guy Hartcup, *The Silent Revolution: Development of Conventional Weapons 1945-85*,

information age warfare - is directly a result of the development of indirect artillery fire in 1917-1918. [22] And, as already mentioned, information warfare is readily identifiable in past conflicts.

Clearly, the current debate has varied theoretical and material origins, depending upon one's perspective. This historical basis is further exemplified through the concepts of integration and jointness. Although both of these concepts are fashionable within the information age warfare literature, they also have historical foundations. Williamson Murray notes that it was the German's combined-arms framework which allowed them such an edge in the exploitation of the tank in armoured warfare in World War Two. [23] The Fourth-century B.C exhibits even more ancient exponents of integration. Both Alexander the Great and his father Phillip II of Macedon led armies that derived much of their effectiveness from their proficiency in combined-arms. [24] The conundrum of whether the concepts of integration and jointness have greater salience in the information age than in the past, is perhaps best summed up by former Chairman of the Joint Chiefs of Staff (JCS) John M. Shalikshili: "The nature of modern warfare demands that we fight as a joint team. This was important yesterday, it is essential today, and it will be even more imperative tomorrow." [25] Hence, the increasing focus on systems.

Within the information age literature, the concept of integration is best exemplified by the work of Admiral William Owens and Martin Libicki. In Owens' vision, a system of systems can be created through the integration of three areas of technology. These are: intelligence, surveillance, and reconnaissance (ISR); command, control, communications, computer applications, and intelligence processing (C^4I); and precision force. Owens insists that

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(London, Brassey's, 1993).

[22] Jonathan Bailey, 'The First World War and the Birth of the Modern Style of Warfare', *Occasional Paper*, No 22, (Camberley, Strategic and Combat Studies Institute, Joint Services Staff college, 1997).

[23] Williamson Murray, ' Armoured Warfare: The British, French, and German Experiences', in Williamson Murray and Allan R. Millett (eds), *Military Innovation in the Interwar Period*, (Cambridge, Cambridge University Press, 1996), p40.

[24] See Arther Ferrill, *The Origins of War: From the Stone Age to Alexander the Great*, (London, Thames and Hudson Limited, 1985). J. F. C. Fuller mirrors Ferrill's assessment that Phillip II created the all-arms tactical organisation which was an enabling factor in Alexander's successes. See Fuller, *Armament and History*. p39. Lieutenant Colonel Stephen J. Kirin also notes that Field Marshal Slim was a great exponent of the art of synchronisation. See Lieutenant Colonel Stephen J. Kirin, "Synchronisation", *Naval War College Review*, Vol. 49, No.4, Autumn 1996, pp7-21.

[25] Joint Chiefs of Staff, 'Joint Vision: America's Military – Preparing for Tomorrow', *Joint Force Quarterly*, No. 12, Summer 1996, pp34-49.

the RMA, as exemplified by the system of systems, represents a new appreciation of joint military operations, and depends on the contributions of all the services, and a common military doctrine. [26] Libicki's speculations on the future battlespace share a number of common features with those espoused by Owens. Libicki's concept of the 'mesh' foresees an ever more ubiquitous coverage of the battlespace by sensors, and an ever closer relationship between sensors and shooters. The ultimate expression of this relationship comes in the form of fire-ant warfare, in which a myriad of sensors either cue a host of mini projectiles, or indeed merge to a point were the sensors are also simultaneously the shooters. [27] Of course, the merger of sensors and shooters is already upon us. This development is apparent in a number of weapon systems, notably a host of acoustic-based autonomous systems such as the Brilliant Anti-Tank (BAT) submunition. [28] What distinguishes Libicki's vision from the weapon systems of today is the ubiquity of multispectral sensors to form a mesh which no manned platform can evade. Libicki comes to the conclusion that "[b]y 2015, visibility is even more likely to equal death on the battlefield." [29] On a practical level, higher levels of integration are being developed by the United States Army's Force XXI program, which seeks to link every unit in the battlespace through digitisation. [30] This goal is being facilitated by a number of initiatives such as the Tactical Internet, ASAS-RWS, ABCS & AFATDS. [31] Likewise, significantly improved levels of integration have achieved operational reality in the United States Navy's (USN) Co-operative Engagement Capability (CEC). Increasing levels of digital connection amongst units and weapon systems has led sections of the RMA literature to place

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[26] Admiral William A. Owens, 'The Emerging System of Systems', *Military Review*, Vol. 75, No 3, May-June 1995, pp15-19. See also Admiral William A. Owens, 'Introduction', in Stuart E. Johnson and Martin C. Libicki (eds), *Dominant Battlespace Knowledge*, Revised Edition, (Washington DC, National Defense University, 1996), pp1-14.

[27] These thoughts, and many others on the subject of the information age battlefield, are developed by Libicki in his work, *The Mesh and the Net: Speculation on Armed Conflict In an Age of free Silicon*, McNair Paper No 28, (Washington, DC: National Defence University, Institute for National Strategic Studies, March 1996)

[28] Marvin G. Metcalf, 'Acoustics on the 21st Century Battlefield', *Joint Force Quarterly*, No 10, Winter 1995-1996, pp44-47. For further details on autonomous weapons see Michael Sovereign, 'DBK with Autonomous Weapons', in Johnson and Libicki (eds), *Dominant Battlespace Knowledge*, pp103-113.

[29] Martin C. Libicki, 'Technology and Warfare', in Patrick M. Cronin (ed), *2015: Power and Progress*, http://www.ndu.edu/ndu/inss/books/2015/chap4.html

[30] Jason Sherman, 'Rush to Digitization: Has the Electronic Battlefield Been Oversold?', *Armed Forces Journal International*, February 1996, pp40-42.

[31] See Lieutenant Colonel Michael R. Nifong, 'The Key to Information Dominance', *Military Review*, Vol. 76, No. 3, May-June 1996, pp62-67.

networks at the centre of future conflict. Notable in this respect are the writings of Arquilla and Ronfeldt and the concept of 'Network-Centric-Warfare' (NCW). [32]

A key operational goal that could be made possible by the levels of integration mentioned above, is Dominant Battlespace Knowledge (DBK). DBK builds upon the information coming from ISR assets, and produces knowledge of the enemy system, identifying key nodes and weaknesses, as well as marrying weapons to targets. A related concept is situational awareness. This operational concept seeks the acquisition of a real-time image of the battlespace that includes knowing the disposition and location of both friendly and hostile forces. The objective is the creation of a transparent battlespace. Efforts to realise these operational concepts work to remove the fog of war from the battlespace for one's own forces, whilst increasing it for the enemy. Clearly, the attainment of these goals would go some way towards undermining an important element of the Clausewitzian paradigm. Of a similar ilk is 'information dominance'. Arquilla defines information dominance as "Knowing everything about an adversary while keeping the adversary from knowing much about oneself." [33] To Arquilla's definition, one might add that information dominance also includes: *Knowing everything about oneself while keeping the adversary from knowing much about himself.* Achieving these objectives is increasingly being regarded as the primary operational goal, as a prerequisite to undertaking more traditional operations such as winning command of the air. [34] Achieving information dominance is also said to facilitate the exploitation of 'control warfare', as opposed to strategies characterised by manoeuvre or attrition. [35] On this issue Gray correctly alerts us to the fact that such claims as these present a false distinction amongst these three styles of warfare. [36]

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[32] Most of Arquilla and Ronfeldt's work on this subject can be found in John Arquilla and David Ronfeldt (eds), *In Athena's Camp: Preparing for Conflict in the Information Age*, (Santa Monica, RAND, 1996). For NCW see Vice Admiral Arthur K. Cebrowski, 'Network-Centric Warfare: An Emerging Military Response to the Information Age', *Command and Control Research and Technology Symposium*, June 29, 1999, and Stanley B. Weeks, 'US Maritime Doctrine and Manoeuvre Warfare', *New Dimensions: Maritime Manoeuvre and the Strategic Defence Review*, Conference at the University of Hull, 2 July, 1999.

[33] John Arquilla, 'The Strategic Implications of Information dominance', *Strategic Review*, Vol. 22, No. 3, Summer 1994, p25.

[34] See Nifong, and Phillip L. Ritcheson, 'The Future of "Military Affairs": Revolution or Evolution?', *Strategic Review*, Vol. 24, No. 2, pp31-40, and General Gordon R. Sullivan, 'A Vision for the Future', *Military Review*, Vol. 75, No. 3, pp5-14.

[35] See Arquilla, 'The Strategic Implications of Information Dominance'.

[36] Gray, *Modern Strategy*, pp159-162 and pp176-179.

Other important buzzwords reverberating throughout the RMA literature are 'simultaneity' and 'non-linearity'. Rather than a campaign being characterised by frontlines, and a series of related, but independent operations, campaigns in the information age will allegedly take the form of simultaneous attacks throughout the breadth, depth, and cyberspace of the battlespace. The objective is to impose complete systemic shock upon the enemy. [37] In this sense it is often claimed that the tactical, operational, and strategic levels are merging. [38] Thoughts like these appear to resonate with the quest for decisive battle. At one level this emphasis on the decisive clash of arms has a certain Clausewitzian ring to it. However, fundamentally it ignores the essence of Clausewitzian thought by all but ignoring the relationship between military means and policy ends. It also ignores the paradoxical logic of strategy and exhibits the danger of falling into the fallacy of the final move, and finally it has the tendency to reduce the complex, interactive activity of strategy to mere bombardment.

Although the RMA literature displays certain common features, such as its emphasis on regular warfare [39] and its astrategic outlook, it does not present a homogenous view of the future. In contrast to the above undue emphasis on battle, a section of the literature recoils somewhat from the use of destructive and violent force, and instead seeks decision through disruption and/or information dominance. [40] Lawrence Freedman postulates that the primacy of these concepts may have its roots in the cultural bias of the U.S. [41] Whatever its origins, disruption is being hailed as the replacement for war based around destruction. [42] A further concept which reflects both the socio-political attitudes of the United States - which in some sections of the US policy making establishment have created a culture of casualty aversion - and the technological

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[37] For a discussion of many of the operational concepts in the RMA literature see Colin S. Gray, 'The American Revolution in Military Affairs: An Interim Assessment', *The Occasional*, No. 28, (Camberley, Strategic and Combat Studies Institute, 1997), p10.

[38] For example, see Jeffrey R. Cooper, 'Another View of the Revolution in Military Affairs', in Arquilla and Ronfeldt (eds), *In Athena's Camp*, p129.

[39] This point is made in Christopher Jon Lamb, 'The Impact of Information Age Technologies on Operations Other Than War', in Robert L. Pfaltzgraff, Jr. and Richard H. Shultz, Jr. (eds), *War in the Information Age: New Challenges for U. S. Security Policy*, (Washington, DC, Brassey's, 1997), p247.

[40] These sentiments can be found variously in the works of Arquilla and Ronfeldt, and Libicki. See the discussion of this subject in Chapter 2, pp75-79.

[41] L. Freedman, *Information Warfare: Will Battle Ever Be Joined?*, International Centre for Security Analysis (Launch), 14th October 1996.

[42] John Arquilla, and David Ronfeldt, *The Advent of Netwar*, (Santa Monica, RAND, 1996).

advances of the information age, is Edward Luttwak's notion of *Post-Heroic Warfare.* This mode of operation stresses forms of conflict that minimise contact between forces, and thereby hopefully reduces casualties. [43]

Finally, higher tempo of operations is an important feature in visions of the RMA battlespace. Real-time information allied to DBK is said to facilitate a significantly higher tempo of operations relative to the enemy. This condition allows one's forces to operate inside the decision-making cycle of the adversary. The philosophical father of this concept is Boyd's OODA cycle. Once again, the implications of overemphasising this approach can entail an astrategic, one-dimensional perspective of war, and ignorance of the human element in warfare. This latter error is particularly pertinent in regards to command issues. The search for an ever-higher tempo could lead to the temptation to remove the human actor from the decision making loop, and perhaps replace him with AI. This, in conjunction with the increasing promotion of the network C^2 structure raises serious questions about the human dimension of command that is enshrined in the ideal model of Clausewitz's 'military genius'.

If the above visions of the future battlespace are taken too seriously there could be significant implications for the structure of forces in the information age. Libicki's work in particular explicitly signals the demise of the manned platform. He propounds that in the contest between stealth and the Mesh, the ubiquitous sensors will be victorious. [44] Libicki follows through the logic of the omnipotent mesh to conclude that warfare will cease to be a force-on-force experience, and will increasingly be characterised by hide and seek, with the seekers having the edge. The notion is mass of effect rather than the massing of force. [45] In this sense, it is possible to conclude that just as Bernard Brodie characterised the post-World War Two period as 'the missile age', then perhaps the information age represents the second missile age, in which missiles expand there dominance from the inappropriately named 'strategic' level to the operational and tactical levels. Alternatively, the information age may facilitate the conduct of 'post-modern warfare', in

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[43] See Edward N. Luttwak, 'A Post-Heroic Military Policy', *Foreign Affairs*, Vol. 75, No. 4, July/Aug. 1996, pp33-44, and Edward N. Luttwak, 'Toward Post-Heroic Warfare', *Foreign Affairs*, Vol. 74, No. 3, May/June 1995, pp109-122.

[44] Libicki, *The Mesh and the Net.*

[45] Libicki, *Technology and Warfare.*

which precise, distant bombardment dispenses with the need to deploy ground forces in a combat role and thereby relegates them to a constabulary function. [46] Many of these notions are not only astrategic and ignore the paradoxical logic of strategy, they also implicitly rely upon unrealistically effective operations, and thereby seemingly ignore the realities of friction.

As mentioned earlier, the art of command is an important testing ground for the interplay between humans and technology. In this respect, there has been a great deal of attention paid to potential changes in command style and structures. An area that has received a great deal of this attention is the structure of command systems. It is often noted in the literature that the hierarchical structure of current military command systems is inappropriate in the face of 'command networks' that are facilitated by the information age. These networks are based around a more equitable dispersal of power amongst more equal units. This creates a more flexible system, with a quicker information flow, and without a recognisable head that can be decapitated. Most notable in this field is the work of Arquilla and Ronfeldt. [47] As the debate has matured, hybrid concepts have appeared which attempt to marry military traditions with the challenges and opportunities of the information age. [48] It is predicted, often within military circles, that tying concepts such as DBK to network forms of C^2 will give lower echelons greater leverage. [49]

Acting somewhat as a counterbalance to these views, much of the broader command literature is infused with a greater emphasis on the role of human characteristics in the art of command. This is evident in the writings of many of those responsible for command, from the First-century Greek Onasander, through the reflections of Field Marshals Wavell and Montgomery, to the writings of those who commanded in the Gulf war of 1991. [50] The central role

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[46] This notion is discussed in Captain Chris Parry, 'Some Recent and Emerging Themes in Maritime Warfare', *New Dimensions: Maritime Manoeuvre and the Strategic Defence Review*, Conference at the University of Hull, 2 July 1999.

[47] Arquilla and Ronfeldt, *The Advent of Netwar*, and Ashley Craddock, 'Netwar and Peace in the Global Village', an interview with John Arquilla, in *Wired*, 5.05, May 1997.

[48] See Captain John Bodnar, and Second Lieutenant Rebecca Dengler, 'The Emergence of the Command Network', *Naval War College Review*, Vol. 49, No 4, Autumn 1996, pp93-107.

[49] 'Joint Vision: America's Military - Preparing for Tomorrow', p41.

[50] See the chapter 'Onasander', in G. Chaliand, *The Art of War in World History: From Antiquity to the Nuclear Age*, (Berkeley, University of California Press, 1994) pp154-156. Archibald Wavell, *Generals and Generalship*, (London, The Times Publishing Co. Ltd., 1941). For an example of command in the Gulf War of 1991, see General Sir Peter de la Billiere, *Storm Command*, (London, HarperCollins, 1992).

of the individual human commander is a shared theme in all three of the classical works. With Napoleon as their model both Clausewitz and Jomini understandably place the individual in centre stage. However, reflecting their differing perceptions on the predictability of war, Jomini sees the role of the commander as that of applying his identified principles of war, whereas for Clausewitz it is the traits of the military genius that are required to deal with the uncertainty and stresses of war. In Sun Tzu's work the human side of command is revealed as a contest of wits, which includes understanding and playing upon the characteristics of the opposing general. For the future, a synthesis is required which can accommodate the advantages offered by AI and networks, but which does not forgo the requisite human features of command. War, and therefore command, are both simultaneously human activities but are also composed of a series of processes in which infrastructures and information are significant enablers.

The RMA literature that advocates many of the above revolutionary changes is not without its detractors. As the debate has matured, a number of writers have appeared to challenge many of the features of the RMA literature and offer more balanced appraisals on the future of warfare. Prominent amongst these are Riper and Scales, and Gray. Occasionally, individual essays make an important and striking contribution to the debate. In this latter category, Brian Holden Reid's *Enduring Patterns in Modern Warfare* is worthy of particular note. [51] The cautionary remarks of these authors stem from an appreciation of many of the key elements of strategy, and include friction, policy requirements, and asymmetrical forms of warfare. When considering the latter of these, the range of options available to a foe facing an RMA force are many and varied. They range from the employment of WMD to the adoption of various styles of 'small wars'. [52] One of the most troublesome asymmetrical responses in the long run will be the use or threat of WMD, especially nuclear weapons. Nuclear weapons can be used both as weapons of mass disruption (relying upon their EMP effect), and thereby directly attack the electronic basis

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[51] See Paul Van Riper and Robert H. Scales, Jr., 'Preparing for War in the 21st Century', *Parameters*, Volume XXVII, No. 3, Autumn 1997, pp4-14, Gray, 'The American Revolution', and Brian Holden Reid, 'Enduring Patterns in Modern Warfare', in Brian Bond and Mungo Melvin (eds), *The Occasional: The Nature of Future Conflict: Implications for Force Development*, Number 36, September 1998, pp15-30.

[52] For the classic explanation of small wars see C. E. Callwell, *Small Wars: A Tactical Textbook for Imperial Soldiers*, (London, Greenhill Books, 1990).

of an information age adversary's capability, [53] as the means to deliver large amounts of destructive force to negate the qualitative advantage of an RMA foe, or as a deterrent force. Some strategies adopted to offset RMA competence may actually serve to reinforce the potential changes in the nature of war. This is potentially the case in the use of SIW.

The SIW debate exhibits important similarities to the early musings on conventional strategic bombing. Although there has yet to emerge an information age variant of Douhet, making ambitious claims concerning the independent war-winning potential for SIW, some have come close. Schwartau is notable for postulating that this form of information warfare will become the dominant form of state conflict in the information age. [54] If this indeed becomes the case, then the concept of the nature of war will need some reworking.

This facet of the information warfare debate has received a great deal of attention in both academic and policy circles. President Clinton issued an Executive Order establishing the *President's Commission on Critical Infrastructure Protection,* [55] and various new operational units have been established to counter this threat. [56] The bulk of the current literature displays a level of concern that is consistent with the spirit of the Presidential Executive Order, although there are a few notable dissenting voices that play down the threat from SIW. [57] Amongst the concerned fraternity, the most extreme proponents warn of the shut down of information age societies in the wake of an attack. At minimum it is predicted that the economic competitiveness of a society would be seriously compromised. [58] There are a plethora of facts and figures that reveal both the

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[53] Charles S. Grace, *Nuclear Weapons: Principles, Effects and Survivability*, Land Warfare: Brassey's New Battlefield Weapons Systems and Technology Series, Volume 10, (London, Brassey's, 1994). See chapter 7 for details of the EMP effects of nuclear weapons, and possible defensive measures in the face of such effects.

[54] Schwartau, pp27-28.

[55] A copy of this executive order can be found at the following Infowar.com URL. http://www.infowar.com/CIVIL_DE/Cyberwar.html-ssi This project has been described by Former Deputy Attorney General Gorelick, as the equivalent of the Manhattan project. See John Carlin, 'The Netizen: A Farewell to Arms', *Wired*, 5.05, May 1997.

[56] One such example is the USAF's 609th Information Warfare Squadron. See Chris O'Malley, *Information Warriors of the 609th: Air Force's 609th Information Warfare Squadron*, http://www.infowar.com/mil_c4i/mil_c4i_100397a.html-ssi

[57] In this country, Lawrence Freedman is one of the few writers to have written on this issue. See his paper, *Information Warfare: Will Battle Ever be Joined?*

[58] P. G. Neumann, 'Security Risks in the Computer-Communication Infrastructure', Written testimony for the U.S. Senate Permanent Subcommittee on Investigations of the Senate Committee on Governmental Affairs, 25 June 1996. p41

growing dependence on information assets, and the related level of vulnerability. Perhaps the most telling of these is the fact that 97% of the U.S. GDP exists as *Cybercash,* meaning that it exists only on computers. A much-vaunted figure is that 95% of government and military communications travel along private lines. [59] It is also important to note that the power grid; transportation network; telecommunication network; water supply system; financial and banking services; emergency services, and many other central sectors of post-industrial societies rely upon computer networks, and are therefore potentially vulnerable to SIW attack. It is reported that Just-in-time (JIT) inventory control and management systems have become imbedded in the national strategic infrastructure (NSI) of the U.S. [60] This latter development allows a greater exploitation of efficiencies, but at the same time creates a certain amount of fragility within the system, as the fuel crisis demonstrated in the United Kingdom in September 2000.

The foundation for the ideas of the SIW literature is the notion that a late-industrial or information age society is increasingly dependent upon information and the required infrastructure. [61] Information is increasingly being discussed as a strategic asset. Consequently, these assets represent valuable targets through which to exert leverage and pursue policy objectives against such societies. A notable feature of SIW is that the capabilities required to wage such a campaign are widely available. [62] It is also notable that such a campaign can be waged by an individual or small group. Although, some authors argue that a large-scale campaign requires substantial resources. [63]

Molander *et al.* have identified two categories of SIW. Alongside the *Homeland* variety as discussed above, they correctly note that a SIW capability can be used to disrupt military operations. [64] The RAND study on SIW identifies four distinct theatres of operations in which the

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[59] The Cybercash figure was taken from Schwartau p43. See Schwartau p48 for details concerning usage of private lines by the military and government.

[60] Peter A. Wilson, 'The Transformation of Military Power, 1997-2027', paper presented at the 1997 Pacific Symposium, Honolulu, Hawaii, 28-9 April, 1997, p5.

[61] S. Nunn, 'Opening Statement', *Senate Permanent Subcommittee on Investigations Hearing on Security in Cyberspace*, 25 June 1996.

[62] The ease with which hacking techniques can be obtained is noted in Schwartau. p39, and John M. Deutch, 'Foreign Information Warfare Programs and Capabilities', Statement for the Record to the *U.S. Senate Committee on Governmental Affairs; Permanent Subcommittee on Investigations*, 25th June 1996, p3

[63] Schwartau, p542.

[64] See Roger C. Molander, Andrew S. Riddile, and Peter A. Wilson, 'Strategic Information

U.S. deploying overseas forces can be attacked. These are: U.S. Zone of Interior; Intercontinental Zone of Communications and Deployment; Allied Zone of Interior; and the Battlefield. [65] In this vein, troop deployments, communications, and logistics present valuable targets. Logistics could prove a particularly inviting target as information age militaries increasingly adopt JIT logistics to increase efficiency and reduce their vulnerable logistics tail. [66]

The final area of thought that will be dealt with in this thesis concerns the geopolitical ramifications of the information age. The accessibility and flexibility of information power has led a number of writers to proclaim the demise of the nation state and the growing insignificance of physical geography and proximity in international politics. [67] The radical nature of such claims testifies well to the scope and reach of the changes the information age will allegedly usher in. As is the case with the other ambitious claims of the RMA literature, a more balanced strategic analysis of the geopolitical implications of the new epoch will suggest that the changes will be less drastic than is often claimed.

Reflecting the broad scope of the information age RMA literature, this thesis will cover a lot of ground and a range of diverse, if related, subjects. However, the homogeneity of the work is provided by the fact that in one way or another the various subsets of the RMA debate challenge the Clausewitzian paradigm. Therefore, the thesis will take the form of an analysis of the challenges posed to the Clausewitzian nature of war. Before embarking upon this task, Chapter 1 is devoted to an in depth exploration of the various facets which go to make up this nature of war. Simultaneously, the opportunity is taken to examine the perspectives of Sun Tzu and Jomini. This exercise serves as the basis for a later comparison of the three great works in light of the changes wrought by the information age. In the case of Sun Tzu, this is especially important because his work has been touted as more relevant to the information age than Clausewitz.

Warfare: A New Face of War', *Parameters*, Autumn 1996, http://carlisle-www.army.mil/usawc/Parameters/96autumn/molander.htm, and [Douglas Waller, "Onward Cyber Soldiers"], *Time International*, (August 21, 1995), pp31-32.

[65] Molander *et al*, p85

[66] Peter A. Wilson, *Preparing for Early 21st Century War: Beyond the Bottom-Up Review*, CGSC Monograph, "Toward 2000" Series, No. 5, (The Centre for Global Security Cooperation).

[67] See Michael Vlahos, 'The War after Byte City', *The Washington Quarterly*, Vol. 20, No. 2, Spring 1997, pp.39-72. Jessica T. Mathews, 'Power Shift', *Foreign Affairs*, Vol. 76, No. 1, Jan/Feb 1997, pp.50-66.

Whereas, Jomini deserves attention since his work has perhaps been underestimated, and therefore *The Art of War* may benefit from the exposure of the information age.

The subsequent four chapters will explore the areas of strategy that have attracted the most attention in the RMA literature and which offer the most significant changes, and therefore present the most direct challenges to the nature of war as outlined in *On War*. To this end, Chapter 2 assesses the fortunes of Clausewitz's 'climate of war' in the future battlespace. This analysis is undertaken within a framework composed of the five most elemental factors of strategy: the demands of policy, the paradoxical logic (dialectic nature of strategy), the various geographic settings in which strategy is conducted, the polymorphous character of war, and finally the fifth, generic, factor that underpins all the others is the fact that war is a human activity. The prominence of each of the four different features that make up the climate of war is variable depending on the particular context and circumstances of the conflict in question. However, the five elemental factors of strategy are always present and determine the levels for each of the four features of the climate of war. Consequently, these five elements of strategy determine the nature of war.

Chapter 3 retains the focus on the battlespace but concentrates on the art of command. An entire chapter is devoted to this area to reflect the significance of the human element in war, and in particular Clausewitz's emphasis on the military genius as the instrument through which to deal with the complexities and uncertainties of war. Particular attention is focused upon the development of AI and the rise of the network structure. In different ways, these two developments both challenge the prominence of the individual human commander.

Moving beyond the battlespace, the fourth chapter deals with the much-publicised concept of SIW. This new form of waging war holds the potential to amend the nature of warfare if it can prove to be independently decisive. In the absence of any historical case studies of a substantial SIW campaign, the theory and practice of strategic bombing is utilised as an informative analogy. It is suggested that many of the same factors that have retarded the strategic potential of strategic bombing will place similar restraints on SIW. In which case, the revolutionary potential of SIW will be curtailed.

The penultimate chapter broadens the scope of the thesis and considers the strategic

and geopolitical ramifications of the rise of information power. This includes an analysis of the infosphere as the fifth dimension of strategy, the flexible and accessible nature of information power, and how this newly empowered dimension will interact with the more established environments.

Finally, the thesis concludes with an assessment of the Clausewitzian nature of war in light of the changes likely to occur in the information age. From this, the continued relevance of the three great works of strategic theory is assessed. It is concluded that in the most important respects Clausewitz remains the most useful work of theory. Nevertheless, in the same manner by which Brodie and Gray suggest that *On War* requires supplementation to reflect certain changes over time and shortcomings in the text, to cope with the nuclear revolution for example, the works of theory that reflect the information age are examined to assess whether they have anything to add to the established treatises. The main objective of this thesis is to present a balanced assessment of the nature of war in the information age, and consequently to appraise whether Clausewitz's work remains "...not simply the greatest but the only truly great book on war." [68]

[68] Bernard Brodie, 'The Continuing Relevance of *On War*', in Clausewitz, p57.

Chapter 1

Classical Strategic Thought and the Nature of War

"The central ingredients of military victory or defeat will continue to reflect the enduring nature of war at least as much as the transient means used to prosecute it." [1]

Introduction

Before undertaking an analysis of any subject, it is often necessary to define some of the main concepts used. In the context of this thesis a satisfactory understanding of the term 'nature' is required. The ultimate objective of this work is to test the continued validity of the fundamentals of warfare, the constants if you will, those elements which are the very essence of war across both time and place, rather than its more transient features. Words such as 'nature' are often used rather loosely, both in general language and more importantly within the academic and professional literature. It is not unusual to come across works in which analysts clearly state that the nature of warfare will change. In *The Future of Warfare* Francois Heisbourg confidently claims that a series of technological, political, social, and economic changes "... are transforming the nature of warfare." [2] Similarly, Arquilla and Ronfeldt argue that the information revolution will bring the next shift in the nature of warfare. [3] Even more ambitiously Robert R. Leonhard asserts that the information age represents the greatest change to the nature of war. [4] These are substantial claims which should not go unchallenged. Therefore, the first step in verifying these assertions is to

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[1] Riper and Scales, p6.

[2] Francois Heisbourg, *The Future of Warfare*, (London, Phoenix, 1997), p1. A similar argument is espoused by Christopher Coker when he asserts that 'Post-modern war' represents a transformation of Clausewitz's 'true nature of war'. See Christopher Coker, 'Post-modern War', in *RUSI Journal*, June 1998, p7.

[3] Arquilla and Ronfeldt, 'Cyberwar is Coming', in Arquilla and Ronfeldt (eds), *In Athena's Camp*, p25.

[4] Robert R. Leonhard, *The Principles of War for the Information Age*, (Novato, Presidio Press, 1998), p6.

understand what the nature of warfare actually is.

According to one dictionary definition, 'nature' refers to "a thing's essential qualities". [5] In this sense the nature of warfare is different from its character. The character of war, or rather its style, is a constantly changing phenomenon, it is less absolute. For those who subscribe to the Clausewitzian perspective, the difference referred to here is that between the 'logic' and the 'grammar' of war. For example, the Napoleonic Wars were clearly of a different character to the Pacific campaigns in World War Two. Features of the latter such as carrier-borne aircraft, strategic bombing (including the use of atomic weapons), and island-hopping, distinguish it from the former. The forces, tactics, and operational art employed vary depending upon a number of factors. These include the period of history one is considering, which security communities are engaged, the technology in use, and the policy objectives to be attained. These self-evident truths should not be taken as evidence that the character of war is of little importance. Understanding the character of a particular war is an important prerequisite to its successful conduct. However, In relation to this thesis, of even greater significance is the possibility that the character of war could change to such an extent that the nature of war itself may be altered. Consequently, this work will test the hypothesis that a dynamic relationship exists between the character and nature of war, and that the changes wrought by the information age will be so momentous that the nature of war itself will be transformed. In theory, if all wars were concluded by calculations of 'information dominance', or through information attacks against information infrastructures, warfare would all but cease to be a violent activity. In which case, the nature of warfare would have been altered by a change in the character of war. Such possibilities may explain the proclivity of certain authors to proclaim the rise of Sun Tzu at the expense of Clausewitz, since the former is noted for his admonition to achieve victory without fighting. [6] However, thus far, although the character of war has proved mutable, the nature of warfare has been resistant to significant or permanent change. This latter point perhaps explains why the

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[5] Joyce M. Hawkins (ed), *The Oxford Reference Dictionary*, London, Guild Publishing, 1987, p559.

[6] See Arquilla and Ronfeldt, 'A New Epoch and – and Spectrum – of Conflict', in Arquilla and Ronfeldt (eds), *In Athena's Camp,* p18, and also James Adams, *The Next World War: The Warriors and Weapons of the New Battlefields in Cyberspace*, (London, Hutchinson, 1998), p93.

works of Clausewitz, Sun Tzu, and Jomini have remained relevant.

In light of the above thoughts, the main objective of this chapter is to define the nature of warfare as it is traditionally understood. This will be achieved using various accounts and memoirs of war, as well as the three great works of classical strategic thought: Carl von Clausewitz's *On War*, Sun Tzu's *The Art of War*, and Baron Antoine Henri de Jomini's *The Art of War*. In this sense, the fate of these three works, and especially *On War*, are entwined with that of the nature of warfare itself. The historical record is also heavily utilised in the endeavor to understand the true nature of war. Whole treatises have been written on the value of historical research in any attempt to understand the essence of human activities. For the purposes of this work, it will suffice to cite Moltke's assessment of military history as "the most effective means of teaching war during peace." [7]

Any attempt to capture the essence of an activity as complex as war is self-evidently a large undertaking, and will ultimately fail to accurately reflect the true reality. It is because of this that we turn to the theories of Clausewitz, Sun Tzu, and Jomini to act as aids in the task. Clausewitz identifies the value of theory in this respect when he notes: "Theory exists so that one need not start afresh each time sorting out the material and ploughing through it, but will find it ready to hand and in good order." [8] Why choose these particular works of theory from amongst the mountain of literature that has been written on the subject of war? The answer to this question lies in the fact that these three works are variously regarded as the founders of modern military thought, and as performing the role of enabling students of war to understand the central elements of warfare. [9] The language and ideas expressed in these works permeate a great deal of modern military doctrine and academic work on war. There is perhaps no better example of this than the United States Marine Corps' key doctrine manual *Fleet Marine Force Manual 1 'Warfighting' (FMFM-1).* Clausewitzian ideas and language dominate this document. Indeed, *FMFM-1*

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[7] Quoted in David J. Lemelin, 'Force XXI: Getting it Right', *Military Review*, Vol. LXXVI, No. 6, November - December 1996, p81.

[8] Clausewitz, p163.

[9] See Crane Brinton, Gordon A. Craig and Felix Gilbert, 'Jomini', in Edward Mead Earle (ed), *Makers of Modern Strategy: Military Thought from Machiavelli to Hitler*, (Princeton, Princeton University Press, 1943), pp80-83 and Michael I. Handel, *Masters of War: Classical Strategic Thought*, Second, Revised Edition, (London, Frank Cass, 1996), p16.

stipulates that Clausewitz's *On War* is "... the definitive treatment of the nature and theory of war...". [10] *FMFM-1* regards both Clausewitz and Sun Tzu as essential reading for any marine officer. [11] Clausewitz and Sun Tzu's influence can be seen in many other doctrinal works, including *British Defence Doctrine: Joint Warfare Publication (JWP) 0-01.* [12]

As previously noted, this thesis does not rest its concept of the nature of war solely upon these three works. Memoirs and accounts of warfare play an equally valid role in understanding war's true nature. However, a further validation of using the three chosen works of theory emanates from the fact that each of the three great theorists were practitioners of war, and therefore their works are the theoretical representations of their real experiences. It follows from this discussion that since it is the works of Clausewitz, Sun Tzu, and Jomini which have been most influential in shaping our understanding of the nature of war, it is these three works which will be examined to discern how relevant they remain, and consequently whether the pre-information age concept of the nature of warfare retains its relevance.

Why is it important to understand the nature of war? There are two main answers to this question. The first concerns a purely academic interest which stems from man's desire to understand the world around him and in particular the activities in which he engages. Since war can be such an important event for the individual, the state, or indeed the whole international system, a desire to better comprehend it is understandable. However, there are more practical reasons to engage in an attempt to grasp the essence of war. This relates to how actors prepare for hostilities. What one perceives as the nature of warfare greatly influences the development of doctrine, force composition, and training. Clausewitz himself noted that the nature of war affects which forces will be used. [13] Turning once again to the United States Marine Corps (USMC), *FMFM-1* declares: "... our understanding of the nature and the theory of war ... must be the guiding force behind our preparation for war." [14] If we take for example the training and education of officers, this is based on the established belief that war is a political, chaotic, violent, uncertain,

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[10] H. T. Hayden (Ed), *Warfighting: Manoeuvre Warfare in the U.S. Marine Corps*, (London, Greenhill, 1995), p43.
[11] ibid, p43 and p54.
[12] See *British Defence Doctrine: Joint Warfare Publication (JWP) 0-01*, 1997.
[13] Clausewitz, p342.
[14] Hayden, p66.

and human activity. It follows that if the nature of war should be altered by the information age, then the whole panoply of war preparation (including military culture) will require amendment in order to prepare for a very different kind of conflict than has occurred historically.

The Genesis of Strategic Thought

Before embarking upon an analysis of the nature of war, it is important to describe briefly the influences upon the three classic theorists. Any thinker (including the author of this thesis), to a greater or lesser degree, will be influenced by their experiences and the intellectual environment of their time and place. In the context of understanding the true nature of war these influences must be considered. It may transpire that each theorist's notion of warfare is more a reflection of his experiences and his intellectual environment than a representation of the reality of war. When we come to analyse the nature of warfare in the information age it may be profitable to consider that our own perspective will be coloured by our own times and culture. For example, the information age resounds with concepts such as 'connectivity' and 'chaos'. Indeed, Christopher Bellamy, writing in 1996, displays this philosophical approach. In order to reflect the complexity of the current international security environment he proclaims "[a] modern science of war and peace needs to be modeled on chaos and complexity." [15] Western attitudes at the turn of the twenty-first century are want to emphasise less destructive forms of warfare, or at least, a conduct of warfare which is more sensitive to casualties (both in terms of combatants and civilians). [16] It is worth considering that this particular mindset of the information age, rather than the reality of war, may lead us to reject the classical strategists too readily. In this sense, the RMA literature may represent no more than a political, social, or intellectual fad.

Both Jomini and Clausewitz witnessed and indeed participated in the Napoleonic Wars. In this sense they both witnessed a time when, through political, technological,

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[15] Christopher Bellamy, *Knights in White Armour: The New Art of War and Peace*, (London, Hutchinson, 1996), p42.

[16] See for example Luttwak's 'Post-Heroic Warfare'.

organisational, and operational changes, warfare became much more total, embracing as it did on the French side the fervour of the revolution and the utilisation of a large part of the nation's resources and effort. [17] As an aside, it is interesting to note that the French revolution in warfare was eventually defeated by armed forces and societies, especially the British, which operated in more traditional ways. [18] This is perhaps an early warning to those who equate the exploitation of an RMA with final victory. It is not only the general trends of the time that influence the theorist. More individual experiences can partly account for the fact that different theories can emerge from the same environment. For example, Jomini served primarily as a staff officer. John Shy notes that this experience with the general staff influenced Jomini to adopt a planning-based approach to the subject of war. This may explain his greater emphasis on concepts such as lines of operation. [19] In broad philosophical terms both Jomini and Clausewitz display a tendency for the enlightenment's propensity towards rational analysis. Christopher Bellamy focuses attention upon their use of Newtonian concepts such as 'mass', 'momentum', and 'force'. Moreover, Bellamy notes that both of them also base their theories in a strictly linear formula. [20] Jomini in particular displays a very Newtonian approach in his quest to discover the fundamental principles underpinning the activity of war. Whereas Jomini is criticised for failing to escape the rationalism of the eighteenth century, [21] Clausewitz managed to create a synthesis of the enlightenment's rationality, and the non-rational approach of German Romanticism with its greater emphasis on the psychological, emotional, metaphysical, and intuitive. [22]

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[17] This is not the place to enter into the Revolution in Military Affairs (RMA) debate, either in a general sense, or in particular reference to whether one can regard the Revolutionary and Napoleonic period as representing a revolutionary change in warfare. The following works are good places to begin exploring the merits of the RMA hypothesis. Bacevich, A. F. Krepinevich, 'Cavalry to Computer: The Pattern of Military Revolutions', *The National Interest*, no.37, Fall 1994, and Gray, 'A Contested Vision'.

[18] See Peter Paret, *Understanding War: Essays on Clausewitz and the History of Military Power*, (Princeton, Princeton University Press, 1992), p16. Christopher Bellamy also notes that the armies which defeated Napoleon, again notably the British, used old-fashioned tactics. See Bellamy, *Knights in White Armour*, p36. Similarly, Azar Gat notes that the British army of the Napoleonic era was an eighteenth-century institution. Azar Gat, *The Development of Military Thought: The Nineteenth Century*, (Oxford, Clarendon Press, 1992), p4.

[19] John Shy, 'Jomini', in Peter Paret (ed), *Makers of Modern Strategy: From Machiavelli to the Nuclear Age*, (Oxford, Clarendon Press, 1986), p157.

[20] Bellamy, *Knights in White Armour*, p42.

[21] Brinton *et al*, p90

[22] Michael I. Handel, 'Introduction', in Michael I. Handel, (ed), 'Clausewitz and Modern Strategy', special issue of *The Journal of Strategic Studies*, p6.

Sun Tzu on the other hand represents the Taoist tradition with its emphasis on non-material force-multipliers. Thomas Cleary suggests that Sun Tzu's theory bears the hallmark of Taoism "the ancient tradition of knowledge." [23] Michael Handel concludes from this that for Sun Tzu, war in its ideal form becomes an intellectual and metaphysical exercise rather than a physical one. [24] Like Clausewitz and Jomini, Sun Tzu was also writing at a time regarded as one of revolutionary change in the art of warfare. [25] Griffith notes that war in the age of Sun Tzu was more total, in the sense that it was less ritualistic, and less restricted to certain campaigning seasons. Conscript standing armies under the control of professional officers were increasingly common, and general staffs began to appear. [26] The careers of the three great theorists may suggest that significant works of theory are more likely to appear in times of revolutionary change in warfare. Should this be the case, perhaps we can expect an important work to emerge from the information age to supplement or even replace the current dominant treatises.

The Nature of War - The Role of Policy

Any attempt to extract an understanding of the nature of war from the three great works of theory quickly runs into a series of apparent contradictions amongst the works. There are a number of possible outcomes from these contradictions. It may be that the true nature of war lies within a synthesis of all three works. This still leaves the question of whether this synthesis has been left outdated by the information age. Alternatively, it may be that each of the works represents a vision of warfare that is not universal. Rather, each one is more or less appropriate to a certain time and place. In which case, one is perhaps more appropriate to the information age than the

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[23] Thomas Cleary, 'Translator's Introduction', in Sun Tzu, *The Art of War*, (Translated by Thomas Cleary), (Boston, Shambhala, 1988), p2.
[24] Handel, *Masters of War*, p74 and p19.
[25] Michael D. Krause, 'Getting to Know Jomini' (Book Review), *Joint Forces Quarterly*, Spring 1995, p128.
[26] Griffith, 'Introduction', in Sun Tzu, *The Art of War*, (translated by Samuel B. Griffith), (London, Oxford University Press, 1971), pp33-35.

others. The following sections of this chapter will extract the main elements relating to the nature of warfare from the three works, and conclude by attempting to produce a coherent appreciation of war's nature. Reflecting the dominance and superiority of *On War*, the following analysis utilises Clausewitz's concepts, in particular the climate of war and the trinity, as a theoretical framework to work from.

War is an extremely diverse activity, with many facets that could conceivably be regarded as part of its 'nature'. One such element that lays a controversial claim to being embedded in the nature of warfare is the 'policy rationale'. This is most famously declared in Clausewitz's oft quoted assertion: "We see, therefore, that war is not merely an act of policy but a true political instrument, a continuation of political intercourse, carried on with other means." [27] This constituent of war unifies the three theorists. However, the notion that this represents an abiding component of war's nature has not gone unchallenged. This principle element of *On War* has been questioned by some of the biggest names in the field of modern military studies. John Keegan opens his work *A History of Warfare* with the following bold statement: "WAR IS NOT THE continuation of policy by other means." [emphasis in the original] [28] Keegan's main criticism of Clausewitz boils down to this: Because in many cases, and throughout most of history, war has been harmful, even fatal, to those security communities who have conducted it, it cannot be regarded purely as a rational instrument of policy. Keegan goes on to argue that war is often a cultural and/or ritualistic activity. In response to this criticism, Christopher Bassford correctly notes that Keegan's analysis is based upon a very narrow interpretation of Clausewitz's work. As Bassford argues, Clausewitz was certainly not stating that warfare was always undertaken in a rational manner. Indeed, the romantic influence in Clausewitz suggests that he fully accepted a non-rational tendency in war. [29] It has also been noted that the Clausewitzian trinity reveals that its author understood that war was not a finely controlled, purely rational activity. Mark T. Clark suggests that two-thirds of the trinity can be regarded as non-rational forces. [30] Similarly, Gray

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[27] Clausewitz, p99.

[28] John Keegan, *A History of Warfare*, (London, Pimlico, 1994), p3.

[29] Christopher Bassford, 'John Keegan and the General Tradition of Trashing Clausewitz: A Polemic', *War in History*, 1, November 1994, pp319-336 and pp325-326.

[30] Mark T. Clark, 'The Continuing Relevance of Clausewitz', *Strategic Review*, Vol. XXVI, No. 1, Winter 1998, p58.

describes the trinity as a flexible concept that represents the mutable nature of war, encompassing both rational and non-rational elements. [31] Rather than portraying war as a sterile activity, Clausewitz was noting that policy objectives give birth to war, and therefore they should guide how it is waged. Policy is also one of the factors which helps prevent warfare from escalating to its extreme. If Clausewitz can ever be said to have proffered advice, it is that war should never do things in accordance with its own independent rationale. Rather, it should always undertake an action with the policy objective clearly in mind and as the guiding factor.

Martin van Creveld is also guilty of basing his criticisms of Clausewitz on very strict and narrow interpretations of various concepts central to the Prussian's work. Akin to Keegan, van Creveld allocates a narrow definition to the concept of 'a continuation of policy'. His interpretation restricts Clausewitz's work as being appropriate only to the post-1648 Westphalian world, and therefore relevant only to state-to-state conflict. [32] Van Creveld places far too much emphasis on a literal interpretation of Clausewitz's concept of the 'Trinity'. These precepts lead van Creveld to conclude that *On War* is of limited value in understanding the entire spectrum of warfare. *The Transformation of War* also breaks down the motivations for warfare into many categories, within which politics is a distinct motivation. In this context van Creveld once again relies upon narrow and restrictive definitions. For him politics is merely concerned with secular state 'interests': "Thus, strictly speaking, the dictum that war is the continuation of politics means nothing more or less than that it represents an instrument in the hands of the state." [33]

An illuminating example of how van Creveld restricts his analysis to narrow and rigid distinctions is in his section regarding religion as an influence and motivation in war. He claims that the influence of religion on warfare declined in post-1648 Europe. [34] There are two predominant reasons why this surely draws the line too strictly between religion and what van Creveld regards as politics. Firstly, religious doctrine often underpins political sentiment, even to this day. Secondly, both politics and religion are concerned with how societies conduct and

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[31] Gray, *Modern Strategy*, p111, and Edward J. Villacres and Christopher Bassford, 'Reclaiming the Clausewitzian Trinity', http://www.clausewitz.com/CWZHOME/Trinity/TRINITY.htm

[32] Martin van Creveld, *The Transformation of War*, (New York, The Free Press, 1991), p41 and p36.

[33] ibid, p125.

[34] ibid, p141.

organise themselves. In this sense, to classify wars of religion and those with political motives as mutually exclusive is to draw artificial distinctions. Of course this is not to suggest that religion and politics are one and the same. Rather, it is merely to suggest that a war waged to decide which religious group or doctrine should hold sway, is not so different from wars waged to decide which political grouping or ideology should dominate a territory or population. Both religious and political rationales have resulted in wars waged to expand the authority of one group at the expense of others. As the case of Philip II of Spain reveals, war can be waged by a state for reasons of religion and 'secular politics' simultaneously. Philip II's conflicts in the sixteenth-century were concerned with promoting the security interests of Habsburg Spain, as well as being part of the counter-reformation effort. [35] Indeed, in Philip II's foreign policy religion and state interests cannot be separated.

In a more general sense, Clausewitz's work can be taken on the basis that 'policy' refers to any objective for which war is waged. In which case, his central point remains that war, being nothing more than a continuation of this motivation, should not have a rationale independent from this guiding objective. Policy may concern religious issues, territorial disputes, resources, or indeed important cultural events. In Book Eight, Chapter Six, of *On War,* Clausewitz himself declares that "Policy, of course, is nothing in itself; it is simply the trustee for all these interests against other states ... we can only treat policy as representative of all interests of the community." [36] Along similar lines, William R. Hawkins declares: "War is about politics, and politics is about the governing of land and people." [37]

One can argue endlessly over what Clausewitz's exact thoughts were on these issues. However, in one sense this does not really matter. If the point in question is how relevant *On War* is to understanding the future of warfare, then adopting a more general interpretation of Clausewitz's work, in which 'policy' or indeed the term 'interests' are more inclusive, not only

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[35] See Geoffrey Parker, 'The Making of Strategy in Habsburg Spain: Philip II's "bid for mastery," 1556-1598', in Williamson Murray, MacGregor Knox, and Alvin Bernstein (Eds), *The Making of Strategy: Rulers, States, and War*, (Cambridge, Cambridge University Press, 1994), pp115-150, and Geoffrey Parker, *The Grand Strategy of Philip II*, (New Haven, Yale University Press, 1998), p286.

[36] Clausewitz, p733.

[37] William R. Hawkins, 'Imposing Peace: Total vs. Limited Wars, and the Need to Put Boots on the Ground', *Parameters*, Vol. XXX, No. 2, Summer 2000, p79.

makes *On War* more universal, it also presents us with a theory for understanding almost any war regardless of it motivations.

Clausewitz's work can also be interpreted as more universal in relation to what van Creveld describes as 'wars of existence'. In these instances, van Creveld argues that the means and ends have merged to a point where distinctions between them have become meaningless, and any cost/benefit analysis becomes equally redundant. Rationality, which van Creveld associates with 'state interests', has become equally irrelevant. [38] The first response to these arguments is that the decision to wage a war of existence is often just that, a decision. A choice has been made to resist. An actor can always decide not to fight and therefore surrender. In which case, a choice has been made based upon some form of cost/benefit calculation of fighting or surrender. It may have been decided that subjugation to enemy rule entails fewer or more acceptable costs than those associated with armed resistance. In hindsight, the former would surely have been the more prudent course for Carthage. Even when the decision to fight has been taken, and all a state's resources are committed, rational calculations may still be in play. Any war of existence, even a seemingly suicidal large-scale nuclear war, can involve rational calculations concerning interest. After all, 'better dead than red' is a statement that implies choice. Again, there is no better way of defending *On War* than to turn to the writings of Clausewitz himself. When discussing how the French revolution brought about changes to warfare which pushed it towards its absolute, Clausewitz asserts that "... these changes did not come about because the French government freed itself, so to speak, from the harness of policy; they were caused by the new political conditions which the French Revolution created...", he continues "It follows that the transformation of the art of war resulted from the transformation of politics. So far from suggesting that the two could be disassociated from each other, these changes are a strong proof of their indissoluble connection." [39] More extreme circumstances or policy objectives may simply result in more extreme efforts. However total a war becomes, means still have to be matched correctly to the ends. World War II can surely be regarded as a war of existence in Europe, and especially on the Eastern Front, and yet both sides still had to decide which particular means to utilise in which proportion and how

[38] van Creveld, *The Transformation of War*, p142 and p155.
[39] Clausewitz, p737.

much effort would be expended against which targets. In other words, the means-ends relationship still functions in such circumstances. Also, as Gray and Kahn assert, even though large-scale nuclear war would in all likelihood result in a pyrhic victory, preparations should be undertaken to use nuclear forces in a manner that offers the best chance of victory and/or damage limitation. [40] Matching means to ends in this ultimate war of existence also serves the policy objective of a more credible deterrence posture. As Gray asserts, strategy does not cease to operate in the nuclear realm, rather it becomes a more challenging task. [41]

Clausewitz undoubtedly constructed his theory within a world-view that he was most familiar with. This happened to be based around state, land-based conflict. It is also worth noting that much of what van Creveld wrote is worthy of consideration. The future of warfare may rest predominately with small wars. He is also certainly correct to highlight the dangers of preparing for the wrong type of war. Of course, Clausewitz was also perfectly aware that one should identify and understand what sort of war one was about to undertake: "The first, the supreme, the most far-reaching act of judgment that the statesman and commander have to make is to establish by that test the kind of war on which they are embarking..." [42] In the end, a less rigid interpretation of Clausewitz's analysis leaves us with a work which is far more universal than either van Creveld or Keegan give it credit for. Basic Clausewitzian concepts, such as the fact that a war should be conducted in line with its motivating influence, or that warfare is prevented from escalating to its extreme by amongst other things its policy considerations, ensures that *On War* is a useful and indeed a productive work. This view is diametrically opposed to van Creveld's view, based as it is on narrow and rigid definitions, that Clausewitz's work is counterproductive to understanding the future of warfare. Too much emphasis is placed on a literal and misguided interpretation of the trinity. [43] Self-evidently warfare has not only been waged by nation-states. To reemphasise, a less rigid reading of Clausewitz presents us with a body of work that can be applied to wars fought for various policy ends (even as an important cultural activity) and by various types

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[40] See Gray, *Modern Strategy*, especially Chapters 11 and 12. Herman Kahn, *On Thermonuclear War*, (Princeton, Princeton University Press, 1960).
[41] Gray, *Modern Strategy*, p278.
[42] Clausewitz, p100.
[43] See Villacres and Bassford.

of actors. In fact, it is possible to see the trinity more as an analogy to the nature of warfare, rather than as a strict comment on the kind of actors who conduct war. Katherine L. Herbig interprets the trinity in this manner, stressing that it regards warfare as being composed of violence, chance, and subordination as an instrument of policy. [44]

In conclusion, based on a more inclusive reading of Clausewitz and the history of warfare, the policy rationale stands as the first element in the nature of warfare. War cannot begin without a rationale, otherwise it is just mindless violence. To reiterate Bull's definition, war is distinguished from other human activities by resort to organised violence for policy objectives. Policy gives birth to the child of war. Therefore, this thesis will not be testing whether the information age will change this facet of warfare. The information age may create new motivations for the resort to war, [45] but it will not produce wars that are not the continuation of policy. Political factors can of course influence the conduct of war. This was Clausewitz's central notion, namely that political factors are one element that prevents war reaching its absolute state. In this sense, the information age may witness a change in the nature of war, brought about by a policy rationale aimed at limiting destruction. [46] This latter objective itself may partly be a product of an omnipotent media and information technology. The power of the policy rationale is once again revealed in this example, and consequently reaffirms that policy is inexorably entwined with war.

The Nature of War - 'The Climate of War'

As previously noted, war is a varied activity. Each war is unique. The policy rationale and the character of each war can differ enormously. However, after examining the three works of theory, as well as various historical and personal accounts of war, a number of key elements seem to

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[44] Katherine L. Herbig, 'Chance and Uncertainty in *On War*', Michael I. Handel, (ed), "Clausewitz and Modern Strategy", special issue of *The Journal of Strategic Studies*, p97.

[45] Although, most will surely still be covered by Thucydides' taxonomy of: 'honour, fear, and interest'. Thucydides, *History of the Peloponnesian War*, Translated by Rex Warner, (London, Penguin Books, 1972).

[46] Although, as is argued in Chapter Two, this is unlikely to be the case.

appear in most wars, and consequently can be said to lie at the heart of the debate concerning the nature of warfare. These represent the main areas of dispute amongst the three classic works. Several words or phrases may be used to describe these elements, but fundamentally they can be described as 'uncertainty', ' violence and destruction', 'chance and narrow friction', and 'human factors'. [47] Taken together these produce a vision of war that is uncertain, violent, and ultimately a human activity both at the physical and psychological levels. Clausewitz amalgamated this combination of elements into the concept 'the climate of war'. [48] *FMFM-1* divides the nature of warfare into a slightly higher number of elements, although the end result is much the same as the 'climate of war'. For the USMC the nature of warfare consists of friction, uncertainty, fluidity, disorder, the human dimension, violence and danger, moral and physical forces. [49]

Uncertainty

Uncertainty is at the heart of Clausewitz's theory of war. On this point he was unequivocal: "In war everything is uncertain." [50] Jack Belden makes this same point more poetically, although no less stark: "Uncertainty is in the very air which a battle breathes .... So I say the unknown is the first-born son of combat and uncertainty its other self." [51] Ferris and Handel declare that this lack of certainty is the condition in which military genius reveals itself. [52] It is within this first element of war's nature that the first contradictions appear between the works of theory. This is particularly the case between Clausewitz and Sun Tzu. In contrast to Clausewitz, Sun Tzu implies that many things can be known in war. Indeed, Lawrence Freedman goes as far as to suggest that "Sun Tzu believed that perfect knowledge could be obtained." [53] In Sun Tzu's theory a general

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[47] For a discussion of the difference between narrow and general friction see Barry D. Watts, *Clausewitzian Friction and Future War*, McNair Paper 52, (Washington, DC, Institute for National Strategic Studies, National Defense University, October 1996), especially Chapter 4.

[48] Clausewitz, p120.

[49] Hayden, pp38-42.

[50] Clausewitz, p156.

[51] Quoted in John Ellis, *The Fighting Man in World war II: The Sharp End of War*, (London, Book Club Associates, 1980), p99.

[52] John Ferris and Michael I. Handel, 'Clausewitz, Intelligence, Uncertainty and the Art of Command in Military Operations', *Intelligence and National Security*, Vol. 10, No. 1, January 1995, pp1-4.

[53] Lawrence Freedman, *The Revolution in Strategic Affairs*, Adelphi Paper 318, (Oxford, Oxford University Press, 1998), p60.

should have good knowledge of his enemy, his own forces, the terrain, and the weather. [54] Throughout his treatise Sun Tzu implies that victory is best assured through knowledge and flexibility. In other words, knowledge of the situation and then adaptation to it. Jomini seems to fall somewhere between the other two writers. Jomini follows Clausewitz's logic quite explicitly at times. For example, he notes the inevitability of uncertainty and inaccuracies in information. [55] More importantly he writes that perfect information on the enemy is impossible, and indeed that it is this fact that distinguishes the theory of war from its practice. Like Clausewitz he ultimately feels that the answer to this problem is the natural talent and experience of the general. [56] However, Jomini does advise, much like Sun Tzu, that one should know the enemy. [57] Although not explicit in his writings, Jomini does appear to imply that certain bits of knowledge can be ascertained. For example, he assumes that the decisive point, a notion central to his theory of waging war successfully, can be identified, whether it be the enemy forces' weak point or a geographical feature. [58] To use an information age concept, Jomini's identification of the decisive point appears to imply that one can have 'Dominant Battlespace Knowledge' (DBK).

The issue of uncertainty reveals differing opinions on both the potential role and value of information in war. Clausewitz, in contrast to Sun Tzu, does not regard the answer to the dilemma of uncertainty to be the acquisition of more information. Rather, he notes that the good general must accept uncertainty and rely upon his intuitive abilities. Clausewitz indeed postulates that guesswork plays a significant part in war. [59] David Kahn correctly notes that Clausewitz is not totally dismissive of the value of collecting information, but ultimately he concludes that its value is strictly limited. This limitation is due to a number of factors, in particular the play of chance, the incomplete nature of information gathered, and related to this latter point, the human tendency to adopt a worse case scenario mindset, and thereby overestimate the enemy's strength and capabilities. As Michael Handel notes, in this sense Clausewitz regards intelligence as another

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[54] In the chapter entitled 'Terrain', Sun Tzu states: "Know the enemy, know yourself; your victory will never be endangered. Know the ground, know the weather; your victory will then be total." Sun Tzu, p129.

[55] Baron Antoine Henri de Jomini, *The Art of War*, (London, Greenhill Books, 1996), pp196-197.

[56] ibid, pp268-269.

[57] ibid, p207.

[58] ibid, p187.

[59] Clausewitz, p96.

source of friction in war. [60] Therefore, information has limited value in warfare. Jomini places a somewhat higher emphasis on the value of information, in that he notes that information on the enemy's proceedings is vital. [61] He continues this line of thinking by noting that "A general should neglect no means of gaining information on the enemy's movements." [62] In contrast to Clausewitz, Jomini's writings on information are far more extensive, and even include issues of information security and encryption. [63]

Unlike Clausewitz, rather than relying upon such metaphysical factors as intuition of the general, and natural talent, Sun Tzu sees the route to victory through knowledge. [64] In fact, Sun Tzu's analysis, indeed his advice, rests heavily upon the ability of a commander to control and manipulate information. This goes to the heart of his statement that "All warfare is based upon deception." [65] In order to deceive the enemy effectively, one must exert control over information. Sun Tzu's emphasis on information is no more obvious than in his last chapter 'Employment of Secret Agents'.

So who's perspective on uncertainty and information most accurately represents the true nature of warfare? Certainly, Sun Tzu's theory is full of sound advice. Having thorough knowledge of oneself, the enemy, and the environment in which a war will take place, is good to have. If you can have better knowledge than the enemy, either through deception or superior collection and analysis, than all the better. This truism is as applicable in the strategic realm as it is in the tactical and operational settings. However, this perspective may represent an ideal rather than a true representation of war. In this sense Clausewitz seems much closer to the mark. In his time the battlefield was a place of great confusion and uncertainty. According to contemporary accounts, the battlefields of the Napoleonic Wars were more often than not veiled in a true fog of war, thanks mainly to smoke arising from musket and artillery fire. [66] Accounts of war since the

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[60] David Kahn, 'Clausewitz and Intelligence', Michael I. Handel, (ed), "Clausewitz and Modern Strategy", special issue of *The Journal of Strategic Studies*, p118, and Michael I. Handel, 'Clausewitz in the Age of Technology', odem, special issue of *The Journal of Strategic Studies*, pp66-67.

[61] Jomini, pp268-269.

[62] ibid, p273.

[63] ibid, p259.

[64] Sun Tzu, pp144-149.

[65] ibid, p66.

[66] For an account of the conditions on Napoleonic battlefields, see John Keegan, *The Face of*

time of Clausewitz only reaffirm the omnipotence of uncertainty on the battlefield. These thoughts do not mean that Sun Tzu has little of importance to say in this respect. In relation to the value of information Sun Tzu's analysis appears far more appropriate. Clausewitz's comments on the value of intelligence are far too negative, and his one-and-a-half page treatment of intelligence is indicative of this. [67] In the final analysis of uncertainty on the battlefield, Clausewitz identifies two factors that lead one to assume that it will be a constant feature of war. The first of these concerns the impossibility of calculating moral forces in battle, in which case war can never be accurately estimated. [68] The second factor also concerns human factors, more precisely in the form of human interaction. [69] To these thoughts one can add the fact that the intentions of an opponent are very hard to discern with any degree of accuracy. T. E. Lawrence describes well the complex nature of war which is constructed of both tangible and intangible elements: "Nine-tenths of tactics were certain enough to be teachable in schools; but the irrational tenth was like the kingfisher flashing across the pool, and in it lay the test of generals." [70] Ultimately, Jomini's assessment presents perhaps the most balanced analysis of uncertainty and information. Whilst recognising that certainty can never be attained, Jomini still values the role of information in the art of waging war.

Violence and Destruction

An element that is seemingly as central to war as uncertainty is composed of 'violence and destruction'. *Warfighting* declares starkly that "[t]he means of war is force, applied in the form of organised violence." [71] Here again we note a clash between the views of Clausewitz and Sun Tzu. Clausewitz, and to a slightly lesser extent Jomini, perceive war as a violent activity with battle and the destruction of the enemy's forces as the main features. In contrast, Sun Tzu is noted for advocating victory without fighting and bloodshed.

This division between Clausewitz and Sun Tzu may not be as absolute as is often portrayed. There are a few occasions in *On War* when Clausewitz accepts that battle and the

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Battle, (London, Barrie & Jenkins, 1988).

[67] See Clausewitz, Book 1, Chapter 6.

[68] ibid, p216.

[69] ibid, p161.

[70] T. E. Lawrence, *Seven Pillars of Wisdom*, (Ware, Wordsworth Editions Limited, 1997), p183.

[71] Hayden, p41.

destruction of the enemy are not always required for victory. These instances in the Prussian's work may help extend the relevance of Clausewitz should warfare in the information age become less violent. For example, Clausewitz acknowledges that there are 'shortcuts to peace'. In this respect he notes that the seizure of lightly or undefended provinces may tip the balance against an enemy who is already fearful of the final outcome. [72] On another occasion Clausewitz recognises that at times the odds prior to battle can be so decisive that one side will capitulate without combat. He postulates that to bend the enemy to your will, you must "either make him literally defenceless or at least put him a position that makes this danger probable." [73] Michael Handel suggests that in Clausewitz's theory this victory without fighting can be achieved by two methods. The first is 'war by algebra', in which a rational calculation of strength prior to battle produces a decisive prediction of the outcome, upon which one side capitulates. Alternatively, manoeuvre on the battlefield can create a similar decisive imbalance of capabilities. Handel goes on to suggest that for Clausewitz the former cannot be considered war proper, whereas the latter can. [74] The identification of this distinction in *On War* between war by algebra and victory through manoeuvre is questionable. This is an important point when one is considering Clausewitz's relevance in an age were information dominance prior to battle could decide the outcome. A different interpretation of *On War* than that of Handel's, suggests that Clausewitz perceived victory through both 'algebra' and 'manoeuvre' as relating back to the physical act of war. To sum up Clausewitz's thoughts on this subject two extracts will suffice. "When one force is a great deal stronger than the other, an estimate may be enough. There will be no fighting: the weaker side will yield at once." [75] However, two pages before this Clausewitz notes: "it is inherent in the very concept of war that everything that occurs *must originally derive from combat.*" [76] From this latter statement we can conclude that capitulation without fighting, whether this emanates from calculations of combat strength or positions brought about by manoeuvre, always relates back to what would occur if combat took place. And therefore, war by algebra still relates back to fighting

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[72] Clausewitz, p105.
[73] ibid, p85.
[74] Handel, *Masters of War*, p219.
[75] Clausewitz, p110.
[76] ibid, p108.

and therefore war proper. Clausewitz's concern about war by algebra was that it appeared to regard war as being bereft of emotion. [77]

On War is one of those works in which the reader can find a maxim to support a wide range of contradictory arguments. [78] Therefore, it is important to recognise the general ideas that underpin the whole treatise. In this sense, those moments in which Clausewitz identifies non-violent means to victory, although significant, ultimately do not detract from his central belief in the significance of physical battle. [79] On the very first page of Book One, Chapter One, Clausewitz states: "War is thus an act of force to compel our enemy to do our will." "Force - that is, physical force ... is thus the means of war." [80] Later on he proclaims "Essentially war is fighting, for fighting is the only effective principle in the manifold activities generally designated as war." [81] More starkly he notes that violent resolution is the first-born son of war, and that the supreme law is force of arms. [82] At times Clausewitz is even more explicit than this: "... it is always true that the character of battle, like its name, is slaughter, and its price is blood." [83] And finally to distinguish war from other activities he notes: "War is a clash between major interests, which is resolved by bloodshed - that is the only way in which it differs from other conflicts." [84] What does this imply for both Clausewitz and indeed war, if war ceases to be characterised by bloodshed?

Clausewitz clearly didn't want to leave the reader in any doubt about the destructive nature of battle. He had himself witnessed the physical ravages of war, including the destructive French retreat from Moscow. Ultimately he emphasises the 'dominance of the destructive principle', and the direct annihilation of enemy forces. [85] For Clausewitz, war is a physical act of force, and even if fighting does not actually occur in a conflict, the result still relates back to this. In which case, fighting and the destructive principle are central to warfare. Thoughts such as these

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[77] ibid, p84

[78] For an excellent discussion of the potential to misunderstand elements of On War see Raymond Aron, *Peace and War: A Theory of International Relations*, translated by Richard Howard and Annette Baker Fox, (London, Weidenfeld and Nicolson, 1966), especially chapter 1.

[79] Gray, *Modern Strategy*, p104.

[80] Clausewitz, p83.

[81] ibid, p145.

[82] ibid, p113.

[83] ibid, p307.

[84] ibid, p173.

[85] ibid, pp269-70.

are echoed by others such as Michael Howard, who notes that the engine of change in battle is the infliction of human suffering through violence. From this Howard deduces that because armies are designed for fighting, military history must primarily be about battle. [86]

On this issue Sun Tzu lies at the other end of the spectrum. In complete contrast to the principle of destruction, he advocates the value of taking things intact. Again, this attitude may be a reflection of the period in which Sun Tzu wrote. Cleary suggests that during the era of the Warring States conflict was regarded as destructive and counterproductive, even for the victor. [87] Samuel Griffith contends that for Sun Tzu war is not about bloodshed or indeed destruction, rather it is essentially a battle of the wills. Cleary comments: "in Sun Tzu's philosophy the peak efficiency of knowledge and strategy is to make conflict altogether unnecessary." [88] Griffith goes on to suggest that for Sun Tzu, even in those circumstances in which war has to be waged, it should be concluded with three objectives very much to the fore. These are: it should be completed in the shortest possible time; with the least expenditure of lives and effort; and with as few casualties inflicted on the enemy as possible. [89] The reader may note that these sentiments have a very contemporary ring to them. The principle of leaving enemy forces and property intact is in stark contrast to the principle of destruction. *The Art of War* also makes reference to the fact that battle is a dangerous affair, and perhaps this also underscores the preference to avoid it if possible. [90] This is a view shared by Vegitius, who regards battle as a risky affair because of the play of chance. [91] Being a very pragmatic man, Sun Tzu realised that battle would not only reduce one's own forces, but would also reduce the resources of the enemy, resources which one could put to good use in the aftermath of victory. *The Art of War*'s advice is best summed up in the phrase 'conquer by strategy'. This statement seems to advocate an approach in which victory should first be sort through attacking the enemy's plans; then his alliances; and finally should these fail, battle must be resorted to. Sun Tzu's approach on this issue can be best represented by three

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[86] Quoted in Keegan, *The Face of Battle*, pp28-29.
[87] Cleary, p5.
[88] ibid, p1.
[89] Sun Tzu, p39.
[90] This point is raised by one of Sun Tzu's commentators Wang Hsi, Sun Tzu, p78.
[91] Vegetius, *Vegetius: Epitome of Military Science*, translated by N. P. Milner, (Liverpool, Liverpool University Press, 1993), p108.

extracts from his work: "Thus, those skilled in war subdue the enemy's army without battle." "Your aim must be to take All-under-Heaven intact. Thus your troops are not worn out and your gains will be complete." And perhaps most famously of all Sun Tzu wrote: "For to win one hundred victories in one hundred battles is not the acme of skill. To subdue the enemy without fighting is the acme of skill." [92] It is interesting that in the second of these extracts Sun Tzu states that complete gains are best assured through non-destructive means. Again this is in contrast to Clausewitz and Jomini who suggest that victory must be exploited through pursuit of the enemy. It is at this point that the most destruction can be inflicted on one's adversary.

It is interesting to note that once again Jomini appears to have a foot in each of the two camps. Jomini recognises the value in the destruction of the enemy army, but he is never as explicit as Clausewitz. Indeed, with his emphasis upon the value of lines of operation, in particular with reference to threatening the enemy lines of communication, he seems to acknowledge that victory is attainable through decisive manoeuvre without bloodshed and destruction. [93] In fact, Crane Brinton, Gordon A. Craig and Felix Gilbert, argue that Jomini was more concerned with the acquisition of territory than with the destruction of the enemy's forces. [94]

The Christian crusades to regain the Holy Lands present an interesting case that demonstrates both the potential and the limits of non-violent means to achieve one's objectives. The particular crusade in question is the thirteenth century campaign by Frederick II. By means of a treaty with the Sultan of Egypt, Frederick reclaimed a great deal of the Holy Lands, including for the first time in forty-two years the city of Jerusalem and a safe route for Christian pilgrims to the Holy Sepulchre. Frederick achieved all of this with a force far inferior to that at the disposal of the Sultan. His achievement is no more starkly outlined than in his own letter to Henry III of England: "for in these few days, by a miracle rather than by strength, that business has been brought to a conclusion which for a length of time past many chiefs and rulers of the world amongst the multitude of nations have never been able until now to accomplish by force, however great," [95]

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[92] See Sun Tzu, pp77-79

[93] Hew Strachan, *European Armies and the Conduct of War*, (London, George Allen & Unwin, 1983), p61.

[94] Brinton *et al*, p88.

[95] See Robert Payne, *The Crusades*, (Ware, Wordsworth Editions Limited, 1998). p317.

There are two main reasons why Frederick was able to retake the Holy Lands without resorting to war. The first relates to his close political relationship with the Sultan. Frederick had for some time been in secret correspondence with the Egyptian leader. Alongside exchanging gifts and embassies, they had reached an agreement by which Frederick would be given Jerusalem in exchange for aiding the Sultan in his attempts to take Damascus from his brother Corraden. It is important to note that within the final treaty, Muslims retained the Temple Area and in particular the Dome of the Rock in Jerusalem. Secondly, as G. A. Campbell notes, the Sultan was at that time facing a rebellion of fellow Muslims against his rule. He feared an alliance between Frederick and these rebellious Muslims, and therefore opted for the treaty with Frederick. The fact remains that whether primarily through fortune or astute political insight, Frederick was able to take advantage of the political situation and achieve his objective without resorting to war. It is worth noting that he achieved this despite the fact that Pope Gregory IX was openly attempting to sabotage the crusade. However, the limits of Frederick's success are reflected in the fact that he left the Christian-held Holy Lands in an unstable and vulnerable condition. The truce failed to hold, and eventually Jerusalem fell to al-Nasir Daud, King of Transjordania.

Frederick's feat was repeated by Richard of Cornwall, the brother of Henry III, in 1241. Taking advantage of a civil war amongst the Muslims, Richard once again retook control of Jerusalem without resorting to war. However, the inability to cement Christian domination of the Holy Lands ended in bloody tragedy for Christians in the area. The new Sultan of Egypt, in alliance with Barbacan's Khorasmains, reconquered most of Palestine. The Christians in Jerusalem were slaughtered, and their religious and cultural artifacts and properties were destroyed. [96]

As with the issue of uncertainty, the majority of historical evidence heavily supports Clausewitz's explicit approach to the issue of fighting, violence, and destruction in war. There are of course exceptions to this. Alongside the above example from the crusades, Clausewitz himself makes reference to the battle of Ulm, in which Napoleon secured victory without the need to resort

[96] For accounts of these events, see Payne, and G. A. Cambell, *The Crusades*, (London, Duckworth, 1935).

to battle. [97] But as already mentioned, the threat of fighting and violence often underpins these exceptions. It is hard to disagree with Peter Paret's analysis that the bottom line is that in all wars violence is always the essence. [98] As a practitioner of war, we can assume that Sun Tzu surely was aware of the occurrence of violence and bloodshed in warfare. Once again his thoughts expressed in *The Art of War* are perhaps best regarded as advice espousing an ideal rather than reflecting reality. A synthesis of Clausewitz and Sun Tzu's thoughts, in which the introduction and level of violence is a decision to be taken, portrays the strategic position on this subject. Whether, and how much, violence and destructive force is required will depend upon the objective sought and the relative circumstances of the belligerents. In this sense, T. E. Lawrence is right to disavow an undue emphasis on battle within the context of the Arab uprising against the Turks during World War I. In this context set-piece battles would normally prove disadvantageous to the Arab forces. Therefore, Lawrence places greater emphasis on the moral, rather than the physical struggle. [99] Gray refines this train of thought somewhat by stating that the enemy can be defeated either physically or by breaking his will. [100] The subtleties and judgments that lie at the heart of this issue can also be found in the writings of Mao. On the one hand he advocates avoiding battle if circumstances are unfavorable, yet on the other hand he seeks the annihilation of enemy forces. [101] However, although in certain circumstances violence and destructive force may not be required to achieve one's policy objectives, in terms of war preparation, violence must be taken as a given element in the nature of war. For war to become and remain non-violent would require the agreement of all potential belligerents. As long as the political objective is of a certain import, the desire to gain an advantage by raising the level of conflict to violence may be too great. The enemy can usually reintroduce violence, and therefore one must be prepared for such an eventuality.

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[97] Clausewitz, p309.

[98] Paret, *Understanding War*, p109.

[99] T. E. Lawrence, 'Guerrilla', in Gerard Chaliand (ed), The *Art of War in World History: From Antiquity to the Nuclear Age*, (Berkeley, University of California Press, 1994), pp882-886.

[100] Gray, *Modern Strategy*, p210.

[101] See Mao Tse-Tung, *Selected Military Writings of Mao Tse-Tung*, (Beijing, Foreign Languages Press, 1963).

Human Factors

Any analysis of the nature of warfare cannot ignore what is perhaps one of its most basic elements. Regardless of what character a war assumes, it is always a human activity, in that humans do the fighting and also that war is a battle between opposing human wills. The involvement of humans is central to the existence of the climate of war, the trinity, and friction more generally. [102] That being the case, war is imbued with human traits, emotions, concerns, and factors. Based upon his after-action surveys of combat troops, S. L. A. Marshall displays an acute awareness of how understanding and dealing with human nature is central to the successful conduct of war. [103] The importance of taking account and dealing with the human side of war is dealt with more fully in the chapter relating to command. At this stage it is merely necessary to show that human factors have a dominant and vital role in warfare. The human dimension accounts for a great deal of what Clausewitz described as the climate of war. As already mentioned, Clausewitz suggests that uncertainty is compounded by human perceptions. Likewise, chance and friction (which will be dealt with shortly) are partly a product of human actions. However, since war will always be orchestrated by humans regardless of who, or what, does the actual fighting in the battlespace, this section will concentrate upon issues relating to the other two elements of the climate of war, namely 'danger and exertion'. These two prominent features of war directly impact upon a crucial range of issues that come under the heading of 'moral forces'. Equally, they are credited with affecting the ability to think and act effectively. Indeed, it has been noted that humans can only operate continuously for four days before they shutdown. [104]

When considering the issue of danger, warfare becomes a very personal endeavor. [105] Keegan, in *The Face of Battle,* correctly argues that for the individual soldier war is not about big issues and policy aims, rather it is about personal survival. [106] Ardent du Picq states simply

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[102] Gray persuasively argues: "in war and strategy people matter most." See *Modern Strategy*, p97. See also p26 in which Gray asserts that 'people and politics' represent one of the dimensions of strategy.

[103] See S. L. A. Marshall, *Men Against Fire: The Problem of Battle Command in Future War*, (New York, William Murrow and Company, 1947).

[104] Watts, p30 and p82.

[105] Ellis, *The Sharp End of War*, p97.

[106] Keegan, *The Face of Battle*, p42.

that the battlefield is dominated by fear. [107] *Warfighting* reiterates this thought by stating that leaders must understand and cope with fear in the battlespace. [108] The following account of one private's experience at the Battle of El Alamein is as good as any expression of these truisms: "Everyone was shouting, screaming, swearing, shouting for their father, shouting for their mother, I didn't know whether to look at the ground or at the sky, someone said look at the ground for spider-mines, someone said look at the sky for the flashes, shells were coming all ways, the man next to me got hit through the shoulder, he fell down, I looked at him and said 'Christ', and then ran on, I didn't know whether to be sick or dirty my trousers." [109] For Clausewitz, danger and physical effort are contributory factors to friction in war. Indeed he notes that because the limits of physical effort cannot be measured accurately, it makes the estimation or understanding of friction uncertain. [110] This in itself goes further towards making war an activity that is far from controllable or an activity that can be reduced to simple calculations. Returning briefly to the subject of destruction, Clausewitz rightly identifies factors such as fatigue, exertion, and privation as separate destructive forces in war. [111] The existence of human limitations, in both the physical and psychological realms, places limits on what armed forces can do. In which case, war is prevented further from reaching its absolute form. [112]

The human element in war goes much deeper than mere reference to the limits of physical exertion. As already hinted at in relation to danger, the human element imbues war with powerful moral forces. War is essentially a battle of wills. Indeed, van Creveld notes that war is always a duel between two moral forces and that any analysis of war that ignores passionate emotions is without value. [113] This places psychological considerations at the heart of warfare. Reflecting these thoughts, Sun Tzu notes that the primary target in war is the opposing commander's mind. [114] In this sense, the Chinese theorist reflects well the intellectual competition

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[107] ibid, p61.
[108] Hayden, pp40-41.
[109] Ellis, *The Sharp End of War*, p111.
[110] Clausewitz, p135.
[111] ibid, p243.
[112] Watts, p30.
[113] Martin van Creveld, 'The Eternal Clausewitz', in Michael I. Handel, (ed), "Clausewitz and Modern Strategy", special issue of *The Journal of Strategic Studies*, p46 and p38.
[114] Sun Tzu, p41.

at the heart of war, and the significance of the emotions of the commander. A similar thought is echoed by Jomini when he states that war is an impassioned drama, although his tendency to perceive victory in geometric lines of operations seems somewhat at odds with any particular emphasis on moral forces. [115] One way in which the emotional and psychological side of man reveals itself is the often-overlooked prevalence of psychological casualty rates. Keegan reveals that according to a British army senior psychiatrists' report from World War Two, of all battle casualties, between ten and fifteen percent were of a psychiatric nature during the active phase of the Battle of France in 1940. During the early days of the Normandy battle the figures were between ten and twenty percent. Just as interesting in reference to the limits of man's endurance in war, he notes that virtually all soldiers involved in continuous or semi-continuous combat broke down. [116] John Ellis alerts us to a real testimony that highlights the human and psychological impacts of combat. An officer of the 1st Scots Guards in World War Two reports: "How I hate shells. I have seen strong, courageous men reduced to whimpering wrecks, crying like children." [117] However, human emotions do not have only negative effects in the conduct of war. Gray asserts how human factors can be one means to overcome an imbalance in technology and numerical inferiority. [118]

Displaying his synthesis of enlightenment and romantic thought, Clausewitz perceives physical and psychological factors forming an organic whole. [119] Whilst admitting that physical factors dominate combat, he also reflects at length on the centrality of morale effect in battle. [120] All the theorists under consideration agree on the decisiveness of the intellectual and moral strength of man, particularly the commander. [121] Ellis highlights the vital role played by officers in helping their men deal with the fear and chaos of battle. [122] The more successful commanders have usually been aware of man's dominant role in warfare. Mao is one such

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[115] Jomini, p344.
[116] Keegan, *The Face of Battle*, p288.
[117] Ellis, *The Sharp End of War*, p69.
[118] Gray, *Modern Strategy*, p97.
[119] Clausewitz, p216.
[120] ibid, p162 and p300
[121] See for example Sun Tzu, p39, and Jomini, p290.
[122] Ellis, *The Sharp End of War*, p228.

example. He was an insurgent leader, who not only revealed an understanding of the political considerations inherent in an insurgency, he also was acutely aware that man was decisive in war. [123]

The human dimension of warfare is one area in which the character of war can affect its nature. If war remains an activity that is ultimately characterised by combat in which man is in conflict with man, then human factors and considerations will remain paramount. In relation to this both Clausewitz and Jomini espouse the centrality of infantry in warfare. In a passage that has interesting implications for the current trend towards stand-off weaponry, Clausewitz states: "the actual core of an engagement lies in the personal combat of man against man. An army composed simply of artillery, therefore, would be absurd in war." [124] It could be argued that these sentiments are merely a reflection of the unmechanised character of warfare that was witnessed by these two theorists. However, the role of close infantry combat is just as noticeable in many wars of the modern period. World War Two, a war that is often portrayed as one dominated by armour and manoeuvre, came down fundamentally to infantry forces. [125] Moving from history to possible futures, van Creveld argues that a future dominated by small wars will continue to place infantry forces, or their equivalent, at the centre of warfare. [126] This focus on the role of infantry will be further enhanced if forecasts concerning the increasing urbanisation of warfare come to pass.

What are the implications of these truisms? As is argued in some detail in Chapter 3, dealing with the human side of warfare must be one of the commander's main preoccupations, whether that involves motivating men to engage the enemy regardless of their fear, or whether it simply means ensuring that the mail gets through from home. Another outcome of these considerations is that armed forces cannot simply be regarded as symbols on a map, or a collection of technologies that can be counted and reduced to quantifiable analysis. Rather, they are social organisms in which personal dynamics and relationships are critical to their functioning. [127] Consideration of the human dimension is a significant concern in the preparation for war.

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[123] See Griffith, p54, and Mao.

[124] Clausewitz, p338. See also Jomini, p290.

[125] Keegan, *The Face of Battle*, p254, and Ellis, *The Sharp End of War*, p72.

[126] van Creveld, *The Transformation of War*, p212.

[127] See Keegan, *The Face of Battle*, p42, pp46-47, and p62. See also Marshall, pp149-51.

Chance and Friction

Thus far this chapter has noted that war can be considered as a human activity imbued with non-rational forces. War is also an uncertain and somewhat chaotic undertaking. Taken together, these features suggest that war is far from being a highly controllable activity. These difficulties are further compounded by the play of chance and the occurrence of friction. When added together with the dialectic element of strategy, and the challenges of matching means to ends, this list produces Clausewitz's unified concept of general friction. [128] In the Clausewitzian paradigm the concept of friction is a central feature of war's true nature: "Friction is the only concept that more or less corresponds to the factors that distinguish real war from war on paper." [129] The occurrence of friction could have important implications for those who predict revolutionary changes which emanate from the operational performance of RMA capabilities. As Clausewitz himself notes when defining friction: "Countless minor incidents - the kind you can never really foresee - combine to lower the general level of performance, so that one always falls short of the intended goal." [130] Whilst stressing the role friction will play in future conflicts, it is important to note that even Clausewitz didn't overplay its invincibility. He suggests that human characteristics such as determination can go some way towards overcoming friction. [131] Gray also notes that other steps can be taken to help limit its influence on performance. These include: good and ample equipment; high morale; rigorous training; imaginative planning; historical education; combat experience; and sensitivity to potential problems. [132] The means by which friction can be dealt with again reveal the value to be gained by identifying, understanding, and preparing for those features that make up the nature of war.

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[128] Watts, p30. In his excellent study on future war Watts identifies the following taxonomy for the unified concept of general friction: danger; physical exertion; uncertainties and imperfections in information; friction in the narrow sense of the resistance within one's own forces; chance events; physical and political limits on the use of military force; unpredictability stemming from interaction with the enemy; disconnects between ends and means in war. See Watts, p32.

[129] Clausewitz, p138.

[130] ibid, p138.

[131] ibid, p138.

[132] Colin S. Gray, *War, Peace, and Victory: Strategy and Statecraft For the Next Century*, (New York, Simon and Schuster, 1990), pp107-108.

An element which itself is prominent within the broader concept of friction is the role of chance. In Clausewitz's view the element of chance is never absent from war. Consequently, guesswork and luck also play a significant role in warfare. [133] Jomini is likewise explicit on the omnipotence of chance. He notes that chance events "are risks which cannot be foreseen nor avoided." [134] Handel notes that the identification of chance as a feature of war has a long history. Thucydides makes reference to it in his *History of the Peloponnesian War.* [135] Taken together, both narrow friction and chance propel warfare further from being an activity that can be controlled with any degree of certainty and completeness. To some extent Sun Tzu appears to offer a different perspective. Far from seeing war as a chaotic undertaking, Sun Tzu implies that with the right knowledge and mindset warfare can be highly malleable. In the chapter 'Energy', Sun Tzu provides a picture of combat that appears chaotic, but in fact "there is no disorder." Organisation and good communications are the means by which order is produced from seeming disorder. [136] This latter point is interesting in reference to the current emphasis on digitisation and the attendant improvements in C^2 of forces. In this sense, it is easy to see why Sun Tzu is popular in the information age. In fact, Arquilla and Ronfeldt go further than just promising a reduction in friction. Instead, they suggest that the Clausewitzian emphasis on friction should be replaced by a vision of war in which the manipulation of entropy is the key. [137]

In concluding this section it is perhaps best to regard Sun Tzu's work as looking towards an ideal, in which the chaotic world of warfare is to a large extent under the control of a good general with the required knowledge at his disposal. On this overly optimistic perspective there is some justice to criticise Sun Tzu for failing to include enough consideration of an intelligent foe. An intelligent foe would also be capable of utilising Sun Tzu's advice, on issues such as deception for example, and therefore warfare may become more chaotic and chance-ridden for the commander on the receiving end of these actions. The fact that warfare is a human interaction creates uncertainty, chance, friction and a certain level of chaos. However, Sun Tzu,

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[133] Clausewitz, p96.
[134] Jomini, p42.
[135] Handel, 'Introduction', p14.
[136] Sun Tzu, pp92-93.
[137] Arquilla and Ronfeldt, 'Information, Power, and Grand Strategy: In Athena's Camp – Section 1', p156.

not unlike Clausewitz, is a useful reminder that certain actions can be taken, including the accumulation of knowledge and more efficient organisation, which can reduce the play of chance and friction. This is a subject to which we will return in later chapters. Overall, it is important to bear in mind these thoughts regarding the ways in which friction and chance can be elevated, whilst still retaining the fundamental notion that the nature of warfare includes a heavy element of chance and friction.

Conclusion

Any attempt to capture the nature of warfare in writing is bound to be inadequate to some degree. Reducing an activity as complex, varied, and impassioned as war to a few concepts is somewhat artificial. Yet, as noted at the beginning of this chapter, understanding the nature of warfare is important in order to prepare and equip oneself adequately. To reiterate Clausewitz's opinion on this issue, theory helps make understanding this subject a manageable exercise. In this vein, the three classical works of theory have been utilised, alongside recorded experience, to act as a basis for that understanding. So, how do the great theorists fare in our quest for a literary manifestation of war's true nature? Clausewitz comes closest to putting the nature of war into a theoretical framework. With regards to the other great works: Sun Tzu also has some useful observations and advice to offer. Whereas, Jomini, although useful in that he often claims the middle ground between the other two, is perhaps too prescriptive, too reductionist, and perhaps devotes too much of his work to operational concepts, for him to be considered as a first rate, universal theorist. Although, it is worth considering that his middle-ground stance may help revive his work in the information age.

What does the nature of warfare consist of? Uncertainty seems to be a prevalent factor throughout warfare in the pre-information age. This results from a number of factors, many of which centre around information. These include the fact that information is rarely in real-time; is often incomplete; contains contradictions; and is subject to human perceptions and interpretations. To this list we can also add the ever-present play of friction and chance, and

ultimately, uncertainty emanates from the fact that war is an activity characterised by human interaction. War is fought against an intelligent foe whose intentions can never really be known with absolute certainty. From this we can deduce that Clausewitz is more useful than Sun Tzu in understanding the uncertain element of war. Sun Tzu may be criticised for promoting advice which indirectly implies that warfare, and information, are more controllable than they really are.

However, the Clausewitzian model may not be as useful with regards to the value of information and knowledge. Clausewitz has been regarded as anachronistic on this issue long before the information age became a perceived reality. In this sense, Sun Tzu's emphasis on the value of knowledge is more practical. This latter point does not invalidate Clausewitz's focus on uncertainty. Rather, it is to say that alongside the character of the commander, which Clausewitz viewed as the means to deal with uncertainty, we should also value information as a means to help diminish the fog of war, and value knowledge to help shed light upon our foe's intentions. In the final analysis, uncertainty has always been present in warfare.

The historical evidence also indicates that violence, and destruction, are usually companions of warfare. There are times when resort to the destructive principle can prove counterproductive. The efficacy of certain counterinsurgency and counterterrorism campaigns may be reduced by the application of destructive force. More positive and productive measures may be required to achieve one's objectives in such cases. Likewise, as already noted in reference to the crusades of Frederick II, and Richard of Cornwall, the objectives of a war can sometimes be achieved without resort to fighting. Although, as these attempts at recapturing the Holy Lands reveal, an enemy left intact can at some point in the future reintroduce the destructive principle very much to your disadvantage. This is not to criticise the activities of these crusaders, who simply didn't have the resources available to destroy their rivals and thereby reclaim the Holy Lands for Christianity in perpetuity. It is merely sufficient to note that the Roman Republic had few problems with Carthage after the city and the Carthaginian civilisation were destroyed in 146 B.C.

The campaigns of Alexander the Great present an instructive case in which one can detect a synthesis of Clausewitz and Sun Tzu on the issue of violence and destruction in war. J. F. C. Fuller notes that Alexander learned from his father, Philip II, that military force was not the sole

weapon, nor the most puissant, in war. Fuller postulates that with the limited resources at his disposal, Alexander could never have conquered the Persian Empire if he had relied upon fighting alone. To rule the hostile Persian population would have necessitated enormous garrisons to administer and secure Alexander's conquered territory. To deal with this, and perhaps for religious reasons, Alexander adopted a policy of unification with the Persians. He did not destroy Persian administration in the areas he conquered, in fact he often employed the local Satraps and shared authority with them. He also took measures such as adopting Persian court etiquette and took to wearing Persian clothes. Rather than always destroy his enemies, Alexander often employed them, and in fact helped them develop, as is revealed through the many cities he built east of the Tigris. The case of Alexander perhaps does reveal the advantages of leaving things intact, and therefore also highlights the limits of the principle of destruction. Yet, it should be noted that Alexander could not have undertook his unification of the two cultures without the success he gained on the battlefield. Nevertheless, Alexander's example suggests that following Sun Tzu's advice can produce positive strategic outcomes. In the final analysis it has to be noted that Alexander created the opportunity for his policies of unification through violent warfare, and it was only after his battlefield victories that he could reap the benefits of his benevolence. [138]

Overall, history conclusively reveals that war is usually a violent activity. Therefore, one should prepare for war with this very much at the forefront of one's mind. This has implications for procurement policies, as well as the training of future warriors. Strategy however, is a complex beast. As Clausewitz expressed in *On War*, the policy objective should dictate the level of violence and destruction to be used. One has to factor the resistance of the enemy into this calculation also. It is the judgment of the strategist that must find the correct balance between the violent nature of war and the demands of policy.

The bottom line in this discussion is that warfare, above all else, is a human activity. This is true both in terms of the units that actually do the fighting, and in reference to the fact that it is an activity best thought of in terms of human interaction. This fact endows warfare with many

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[138] For details of these campaigns, see J. F. C. Fuller, *The Generalship of Alexander the Great*, (Ware, Wordsworth Editions, 1998), Nicholas Hammond, *The Genius of Alexander the Great*, (London, Duckworth, 1998), and Robin Lane Fox, *Alexander the Great*, (Harmondsworth, Penguin Books Ltd, 1986).

of the elements that have been discussed in this chapter. War is essentially a battle of wills in which moral forces dominate. However they choose to organise themselves politically or socially, and whatever terms they employ to describe the motivations behind their decision to wage war, humans fight each other for human reasons. As a result of this, the 'climate of war' and the 'trinity', and therefore the work of Clausewitz, comes very close to defining the true nature of warfare. The rest of this thesis will be devoted to an exploration of warfare in the information age, to assess whether *On War* will continue to best reflect the nature of war. Alternatively, the work of either Jomini or Sun Tzu may prove more fruitful. Or finally, maybe the character of war will change so significantly that new theorists will have to be utilised to understand the nature of warfare in the information age. Because Strategic Studies is a practical subject, any work that has become anachronistic should not serve as the basis for military education.

Chapter 2
The Future Battlespace

"We are in the midst of a dramatic change in the relationship between technology and the nature of warfare." [1]

Introduction

The future battlespace is a realm of infinite possibilities. That is not what some of the RMA literature would have us believe. In their different ways, many of the RMA enthusiasts each portray a vision of the future which is narrow and often ignorant of strategic considerations. This chapter will analyse and challenge the central tenets of this literature. Of course, the literature in question is plentiful, consequently it contains a host of different visions of the future. However, certain themes can be identified. Indeed, it is these central themes which present the most direct challenge to the nature of warfare as outlined in the previous chapter.

What are these central themes and claims? The contemporary RMA hypothesis is fuelled by the increased application of IT to the battlefield and the consequent digitisation of forces. From this, the prime commodity and engine of change is 'information'. As Robert R. Leonhard has noted: "If twenty-first century warfare has any theme, it is information." [2] Hence, the prominence of the terms 'Information Warfare' and 'Information-led Warfare'. [3] On occasion, some of the RMA devotees refine their visions to promote the concept of 'knowledge' above that of information. In this way, knowledge is merely information with meaning and understanding attached to, or extracted from, it. Another important component of some of the literature is an emphasis on the relationship between the increased availability of real-time information and Precision Guided Munitions (PGMs). Taken together, these developments allegedly establish

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[1] General William Odom, quoted in David Jablonsky, 'US Military Doctrine and the Revolution in Military Affairs', *Parameters*, Vol. XXIV, No. 3, Autumn 1994, p18.
[2] Leonhard, p219.
[3] For a discussion of 'Information-led Warfare', see Gray 'A Contested Vision'.

assured destruction in the battlespace.

The claims that emanate from the above themes offer a radical vision of the future, one that goes a significant way towards rendering the Clausewitzian paradigm anachronistic. The promise of an increasing abundance of information has led some writers to proclaim the significant decline of uncertainty in war. They postulate that operational concepts such as high levels of 'situational awareness' and 'Dominant Battlespace Knowledge' (DBK) will facilitate a lifting of the fog of war for friendly forces. Also evident is a proclivity to view war merely as an act of bombardment, in which victory is assured through the destruction of enemy targets with stand-off PGMs. At a 1999 conference, Captain Chris Parry of the Royal Navy predicted that heavy ground forces would never again engage the enemy close in. Rather, ground forces would merely fulfill a constabulary function and consolidate the victory already won by distant firepower. [4] Similarly, the authors of NCW subscribe to the belief that destruction of 50% of the enemy's assets automatically translates into victory. [5] Attitudes such as these reflect both emerging capabilities and an alleged sensitivity to casualties in Western societies and polities. [6] An extreme manifestation of these trends is 'Post-heroic warfare'. [7] Indeed, Libicki argues that due to sensitivity to casualties, the US must adopt and perfect stand-off warfare. [8] As this chapter will contend later, Parry and Luttwak's outlook may fufil the requirements of perceived domestic political requirements, and in that sense make the military instrument more politically usable, but it certainly does not necessarily represent good strategy. [9] A related consequence of the reconnaissance-strike complex (the linking of reconnaissance assets and PGMs) is the demise of the manned-platform, either to be replaced by unmanned vehicles or miniprojectiles, or indeed

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[4] Parry.

[5] Vice Admiral Arthur K. Cebrowski, 'Network-Centric Warfare: Its Origin and Future', *Proceedings*, January 1998, p32.

[6] Michael O'Hanlon describes how 'The RMA Movement' includes an emphasis on technology and a sensitivity to casualities. See Michael O'Hanlon, *Technological Change and the Future of Warfare*, (Washington, DC, Brookings Institution Press, 2000), p7.

[7] Luttwak, 'A Post-Heroic Military Policy'.

[8] Martin C. Libicki, 'Information and Nuclear RMAs Compared', *Strategic Forum 82*, July 1996, http://www.ndu.edu/inss/strforum/forum82.html

[9] In fact, as David Tucker argues in relation to the American experience in Somalia, the public's perceived sensitivity to casualties may not be a true representation of their opinions. See David Tucker, 'Fighting Barbarians', *Parameters*, Summer 1998, http://carlise-www.army.mil/usawc/Parameters/98summer/tucker.htm

rendered partially obsolete by the concept of 'virtual presence'. [10] The latter exhibits striking similarities to control from the air, and in this sense it suffers from similar limitations as expressed by General Schwarzkopf: "There is not a military commander in the entire world who would claim he had taken an objective by flying over it." [11] In our efforts to understand this removal of man from the battlefield we can again look towards a combination of technological determinism and socio-political considerations. To reiterate, Fuller may have identified this trend as far back as 1946, when he describes a hidden impulse in technological development, which has as its objective "The elimination of the human element both physically and morally, intellect alone remaining." [12] Chapter Three of this thesis will explore whether Artificial Intelligence (AI) will pose a challenge to Fuller's last refuge of man's role in warfare.

Overall, an increased ability to gather and disseminate information, allied to the assumed reliability of PGMs, creates a battlespace in which the conflict over information is perceived to be the key to success. In this vein, Libicki foresees a battlespace that is characterised by 'hide and seek' warfare rather than a 'force-on-force' experience. [13] Likewise, Admiral Owens has claimed "If you see the battlefield, you win the war." [14] Alvin Toffler has joined this fray by stating explicitly: "The wars of the future will increasingly be prevented, won or lost based on information superiority and dominance." [15] Lawrence Freedman has identified in the RMA literature a desire for victimless war typified by the achievement of victory through disruption

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[10] This concept originated in the USAF, and although it accepts that at times physical presence will be required, it does postulate: "There is an informational form of presence – a virtual presence -...". See Glenn W. Goodman Jr., 'The Power of Information: Air Force Clarifies its Misunderstood Virtual Presence Concept', *Armed Forces Journal International*, July 1995, p24. For a critical assessment of 'virtual presence', see Squadron Leader Peter Emmett, 'Information Mania - A New Manifestation of Gulf war Syndrome?', *RUSI Journal*, February 1996, pp19-26.

[11] Michael R. Gordon and General Bernard E. Trainor, *The Generals' War: The Inside Story of the Conflict in the Gulf*, (Boston, Little, Brown and Company, 1995), p442.

[12] Fuller, *Armament and History*, pv.

[13] See Martin C. Libicki, "Technology and Warfare", Lawrence E. Casper, Irving L. Halter, Earl W. Powers, Paul J. Selva, Thomas W. Steffens, and T. LaMar Willis, 'Knowledge-Based Warfare: A Security Strategy for the Next Century', *Joint Force Quarterly*, Autumn 1996, No. 13, p83.

[14] Admiral Owens quoted in Mackubin Thomas Owens, 'Technology, the RMA, and Future War', *Strategic Review*, Volume XXVI, No. 2, Spring 1998, p69. See also James Adams, ['Anoraks' Apocalypse'], *The Sunday Times*, News Review, 16th March 1997, p9. Arquilla and Ronfeldt provide a useful description of the current RMA at the operational level. See 'Cyberwar is Coming', p26.

[15] Alvin Toffler, 'Looking at the Future with Alvin Toffler', 02/07/00, http://www.usatoday.com/news/comment/columnists/toffler/toff05.htm

rather than destruction. [16] Christopher Coker proclaims that the ultimate manifestation of Post-modern War is 'humane warfare', in which the mission is to neutralise rather than kill. [17] Evidently, these visions of future war do not fit well with the emphasis placed on violence and destruction in the Clausewitzian nature of warfare. The notion of victory through information dominance reads like the theory of war by algebra, which Clausewitz largely dismissed. [18] Finally, although rarely explicit in the RMA literature, there does appear to be a reduced emphasis on friction in much of the enthusiasts' work. By significantly removing humans from the battlespace, by reducing or eliminating violence and destruction, and by lifting the fog of war, the RMA visionaries are going some way towards removing significant causes of friction. This implicit reduction of friction perhaps explains why they can make such confident claims regarding the efficacy of RMA forces and operations in the future battlespace. An example of this can be found in the concept of 'effects-based planning': "Modelling this concept is a planning and analytical tool that accurately depicts the intercourse among enemy economic, political, military, and social structures and predicts the impact of operations on many target sets in these categories." [19]

Should the future battlespace resemble the visions outlined above, in which war is a significantly less uncertain activity, is concluded with little or no violence, is to a large extent devoid of human involvement at the sharp end, and much less vulnerable to friction, then certainly modern warfare would be almost unrecognisable to Clausewitz. In many respects, certainly in relation to the climate of war, the nature of warfare would have been transformed. Such a change would have a number of important implications, and therefore these claims are worthy of study. Bearing in mind the role of theory in the education of officers, changes as radical as those proffered in the RMA literature would make Clausewitz's work much less meaningful. In this respect, Mackubin Thomas Owens reports that an army general has declared that technological advances will soon result in the end of Clausewitz. [20] As noted in Chapter One, obsolescence for

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[16] Freedman, *Information Warfare*, p6.
[17] Coker, p14.
[18] Clausewitz, p84.
[19] Casper *et al*, p87.
[20] Mackubin Thomas Owens, p64.

Clausewitz could mean greater prominence for other classical theorists, or indeed for theorists of the information age.

Aside from the educational ramifications of change, there are more direct and practical implications. As previously noted, one's understanding of the nature of warfare significantly influences how one prepares to wage war, and with what kind of equipment. Predicting, and preparing for, the character of future wars is a difficult and uncertain undertaking. Too much enthusiasm for the latest fad can leave you ill-prepared for the next war. In the 1950s, an overemphasis on nuclear weapons detracted from the conventional warfighting capabilities of the United States. [21] Relating that period to the current RMA, Paul Van Riper and Robert H. Scales, Jr., in an extremely well balanced appraisal of twenty-first century warfare, offer the following warning: "What overconfidence in nuclear weapons produced then, overconfidence in the microchip threatens to reproduce today." [22] Similarly, an emphasis on limited war theory in the pre-Vietnam War era is also criticised for distorting American performance in that conflict. In particular, Harry G. Summers bemoans the proclivity in limited war theory to rid war of its passion and emotions, and attempt to reduce it to an academic model. [23] It is tempting to suggest that much of the current RMA literature perceives war as devoid of intangible forces such as emotions. The significance of debates concerning the future of warfare is highlighted by Gray, who notes that dangers exist if you buy into an RMA too enthusiastically. However, he goes on to note that there are also pitfalls for those who do not adapt sufficiently to the changing character of war. [24] There are obvious procurement implications to this debate. Peter A. Wilson, whilst a senior consultant at RAND, noted that in order to fund the current RMA the 'radicals' are prepared to cut infrastructure and force structure. In particular, he notes that the US Army would feel the brunt of any cuts. [25] Evidence of this can be found in Campen's assessment that the RMA enables the

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[21] See Mackubin Thomas Owens, 'Vietnam as Military History', Review Essay, *Joint Force Quarterly*, Winter 1993-94, pp112-118.

[22] Riper and Scales, p4. See also Chapter Four of this thesis for an analysis of the difficulties faced by the USAF in Vietnam as a result of their pre-war emphasis on nuclear weapons, and Gray, *Modern Strategy*, p250.

[23] Harry G. Summers, Jr., *On Strategy: A Critical Analysis of the Vietnam War*, (Novato, Presidio, 1982), p35.

[24] Gray, 'A Contested Vision'. This point is also strongly made in Krepinevich. See also, O'Hanlon, pp24-26

[25] Wilson, p4.

development of a much smaller force structure. [26] Bearing in mind the opinions of those such as Captain Parry, one can envisage a procurement policy which emphasises sensors and stand-off munitions, such as increased numbers of TLAMs, at the expense of armoured and infantry forces. This chapter will return later to the debate concerning the value of ground forces, at this juncture it will suffice to note that although TLAMs are a very effective means to deliver explosives, they cannot patrol the streets of Belfast or Pristina, nor could they have rooted out insurgents in Malaya.

Overall, it is important to note that the danger exists that an overly enthusiastic implementation of the RMA could establish military and strategic cultures that are ill-suited to cope with the gamut of future conflicts and enemies. Williamson Murray is correct to draw our attention towards the fact that military culture, through which military organisations develop an understanding of the nature of warfare, is a central component of military effectiveness. [27] In this respect, we should be wary of further moves towards the 'humanisation' of warfare, which is a trend identified by Brian Holden Reid in the work of Fuller and Liddell Hart. [28] Alongside the principle of 'Economy of Force', this desire to 'humanise' war appears implicitly to underpin the current *promotion of disruption at the expense of destruction.* The inherent danger in this honorable solecism is no better described than by Clausewitz, who warned: "The fact that slaughter is a horrifying spectacle must make us take war more seriously, but not provide an excuse for gradually blunting our swords in the name of humanity. Sooner or later someone will come along with a sharp sword and hack off our arms." [29] Another flaw in an RMA-based military culture is an increased emphasis on technology. [30] Although important, technology only represents one dimension of strategy. [31] Indeed, the other factors, which include the human dimension of war, may be more influential in deciding success or failure.

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[26] Alan D. Campen, 'Introduction', in Campen (ed), *The First Information War*, (Fairfax, AFCEA International Press, 1992), pix.

[27] Williamson Murray, 'Does Military Culture Matter?', *Orbis*, Volume 43, No. 1, Winter 1999, pp27-42.

[28] Holden Reid, 'Enduring Patterns in Modern Warfare', p20.

[29] Clausewitz, p309.

[30] Major David J. Lemelin has criticised the US Army's Force XXI program for putting technology centre stage, and only rhetorically acknowledging the human side of warfare. See Lemelin, p81. Similarly, O'Hanlon argues that high technology has become the defining characteristic of the American way of war. See O'Hanlon, p1.

[31] Gray, *Modern Strategy*, p37.

The above discussion reveals that perceptions of the future nature of war will have significant implications for future strategic performance. Preparing for a very different kind of war to that which actually occurs could leave you materially and culturally at a significant disadvantage. Therefore, this chapter will examine the main challenges suggested in the RMA literature to the Clausewitzian nature of warfare. This will consist of an analysis of how resilient friction, humans, violence/destruction, and uncertainty will prove to be in the information age. This chapter will not contain a detailed account of the future technologies and operations that may characterise the future battlespace. This is impossible to do with any degree of accuracy, since no one security community can control the future development of warfare. Instead, the analysis will explore the most prominent claims in the RMA literature, within a framework constructed of the factors that most heavily influence the conduct of war. These factors are: strategy; geography; the existence of an intelligent enemy (the paradoxical logic of strategy); the fact that war can take many forms (the character of war is polymorphous and therefore the belligerents have a number of options available to them with regards to the style of conflict they adopt); and finally that war is a human activity. Taken together, these factors prevent war from attaining any degree of uniformity. However, this work is not so conservative as to reject the notion that the information age will impose some changes on the conduct of war. In this vein, the chapter will conclude with a speculative assessment of what significant changes could occur.

An Uncertain Future

As noted in the previous chapter, uncertainty lies at the heart of the Clausewitzian concept of war. The expectation of uncertainty influences the conduct of war, including approaches to command and control, doctrine, and demands the holding of reserve forces to safeguard against the unexpected. Indeed, the USMC has described its doctrine of *Maneuver Warfare* as a culture designed to cope with the fog, chaos, and friction inherent in war. [32] Uncertainty may be an

[32] Hayden, p10.

elemental characteristic of the Clausewitzian paradigm, but it has been subject to some of the most severe challenges to be found in the RMA literature.

Although at times even the most strident RMA enthusiasts qualify their optimism concerning the levels of certainty attainable, their general message proclaims that the fog of war is a malleable phenomena which can be lifted or increased as required. For example, Admiral Owens, one of the most ardent RMA theorists, has admitted that the system-of-systems will not see everything. Rather, it will *reduce* the fog and friction of war. This is a welcome statement, although one which is at odds with most of his less restrained assertions: "technology could enable U.S. military forces in the future to lift the 'fog of war' .... battlefield dominant awareness - the ability to see and understand everything on the battlefield - might be possible." [33] Similarly, in *Lifting the Fog of War* he proclaims: "This new revolution challenges the hoary dictums about the fog and friction of war." [34] Behind these claims lies the notion that layers of multispectral sensors, digitally linked to form a common picture of the battlespace, will be able to identify every physical instrument in a conflict. At the purely technological level this claim is not too outlandish. However, the omnipotence of friction and the mere existence of an intelligent enemy should cause one to be cautious even of these claims. These two factors will undoubtedly reduce the efficacy of IT-based capabilities. Where the RMA literature becomes even more daring is when it claims an ability to translate this information into knowledge. [35] The following definition of 'Information Dominance' reveals how excessive these notions can become: "Knowing *everything* about an adversary while keeping the adversary from knowing much about oneself. [emphasis added] " [36] Over-confidence in IT encourages Cooper to declare that DBK allows the commander to transcend the problems of uncertainty. [37]

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[33] For the more cautious appraisal see William A. Owens, 'Introduction', p12. The less restrained statement was quoted in Mackubin Thomas Owens, p63.

[34] Admiral William Owens with Ed Offley, *Lifting the Fog of War*, (New York, Farrar, Straus and Giroux, 2000), p15.

[35] For more details on these issues, see Martin C. Libicki, *What is Information Warfare?*, ACIS Paper 3, (Washington, DC, National Defence University, August 1995), http://www.ndu.edu/ndu/inss/actpubs/actoo3/aoo3cont.html
Libicki, *The Mesh and the Net*, and Owens, 'The Emerging System of Systems'.

[36] John Arquilla and David Ronfeldt quoted in Arquilla, 'The Strategic Implications of Information Dominance', p25.

[37] Jeffrey Cooper, 'Dominant Battlespace Knowledge and Future Warfare', in Stuart E. Johnson and Martin C. Libicki (eds), *Dominant Battlespace Knowledge*, (Washington DC, National

Taking the above claims too seriously could have ruinous consequences. It has been variously asserted that in a DBK future there are no requirements for mass, flank protection forces, or reserves, because part of the rationale for these forces is to deal with the unexpected. [38] The obvious danger with these notions emanates from the not unreasonable possibility that, whether due to friction within one's own forces, or because of the actions of the enemy, the certainty that underpins the above claims could prove transient. Another cause for concern relates to the impact on doctrine and training. This relates to both the commander and the forces in his charge. At the risk of being glaringly obvious, it is worth noting that a military equipped and trained to operate in an environment characterised by certainty would surely struggle if deprived of its information-crutch or faced with an unexpected development. It is profitable to remember that the USMC's entire doctrinal culture is premised on the expectation of uncertainty, which reveals the potency of this aspect of the nature of warfare.

It should be clear from the discussion thus far that the author expects uncertainty to remain an ever-present factor in the battlespace. There are a number of different, if at times overlapping, reasons which lead to this conclusion. The first of these reasons relates to the aforementioned existence of an intelligent enemy. Any foe that is faced with an array of information gathering devices will in all likelihood place significant weight on the art of *deception.* [39] Writers such as Libicki proclaim that deception will become increasingly difficult as the array of multispectral sensors increases. [40] However, one can only look to the historical evidence and conclude that it would take a seismic shift to end the continuous dynamic conflict between the hunters and hunted. Libicki appears to underplay the possibility that those wishing to remain

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Defence University, Revised Edition 1996), p92.

[38] See Leonhard, and Richard J. Harknett, 'Information Warfare and Deterrence', *Parameters*, Vol. XXVI, No. 3, Autumn 1996, p102.

[39] See *FM 100-6 Information Operations*, (Washington, DC, Headquarters Department of the Army, 1996), p4-1, and Vice Admiral Arthur K. Cebrowski, *Network-Centric Warfare: An Emerging Military Response to the Information Age*, Presentation at the 1999 Command and Control Research and Technology Symposium, June 29, 1999. Bennett provides an excellent account of Allied deception in the D-Day operation, and quite clearly shows that the information one receives is not always beneficial, indeed it was detrimental to the Germans. Ralph Bennett, *Behind the Battle: Intelligence in the War With Germany 1939-1945*, (London, Pimlico, 1999), pp259-269. See also Timothy L. Thomas, 'Kosovo and the Current Myth of Information Superiority', http://carlisle-www.army.mil/usawc/Parameters/00spring/thomas.htm

[40] See Martin Libicki, *What is Information Warfare?*

unseen will not stand still in the development of their techniques. In this respect, he appears to assume that those producing the mesh have a monopoly on technical and tactical developments. Both the Gulf War of 1991 and the Kosovo conflict of 1999 reveal that the technologically disadvantaged can still deceive opponents fielding the most advanced information systems. During the Gulf War, the Coalition destroyed a substantial number of high-fidelity ballistic missile decoys, which according to United Nations' inspectors were only identifiable as fakes twenty-five yards away on the ground. [41] Similarly, reports suggest that Serbian camouflage and deception techniques limited the numbers of military hardware destroyed in Kosovo. [42] When considering the impact deception could have on the ability to remove uncertainty from the battlespace, it is interesting to note that advocates of the RMA often cite the writings of Sun Tzu because of his focus on the value of knowledge, and yet they appear to overlook his declaration that "All warfare is based on deception." [43] If they do not overlook this sentiment, then they are naively assuming that the art of deception rests only with the side fielding the RMA force.

Aside from acts of deception, there are other reasons to suggest that information on the battlespace can never be complete. This is the case because war does not consist purely of tangible physical objects to be counted and classified. At least as important, if not more so, to the outcome of any particular conflict are the intangible qualities, such as morale and level of training. This is one area in which gaps in 'knowledge' can occur most readily. T. E. Lawrence notes: "There was a line of variability (man) running through all its estimates. Its components were sensitive and illogical, and generals guarded themselves by the device of a reserve, the significant medium of their art. Goltz had said that when you know the enemy's strength, and he is fully deployed, then you know enough to dispense with a reserve. But this is never. There is always the possibility of accident, of some flaw in materials, present in the general's mind: and the reserve is unconsciously held to meet it." [44] *The Economist*, quoting an infantry colonel, expresses this dilemma well: "No screen can convey perfect information: there is always more to know, like,

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[41] Thomas A. Keaney and Elliot A. Cohen, *Gulf War Air Power Survey: Summary Report*, (Washington, DC, 1993), p86.

[42] See Nick Cook, 'War of Extremes', *Jane's Defence Weekly*, 7 July 1999, p21.

[43] Sun Tzu, p66.

[44] Lawrence, 'Guerrilla Warfare', in Gerard Chaliand (ed), *The Art of War in World History: From Antiquity to the Nuclear Age*, (Berkeley, University of California Press, 1994), p884.

are the enemy soldiers tired and hungry?" [45] S. L. A. Marshall identifies other incalculable such as the effects of terrain, weather, and morale. The latter is particularly troublesome, because as Marshall notes: morale is not a stable phenomenon, rather it tends to fluctuate. [46] Callwell adds yet another complication into this issue by correctly postulating that one cannot truly know the fighting quality of enemy forces until the conflict has actually got underway. [47] In reference to terrain, it is tempting to suggest that terrain analysis could predict the effects of a particular environment on a military operation. In contrast to this notion, Field-Marshal Slim, the noted commander of Fourteenth Army in Burma during World War Two, suggests from experience that one can never fully appreciate the impact of terrain until one is in it. [48] Similarly, Winters notes that in general environmental factors are unpredictable. [49] For a balanced appraisal of this subject we can turn once again to the USMC's *Warfighting* doctrine publication. *Warfighting*, following Clausewitzian ideas, correctly describes war as an interaction of moral and physical forces, the former having the greater effect in the outcome of a conflict. [50]

It is noteworthy, and of concern, that much of the RMA literature simply fails to mention intangibles such as morale. However, the literature is not totally devoid of such issues. For example, the Tofflers stress the importance of the 'knowledge terrain', which includes qualities of the enemy such as level of training, education, and culture. [51] In this respect, the Tofflers are offering sound advice. Of course, much of this already comes under the rubric of 'strategic culture'. In which case, it is profitable to explore the strategic culture literature, as it contains a number of cautionary points. While it is certainly sensible to attempt to understand how a particular enemy usually thinks and acts, absolute knowledge is not attainable. The process of turning information into knowledge involves subjective interpretations. History reveals that what passes for an appreciation of strategic culture can sometimes be no more than the creation or

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[45] 'The Future of Warfare', *The Economist*, 8 March 1997, p24.
[46] See Marshall, pp108-109, and p179.
[47] Callwell, p47
[48] Field-Marshal Sir William Slim, *Defeat into Victory*, (London, The Reprint Society, 1957), p22. This sentiment is shared by Marshall, p107.
[49] Harold A. Winters, with Gerald E. Galloway Jr., William J. Reynolds, and David W. Rhyne, *Battling the Elements: Weather and Terrain in the Conduct of War*, (Baltimore, The John Hopkins University Press, 1998), pp3-4.
[50] Hayden, pp41-42.
[51] Toffler and Toffler, *War and Anti-War*, p158.

validation of stereotypes. [52] Consequently, the knowledge you have acquired or constructed does not necessarily represent reality. These comments are not designed to denigrate the value of acquiring knowledge on the enemy, rather they are designed to suggest that certainty is rarely, if ever, achieved. In this exploration of the difficulties encountered in the quest for knowledge there is one very important factor still to mention, namely, intent. Being able to see all the enemy's physical assets is not the equivalent of knowing what he will do with them. [53] Although, Leonhard is right to suggest that by watching enemy logistical preparations one can gain some insight into his intentions. [54] Also, intelligence gathering, including the interception of enemy communications, can also help in this process. However, even assets such as the intelligence garnered from Ultra do not guarantee certainty in understanding the enemy's intentions. Despite the advantages offered to Allied commanders in the North African campaign, Rommel was still able to achieve surprise on a number of occasions. [55] The previous discussion of deception should also temper any undue optimism regarding the identification of enemy intentions. Finally, it is necessary to once again refer to the polymorphous character of war. Conflict is not restricted to conventional warfare composed of easily identifiable units and formations. Both Callwell and Lawrence remind us that irregular operations and formations mitigate the chances of quantifying enemy force structures and intentions. [56] Ultimately, on the issue of intentions, the USMC once again seems to have the most sensible view. *Warfighting* declares that the best one can hope for is to establish probabilities, to estimate the enemy's designs. However, some enemy actions will always come as a surprise, and these kinds of actions can often have the greatest impact on the battle. [57]

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[52] For an assessment of strategic culture the following works offer a range of perspectives: Gray, *Modern Strategy*, especially Chapter 5 'Strategic Culture as Context', Chaliand, 'Warfare and Strategic Culture', in Chaliand, (ed), *The Art of War in World History*, Carl G. Jacobsen, ed., *Strategic Power: USA/USSR*, (New York, St. Martin's Press, 1990), Alastair I. Johnston, 'Thinking About Strategic Culture', *International Security*, Vol. 19, No. 4, Spring 1995, Yitzhak Klein, 'A Theory of Strategic Culture', *Comparative Strategy*, Vol. 10, No. 1, January-March 1991, pp3-23, Gerald Segal, 'Strategy and Ethnic Chic', *International Affairs*, Vol. 60, No. 1, Winter 1983-84.

[53] Campen, p172

[54] Leonhard, p166.

[55] Bennett, p86.

[56] Lawrence, 'Guerrilla', p888, and Callwell, p47.

[57] Hayden, p39.

Aside from these two major obstacles to the pursuit of certainty, there are a host of other difficulties. One often noted in the literature is the potential for information overload. Indeed, Ferris and Handel identify this as one of the more prominent elements of uncertainty in the modern battlespace. [58] Rather than lifting the fog of war, too much information could thicken it, presenting a commander and his staff with too much data to understand in a reasonable time. [59] A possible future answer to this dilemma is the utilisation of Artificial Intelligence (AI) in the process of command. The following chapter will explore this possibility and suggest reasons why this may not present a credible solution to the problem of command in the information age. The context in which a conflict occurs can also have a significant bearing on the chances of dispersing the fog. In this respect, the difficulties posed by wooded and jungle areas immediately come to mind. In this context, Michael O' Hanlon notes that the sensors which collect information have a number of limitations. For example, in the 1991 Gulf War the performance of infrared, electro-optical, and laser systems suffered due to the weather, dust, and smoke. Similarly, O'Hanlon suggests that an enemy facing the Brilliant Anti-Tank (BAT) submunition can employ flares to confuse its infrared sensors, and/or create noise to jam its acoustic sensors. In general, he concludes that although sensors will improve, their potential will be limited by the laws of physics, enemy countermeasures, and natural cover. [60] There may well be technological solutions lurking in the future to help the seekers peer through what were once impenetrable screens. However, other environments, such as the growing urban environment, will present greater difficulties. This is not so much a result of the physical characteristics of these areas, although that is still clearly a problem, but is more to do with the density of population into which the enemy can blend. David Jablonsky reminds us of the obvious difficulties faced by US forces in Somalia in trying to identify the bad guys amongst the general population. [61]

Reference has already been made to the problems involved in the interpretation of information. The classic study of this subject is Roberta Wohlstetter's analysis of the Japanese

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[58] Ferris and Handel, p42 and p49.

[59] This point is made in Ritcheson, p35.

[60] Michael E. O'Hanlon, 'Beware the "RMA'nia!", Paper Presented at the National Defence University, September 9 1998, See also O'Hanlon, *Technological Change and the Future of Warfare*, p3.

[61] Jablonsky, p30.

attack on Pearl Harbour in 1941. Significantly for those who equate information/knowledge with victory, Wohlstetter concludes: "Never before ... have we had so complete an intelligence picture of the enemy." [62] Despite this, the Japanese were still able to achieve surprise. The Arabs in 1973 and Iraq in its invasion of Kuwait in 1990 achieved similar strategic surprise. Although deception often played a role in these instances, with reference to Japan, Wohlstetter highlights the problems of deciphering the useful information from the surrounding noise, and the subjective interpretation of information as a result of preconceived expectations of the enemy's intentions: "In short, we failed to anticipate Pearl Harbour not for want of the relevant materials, but because of a plethora of irrelevant ones." [63] Looking further back into history, Elizabeth I had acquired plans for Philip II's Armada of 1588. However, like Pearl Harbour, Spain's actual intentions were subsumed within a cacophony of other intelligence. [64] The above cases refer to what might be described as surprise at the strategic level, yet the fears and pressures confronted in the battlespace will surely produce similar mistakes in the use of information at the lower levels of strategy. Again, the ever-useful *Warfighting* assumes that information and instructions will be unclear and/or misunderstood during battle. [65] It is also worth remembering that Clausewitz discusses a 'psychological fog', which emanates from an emotional response to the suffering and hardship of battle, which makes it "hard to form clear and complete insights." [66] The underlying point to be made is that even the possession of complete information does not guarantee certainty of understanding, nor the ability to act upon that information. Bennett cites the example of Crete in 1942, when General Freyberg, the Allied commander on Crete, lacked the resources to defeat the German assault he knew was coming. [67]

There are myriad factors that prevent information from fufiling its operational and strategic potential. This does not mean that uncertainty cannot be reduced. Indeed, the increasing

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[62] Roberta Wohlstetter, *Pearl Harbor: Warning and Decision*, (Stanford, Stanford University Press, 1962), p382.
[63] Ibid, p387.
[64] Parker, *The Grand Strategy of Philip II*, p215.
[65] Hayden, p40.
[66] Quoted in Riper and Scales, p9. Similarly, Bennett comments: "hindsight finds it easy to propose facile answers and actions which would never have entered the minds of men forced to make quick decisions in the heat of battle or in the moment of unguarded elation which may follow hard-won victory." Bennett, p109.
[67] Bennett, p80.

deployment of ever more enhanced sensors should help to increase the level of transparency in the battlespace. In this sense, *Joint Vision 2010* is probably correct when it asserts that the likes of DBK will not eliminate the fog of war, rather they will merely increase transparency. [68] However, what will ensure the dominance of uncertainty more than anything is the inescapable fact that war is an interaction between intelligent foes. [69] In this respect, an intelligent foe can deceive his enemy, alternatively he can directly offset his opponent's information technology. This latter objective could be achieved by a number of methods, including the utilisation of an EMP. Just as importantly, one can never know for sure how the enemy will react within the interactive activity that is war.

These conclusions suggest strongly that it would be wise to continue to prepare for war in the expectation of uncertainty. Kenneth F. McKenzie, Jr. is right to warn us against the dangers of training for, and expecting, certainty. [70] Finally, two doctrinal manuals, *Warfighting* and the 1986 version of the US Army's *FM 100-5*, both caution that creating a culture which expects certainty could result in the surrender of the initiative to the enemy as the elusive search for certainty dominates a commander's actions. [71]

A Human Future

Reference has already been made to what Fuller described as the hidden impulse to remove humans from the direct conduct of war. A number of concepts that underlie the current RMA appear to continue this process. This is not wholly surprising because the modern RMA is, to a significant degree, shaped by the United States. The strategic culture of the United States tends to place undue emphasis on technological answers to strategic questions. [72] Major Norman C. Davis

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[68] See 'Joint Vision 2010', p39.

[69] Riper and Scales, p10.

[70] Kenneth F. McKenzie, JR., 'Beyond Luddites and Magicians: Examining the MTR', *Parameters*, Vol. XXV, No. 2, Summer 1995, p19.

[71] See Hayden, p70, and FM 100-5 cited in Williamson Murray, 'Does Military Culture Matter?', pp36-37.

[72] See Colin S. Gray, *Nuclear Strategy and National Style*, (Lanham, Hamilton Press, 1986), p45.

of the USMC notes that for decades the US has pursued the objective of replacing manpower with firepower. [73] In terms of protecting friendly lives, this is undoubtedly a laudable goal. However, the development of a force structure and strategic culture that reduce the ability to put men into 'harms way', may not serve the cause of strategic efficacy.

Two main sources of change can be identified in this area. Those who seek and believe victory can be obtained by distant bombardment provide the first of these. This approach is typified by the opinions of men like Captain Parry, and was also reflected in NATO's strategy during the Kosovo conflict. In the conclusion to his book *The Next World War*, James Adams declares that stand-off will be the fundamental strategy of the future. More alarmingly, he goes on to postulate: "fighting wars without casualties might seem a contradiction in terms, but there are systems in service or being developed that allow exactly that." [74] On the basis of these ideas, Adams concludes that embracing stand-off equates to accepting a decreasing requirement for people to do fighting up-close and personal. [75] In his work on Post-heroic warfare, Luttwak complains at the cost of infantry and armoured forces and the corresponding shortage of cruise missiles. Although he recognises that ground forces are the most versatile expression of military power, he concludes that in the current political environment they are politically unusable. [76] In light of the Kosovo conflict, one has to conclude that in many respects Luttwak's ideas were proven correct. There was certainly unwillingness on the part of NATO political leaders to risk deploying more casualty prone ground forces. The conflict also uncovered a shortage of precision munitions in NATO arsenals. [77] An aversion to casualties may also increasingly influence future urban operations for security communities such as the United States. The proceedings of a 1998 conference on urban warfare reveal how influential the risk of casualties could prove to be in future US military operations. The summary of the conference concluded that sustained urban conflict was almost totally out of the question because of the potential casualties that could be

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[73] Major Norman C. Davis, 'An Information-Based Revolution in Military Affairs', *Strategic Review*, Vol. XXIV, No. 1, Winter 1996, p45.
[74] Adams, *The Next World War*, p310. The quote was taken from p125.
[75] ibid, p125.
[76] Luttwak, 'A Post-heroic Military Policy', p38.
[77] Bryan Bender, 'US Weapons Shortages Risked Success in Kosovo', *Jane's Defence Weekly*, Vol. 32, No. 14, 6 October 1999.

sustained. [78] However, as this chapter will subsequently argue, strategy demands that the response to the current political environment is not to change force structure, but rather to attempt to change the current political psyche. Future enemies, plus the requirements of future strategy, may not play by the rules of post-heroic warfare. In this context, referring to the Confederacy's loss at the Battle of Gettysburg, Vincent J. Goulding, Jr. comments: "our 21st-century Cemetery Ridge awaits us if we allow political expediency and transient technological advantage to become the determinant of successful military operations." [79] Goulding wisely argues that decision makers must accept that mission success might entail casualties, and chastises the following statement by Don Snider, John Nagl, and Tony Pfaff: "if mission and force protection are in conflict, then we don't do the mission." [80] Finally, in what is a praiseworthy article, Goulding bemoans the fact that aversion to casualties is reaching into Peace Support Operations (PSO), and creates a situation in which US troops, cocooned within their fortified camps, cannot interact properly with the local inhabitants nor understand the situation on the ground. [81]

The second potential agent of change is an increased emphasis on unmanned platforms. Wilson observes that it is not just a sensitivity to casualties that drives these efforts. The desire for higher operational tempo, allied to the physical and mental limitations of humans, present understandable motivations for the development of unmanned vehicles. [82] One of the most extreme versions of these ideas, and one which brings together the notions of war by bombardment and unmanned delivery systems, is Libicki's concept of fire-ant warfare. In this vision of the future, which is devoid of reference to strategic context, tiny sensors, emitters, and microprojectiles dominate the battlespace. The existence of a fine 'mesh' of sensors that covers the battlespace ensures that nothing the size of a manned platform can escape detection. [83]

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[78] Daryl G. Press, *Urban Warfare: Options, Problems and the Future*, The Summary of a conference sponsored by the MIT Security Studies Program, 20 May 1998, Hanscom Air Force Base, Massachusetts, p18.

[79] Vincent J. Goulding, Jr., 'From Chancellorsville to Kosovo, Forgetting the Art of War', *Parameters*, Vol. XXX, No. 2, Summer 2000, p7.

[80] Ibid, pp8-9.

[81] Ibid, p11.

[82] Wilson, pp7-8. This point is reiterated by Adams, who correctly notes that Unmanned Combat Aerial Vehicles (UCAVs) can operate at significantly higher speeds and G-forces. See Adams, *The Next World War*, pp128-129.

[83] See Libicki, *The Mesh and the Net*. In one of his latest works, Libicki argues that we are witnessing the sunset of platform-centric warfare. See Martin C. Libicki, *Illuminating*

Interestingly however, at one stage Libicki does acknowledge that the best ground-based sensor is a digitally-linked human. [84] Yet, in another piece of work Libicki declares that even an infantryman will not go unnoticed in the future battlespace. [85] There is, of course, a distinction between utilising humans merely as sensors, and perceiving them as broader instruments of strategy that may include the use of them for the delivery of firepower and 'control'. It is also worth bearing in mind, as Lemelin argues, that an acknowledgement of the value of humans in warfare evident in some of the RMA literature may be no more than rhetoric. [86] Often, work by RMA enthusiasts begins with a declaration on the value and continued role of humans, only for the rest of the paper to focus entirely on the latest technology. Even Libicki's concept of fire-ant warfare is surpassed by the aforementioned notion of 'virtual presence'. Careful analysis of these issues is required because the procurement and military cultural implications of accepting these RMA visions on the future role of humans are very significant.

As in the case of uncertainty, there are a number of fundamental reasons to indicate that humans, and the platforms in which they travel, will continue to be put into harm's way, and therefore have to engage in direct and close combat with the enemy. These reasons emanate once again from the requirements of strategy. The central role of strategy is often overlooked in the RMA literature. For example, Admiral Owens concentrates his attention on the 'combat superiority' that can be garnered from long-range PGMs and enhanced delivery systems. [87] Whilst it is right and proper to stress the requirement for efficacy in combat, the real focus of attention should be on the attainment of 'strategic superiority'. To reiterate, strategy is concerned with the relationship between means and ends, in which means are represented by military instruments and the ends refer to policy objectives. In broader terms, the objective of war, to use Admiral J. C. Wylie's terminology, is to exert some measure of *control* over the enemy and/or the situation. [88]

Tomorrow's War, McNair Paper 61, November 1999, http://www.ndu.edu/inss/mcnair/mcnair61/m61cont.html

[84] Libicki, *What is Information Warfare?*

[85] Libicki, *Power and Progress.*

[86] Lemelin, p81.

[87] Owens, *Lifting the Fog of War*, p208.

[88] J. C. Wylie, *Military Strategy: A General Theory of Power Control*, (Annapolis, Naval Institute Press, 1967), p66. Clausewitz expressed a similar concept when he described the objective of war as "an act of force to compel our enemy to do our will." See Clausewitz, p83.

Wylie describes the method by which control is enforced: "The ultimate determinant in war is the man on the scene with the gun. *This man is the final power in war. He is control.*" [89] The term 'control' accurately describes the broad objective of strategy, in that it engenders a notion of physical control over the land, its people, resources, and thereby the issues at stake. As Gray and Corbett have both noted, land is where the final decisions will be made, because it is on land where humans dwell. [90] Control can be applied to a number of things, including the control or protection of populations, resources, or territory for its own sake. The possession of territory can serve many purposes, from the establishment of a security buffer zone, to fufiling the requirements of political symbolism. [91] The deployment of ground forces can also display resolve and commitment to allies. In contrast to air power, ground forces can provide you with prolonged presence. The history of warfare continually reaffirms Wylie's principle of the man on the scene with a gun. The conflict in Kosovo presents one of the most recent examples. The debate continues over whether the air campaign alone proved decisive. However, from a strategic perspective it is clear that one of NATO's primary objectives, the return of the Kosovar Albanians, could not be achieved without the physical presence of NATO ground forces in the Yugoslav province.

The value of ground forces, especially infantry, is further enhanced when the various possible contexts of future conflicts are considered. Much of the RMA literature focuses its attention on regular conventional forms of warfare, and yet this is in direct contrast to a substantial body of work which foresees a future of low-intensity, irregular forms of conflict. Within this literature, the writings of van Creveld and Ralph Peters are amongst the most prominent. [92] In the

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[89] Wylie, p72.

[90] Colin S. Gray, *The Leverage of Sea Power: The Strategic Advantage of Navies in War*, (New York, The Free Press, 1992), p4, and Julian S. Corbett, *Some Principles of Maritime Strategy*, (London, Longmans, Green and Co., 1919).

[91] Riper and Scales argue that for Less Developed Countries the conquest of land still holds great significance for the purposes of resource and/or population control, and to satisfy the need for political symbolism. That being the case, Western countries could easily be drawn into these conflicts. See Riper and Scales, p7. It is also worth noting that despite the relatively long, if uneasy peace in Europe, these motivations behind the conquest and occupation of land could once again become important in the Western world. Any suggestion that political boundaries in the West are stable in perpetuity is hard to accept because of the lack of historical precedent. & see Freedman, *Information Warfare*, p12.

[92] In this genre the classic text is van Creveld's *The Transformation of War*. Although in this thesis the author uses the traditional terms of 'high' and 'low' intensity warfare, it should be noted that the validity of these terms has been questioned by various authors. Of particular value is Christopher Bellamy, 'Spiral Through Time: Beyond "Conflict Intensity"', *The Occasional*, No

context of this chapter, the important implication of these ideas is, as Peters suggests, that irregular forms of conflict more often than not require the utilisation of infantry and special operations forces. [93] This truism was evident in British operations on the North West Frontier during the interwar period: "The infantryman and pack mule reigned supreme in frontier warfare." [94] In more recent history, as the United States discovered in Vietnam, indirect firepower can only achieve so much in a counterinsurgency (COIN) campaign. In this form of conflict the most useful military instrument is the light infantryman. [95] An important component of a COIN campaign is the protection of the local population from coercion by the insurgents. In this respect, it is unlikely that the local inhabitants will attain a real sense of security from 'virtual presence'. As is the case in Kosovo, the perception of security begins with the immediate presence of an armed NATO soldier. Although it is questionable whether the future will be entirely or even predominately composed of irregular warfare, it is wise to anticipate that irregular operations will be required. The future, much like the past, will likely consist of a mixture of both regular and irregular forms of conflict. In which case, future force structure and military culture must strike a balance between these differing needs.

The future battlespace will take many different forms. A strong candidate in this respect is urban warfare. Daryl Press makes the point that wars have always drawn troops into cities, but this trend may increase in line with the increasing pace of urbanisation. It has been estimated that in twenty-five years seventy percent of the world's population will reside in urban areas. [96] As Murray notes, there are a host of factors which endow urban areas with both political and military significance. Not only are they often key transportation hubs, and therefore have

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35, August 1998.

[93] Ralph Peters, 'After the Revolution', *Parameters*, Vol. XXV, No. 2, Summer 1995, p9. M&K pp25-26, Loren B. Thompson, 'Low-Intensity Conflict: An Overview', in odem (ed), *Low-Intensity Conflict: The Pattern of Warfare in the Modern World*, (Lexington, Lexington Books, 1989), p22, and O'Hanlon, *Technological Change*, p128.

[94] T. R. Moreman, 'Small Wars and Imperial Policing: The British Army and the Theory and Practice of Colonial Warfare in the British Empire, 1919-1939', in Brian Holden Reid (ed), *Military Power: Land Warfare in Theory and Practice*, (London, Frank Cass, 1997), p115.

[95] Leroy Thompson, *Ragged War: The Story of Unconventional and Counter-Revolutionary Warfare*, (London, Arms and Armour Press, 1996), p148.

[96] Press, pp3-4. The United Nations estimates that in developing countries the urban population grows by 150 000 each day. See Mark Hewish and Rupert Pengelley, 'Warfare in the Global City: The Demands of Modern Military Operations in Urban Terrain', *Jane's International Defense Review*, Vol. 31, June 1998, p32.

significant logistical importance, they also represent the political centres of power. Subsequently, cities have both physical and psychological resonance. [97] Indeed, the urban environment is an area that the USMC is currently taking very seriously. [98] Because of population density, the physical nature of the environment, and possible strategic objectives, ground forces are likely to prove the most applicable and versatile expressions of military power in urban conflict. [99] The reconnaissance-strike complex would seem to have limited strategic value in these operations. In this sense, the nature of certain physical environments can influence the types of forces required in the future. At this stage it is important to stress the inherent advantages of infantry forces. These benefits have long been recognised. In the late fourth century Vegetius wrote "infantry are more vital to the state, as they can be useful everywhere." [100] Furthermore, a point worth emphasizing is Goulding's observation that a footsoldier is the most precise instrument of war. [101] Marshall likewise identifies the value of infantry, and yet he correctly balances this opinion with a recognition of the importance of firepower in combat: "when decision is made possible through the attainment of a superiority in the striking (fire) power of the heavy weapons of war, they [the infantry] must go forward to claim the victory and beat down the surviving elements of resistance." [102] This last quote by Marshall is important, in that it correctly presents the value of both distant firepower and close combat forces. To this end, the comments in this section are not designed to denigrate the importance of firepower, which will continue to play a vital role in the defeat of enemy forces. Nonetheless, in certain physical environments (urban particularly) and in certain strategic contexts (COIN), heavy and distant firepower may prove counterproductive and strategically unusable, in which case ground forces with organic firepower will prove most effective. The significance of this point is evident when one considers Blaker's statement that the

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[97] Williamson Murray, 'Thinking About Cities and War', http://www.mca-marines.org/Gazette/stanton.html

[98] For example, see USMC, *A Concept for Future Military Operations on Urbanized Terrain*, Marine Corps Concept Paper, (Quantico, USMC, 1997)

[99] Timothy L. Thomas, 'The Battle of Grozny: Deadly Classroom for Urban Combat', *Parameters*, Summer 1999, http://carlisle-www.army.mil/usawc/Parameters/99summer/thomas.htm

[100] Vegetius, p30.

[101] Goulding, p10.

[102] Marshall, p19. See also p51 in which Marshall claims that the core of tactics is putting down firepower on the decisive point.

RMA force will contain little organic firepower. [103] Ground forces also enable control. Riper and Scales are once again correct when they conclude that ground forces give you resolution, durability, and versatility. [104]

Once we accept the need physically to hold ground and to deploy infantry forces, then the requirement for manned platforms becomes clear. Again, Blaker's comments are of particular interest here, as he concedes that the RMA force is less able to hold and occupy territory. [105] A number of reasons promote the retention of manned platforms. Because men will have to be placed in harm's way, they will continue to require protected firepower and mobility. Armoured platforms such as tanks and APCs provide these very capabilities. [106] To this end, Christopher Bellamy suggests that the tank represents a good compromise between firepower, mobility, and protection. [107] Peters, commenting on the experience of the United States in Mogadishu, states that the protection provided by armour was sorely needed in Somalia. [108] The history of urban warfare is one in which armour often plays an important supporting role to infantry. [109] In the battle for Hue, organic firepower proved critical for the USMC, since ROE and the weather limited the applicability of support from the air. [110] Similarly, in the battle for Ban Me Thuot the NVA operated primarily through combined arms organizations based around infantry and amour. This approach created self-sufficient units which possessed speed, mobility, and striking power. [111] Aside from the protection offered, platforms such as the tank also provide much needed organic firepower. But why would organic firepower be required if one possessed a

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[103] Blaker, p22.

[104] Riper and Scales, p12.

[105] Blaker, p16.

[106] These characteristics of tanks are outlined in Brigadier A. C. I. Gadsby, 'Do We Still Need Tanks?', *RUSI Journal*, Vol. 142, No. 4, August 1997, pp17-22.

[107] Christopher Bellamy, *The Evolution of Modern Land Warfare: Theory and Practice*, (London, Routledge, 1990), p25.

[108] Ralph Peters, 'The Future of Armoured Warfare', *Parameters*, Vol. XXVII, No. 3, Autumn 1997, p51. Some of the dangers of the improper use of armour in an urban environment are evident in the Russian experience in Grozny. See Thomas.

[109] See Ashworth's account of the battle for Groningen 13-16 April 1945. G. J. Ashworth, *War and the City*, (London, Routledge, 1991), pp125-128, and Robert W. Lamont's discussion of the role of armour in Hue and Khorramshahr, Robert W. Lamont, 'A Tale of Two Cities - Hue and Khorramshahr', *Marine Corps Gazette*, Vol. 83, No 4, April 1999, pp22-24.

[110] Andrew J. Lawler, 'The Battle for Hue City', http://www.geocities.com/Pentagon/6453/hue3.html

[111] Robert W. Lamont, 'Urban Warrior – A View from North Vietnam', http://www.geocities.com/Pentagon/6453/uwvietnam.html

true reconnaissance-strike complex? The most obvious answer to this question stems from the potential vulnerability of the networks that underlie such capabilities. Such weaknesses that may be present in an RMA force may be enhanced by the paradoxical logic of strategy. If the strength of an RMA-based military resides in its digital networks, then these networks will likely be the most pressing target for an enemy. Also, as Colonel Volney J. Warner argues, "Remoteness impairs effectiveness and invites countermeasures." [112] Although a somewhat sweeping statement, in the light of the Kosovo conflict it is difficult to disagree with Colonel Warner substantially. For these reasons, it would seem somewhat of a gamble to remove organic firepower and rely solely upon distant, networked means of delivery. Looking to potential future operations and conflicts, Colonel Dick Applegate notes that the British Army may want to keep its organic firepower assets because in future multinational operations it may not have the RAF or RN on hand to provide such capabilities. [113] Equally, O'Hanlon notes that many of the tactics used by the North Vietnamese and Viet Cong forces to offset distant firepower are still applicable today. These techniques include: bunkers and tunnels, and 'hugging', to name but two. [114] In this respect, it is encouraging to see that although the Royal Artillery is sensibly planning to replace some of its heavy guns with precision missile systems, it is retaining some of its 105mm guns, and perhaps purchasing lighter short-range guns for the battlefield. [115] Tanks and their equivalents offer other advantages besides those already mentioned. As both Gadsby and Bellamy show, in Bosnia the British Challenger MBT proved an effective military instrument psychologically. [116] In this respect, Bosnia showed armour to be far more versatile than is often assumed.

Identifying a need for manned platforms does not in itself quell the doubts concerning the alleged vulnerability of these instruments. So why is Libicki wrong to signal the end of the manned platform? Because manned platforms are required, those deploying them will devise ways to provide for their protection. Various methods could be deployed in this endeavour.

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[112] Colonel Volney J. Warner, 'Technology Favours Future Land Forces', *Strategic Review*, Vol. XXVI, No. 3, Summer 1998, p41.
[113] Colonel Dick Applegate, 'Towards the Future Army', in Bond and Melvin, p81.
[114] O'Hanlon, *Technological Change*, p117.
[115] Hugh McManners, ['Smart Missiles to Spike the Army's Big Guns'], *The Sunday Times*, 11 October 1998, p7.
[116] Gadsby, pp19-20, and Bellamy 'Spiral Through Time', p22.

These range from plastic tanks with stealthy characteristics and electromagnetic armour, to the employment of laser dazzlers. [117] Peters raises a salient point when he asks the question: why should tanks not be able to enjoy the benefits of situational awareness, and reap the security benefits thereof? [118] And as the MV-22 reveals, steps can be taken to make even relatively slow flying manned platforms more robust. [119] At the technical level of strategy the devil is very much in the detail. Yet, for the purposes of this thesis the detail is not that important. What matters is the recognition of the paradoxical logic of strategy. Put simply, those deploying manned platforms will almost certainly develop means by which to offset the efficacy of Libicki's mesh or its equivalent. Evidence of the ability of platforms to survive in the face of countermeasures is provided by airpower. Despite the continued development of anti-aircraft capabilities, aircraft have not only survived as viable instruments of strategy, but arguably have attained greater prominence in certain circumstances and contexts. [120] Of course, some pieces of equipment do become obsolete, but something as important and fundamental as the manned platform, in all its guises, will in all likelihood find ways to remain viable. These thoughts do not mean that the world will stand still. Indeed, in the face of these threats armoured vehicles probably will have to change in response. Also, there is undoubtedly a future role for unmanned vehicles. For instance, Damian Kemp offers one of the most sensible evaluations concerning the future role of Unmanned Combat Aerial Vehicles (UCAVs). Kemp foresees UCAVs operating somewhere between cruise missiles and manned fighters. [121] There are certainly missions to which unmanned platforms are well suited. Kosovo further revealed the utility of these vehicles in reconnaissance roles. However, what the Balkan conflict also showed was the importance of manned platforms in attacks on mobile ground targets. Despite errors such as the mistaken NATO bombing of a refugee column, Kosovo showed the political value of having pilots on the spot to verify target

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[117] See Hugh McManners, ['Plastic Tank is Silent Killer of Battlefield'], *The Sunday Times*, 7 February 1999, p9, J. Reed, 'Protecting Armoured Vehicles Against Helicopter Attack: Stealth, Smoke and Mirrors', *Asian Defence Journal*, July 1996, pp70-73, and Peters, 'The Future of Armoured Warfare'.

[118] Peters, 'The Future of Armoured Warfare', p52.

[119] Greg Seigle, 'USMC Receives First MV-22', *Jane's Defence Weekly*, 16 June 1999, p8.

[120] For example, Gray argues that Coalition airpower in the Gulf War of 1991 represented the 'leading edge'. Gray, *Modern Strategy*, p240.

[121] Damian Kemp, 'Combat Drones Fly For Casualty-Free War', *Jane's Defence Weekly*, 9 June 1999, p90.

identification. The political nature of war will continue to place a premium on the skill and judgment of trained pilots to minimise strategically harmful mistakes.

Stand-off firepower certainly has a role to play. If strategy and the enemy allow, then utilising this method of delivery makes a great deal of sense. Likewise, the future should see a greater role for unmanned vehicles. However, the requirements of strategy, allied to the fact that the future battlespace, and future adversaries, will take many guises, dictate that control will ultimately continue to be exercised by the man on the scene with a gun. In this context, Goodwin is correct to state that strategic success depends on control of land, people, and resources. [122] This requirement, allied to the existence of the paradoxical logic, should ensure that the manned platform will continue to prove to be a viable instrument of war. These thoughts contrast sharply with Libicki's comment that stand-off warfare focuses not on controlling territory but on destroying adversaries. [123] Applegate could not be more correct when he states that "we will still need the ability to generate mass and provide forces for endurance, and *maintain the capability and mental outlook necessary to conduct and sustain aggressive close combat* [emphasis added]." [124] The rationale for this statement is well described by Scales, who proclaims that an actor facing an opponent waging stand-off warfare would only have to avoid defeat by preserving his forces. He surmises that this is an achievable objective as long as countries such as the US are not prepared to dominate on the ground. [125]

A Violent Future

Some of the most contentious claims in the RMA literature concern the prominence of information-based warfare in deciding future conflicts. In its most extreme form, this section of the debate throws into question the most basic assumptions about warfare. Clausewitz defines war

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[122] Brent Stuart Goodwin, 'Don't Techno for an Answer: The False Promise of Information Warfare', (Review Article), *Naval War College Review*, Vol. LIII, No. 2, Spring 2000, p219.
[123] Libicki, *Illuminating Tomorrow's War.*
[124] Applegate, p83.
[125] Robert H. Scales, Jr., 'Cycles of War: Speed of Maneuver Will be the Essential Ingredient of an Information-Age Army', *Armed Forces Journal International*, July 1997, p41.

as "an act of force to compel our enemy to do our will." He goes on to define these concepts further: "Force - that is, *physical force* - ... is thus the means of war. [emphasis added]" [126] Contrast these thoughts with Libicki's definition of information-based warfare: "Information-based warfare is that which utilises information, especially computer-processed information, to impose one's will on the enemy." [127] Often at the heart of these notions concerning the role of information is the idea that wars can be won with significantly less, or no, fighting and violence. As noted earlier, this emanates from two desires. The first draws its origin from the principle of economy of force. The second, from the aspiration to humanise the act of war. In terms of the classical works of strategic thought, these ideas are often regarded as signaling the substitution of Sun Tzu for Clausewitz. To this end, the literature often recalls Sun Tzu's statement "For to win one hundred victories in one hundred battles is not the acme of skill. To subdue the enemy without fighting is the acme of skill." [128] Although such desires to make war a less violent and destructive activity may at first appear to be admirable objectives, when one considers the nature of future war, the requirements of strategy, and the actions of the enemy, doubts can be raised on the viability of these visions.

Prominent in much of the RMA literature are references to the attainment of victory through the disruption rather than destruction of the enemy. Although more cautious in some of their claims than many of their colleagues, Arquilla and Ronfeldt still feel justified to declare that war is evolving into a less destructive pursuit: "In the new epoch, decisive duels for the control of information flows will take the place of drawn-out battles of attrition or annihilation; the requirement to destroy will recede as the ability to disrupt is enhanced." [129] In an optimistic appraisal of information-based warfare, Arquilla postulates that 'control warfare', which derives from information dominance, can achieve victory at a low cost in blood and treasure even against the strongest opponents. [130] What Arquilla seems to misapprehend is that it is not the strong opponents one should necessarily worry about; the real danger comes from those foes that are

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[126] Clausewitz, p83.
[127] Libicki, *Technology and Warfare.*
[128] See Sun Tzu, pp77-79
[129] Arquilla and Ronfeldt, 'A New Epoch', p2. Similar ideas are also expressed in Arquilla and Ronfeldt, 'Cyberwar is Coming'.
[130] Arquilla, 'The Strategic Implications of Information Dominance', p25.

strategically adept. Similar ideas to those above are also at the heart of the US Navy's concept of Network-Centric-Warfare. When publicly challenged, one of the authors of the NCW literature unambiguously avowed that disruption is a preferable way to defeat the enemy. [131] In theory, victory through disruption is achieved by breaking the coherence of enemy forces, usually by attacking or disrupting his C^2 system. The objective is to paralyse his forces so that they cease to function as a viable whole. The assumption behind these claims is the optimistic hope that a disrupted force will sue for peace because his will has been broken.

Related to the notion of victory by disruption is the belief that information has become the determining factor in any given conflict. For example, Donald E. Ryan equates twenty-first century warfare with the eighteenth century, in that information-based warfare attains victory without firing a shot. [132] Similarly, Alan D. Campen postulates that the Gulf War of 1991 "was the first war with a notion that an enemy could be brought to his knees by denial of information." [133] Although Campen is correct to note that an asymmetry in information endowed the Coalition with an undoubted advantage, it is tempting to respond to his enthusiasm by pointing out that the Coalition's victory also required the destruction of Iraqi forces in the KTO. This tendency to overplay the significance of information in war also has crept into historical analysis. It is not uncommon for modern scholars to re-examine past conflicts, and with an information age perspective, discover that information was the key to many past campaigns. In his vigorous efforts to highlight the central importance of information, Leonhard makes the extraordinary claim that the Maryland campaign of 1862 was decided not by guns or cavalry, but rather by information. In contrast to these thoughts, it is more credible to recognise the value of information and yet also conclude that information was just one factor in the outcome of the conflict in question. In 1862, information did not kill a single soldier, destroy a single piece of artillery, nor did it occupy a square inch of land. [134] Information may have enabled these actions, but it did not achieve them

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[131] See Weeks. However, Cebrowski's work doesn't dismiss the act of destruction. Indeed, he focuses some of his attention on the fact that increased battlespace awareness creates more potency in firepower. See Cebrowski, 'Network-Centric Warfare: Its Origin and Future', p32

[132] Donald E. Ryan cited in Ritcheson, p35.

[133] Campen quoted in Colin S. Gray, *Explorations in Strategy*, (Westport, Praeger, 1996), p239. See also Campen, ppx-xi

[134] In a similar vein, Lawrence Freedman warns against overplaying the independent role information can play, by reminding us that alone it cannot destroy or move anything. See *The*

directly. Leonhard's claims are akin to the Tofflers' proclamation that software was the real star of the Gulf War. [135] This is rather like saying that fuel was the real star of Germany's victory over France in 1940. In both cases, software and fuel were significant enablers; after all, German panzers could not have advanced into France without fuel. But success in war relies upon a myriad of factors, including information, leadership, adequate technology, trained soldiers, morale, and logistics, to name just six. To reduce success in war to one element is simply too reductionist. This tendency to oversimplify the conduct of war is often underpinned by a one-dimensional perspective of conflict in which the enemy plays a placid, even cooperative role. This is evident in claims that in future wars course and outcome will be one and the same, that because of the reconnaissance-strike complex surprise may become decisive and therefore there will be only one period of fighting. [136] Although historically some wars have been concluded by one action, one should not plan on the basis that this will invariably happen. [137] Placing too much faith in such actions presents the real danger of giving insufficient attention to the dialectic nature of strategy, and therefore the paradoxical logic is not given its due.

Libicki has written extensively on the issue of information as a deciding factor in future conflicts. As noted earlier, Libicki postulates that war will cease to be a force-on-force experience. Rather, it will be conducted along the lines of hide and seek. At times Libicki accepts that targets identified by the mesh would still require destruction. However, he predicts also that recognised information superiority may compel the enemy to sue for peace. [138] This latter claim is not wholly unreasonable. It is not inconceivable, in permissive conditions, for a conflict to end once information dominance has been achieved. As previously noted, even Clausewitz, who places significant emphasis on battle, recognises that on occasion the odds prior to battle could be

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Revolution in Strategic Affairs, p50.

[135] Toffler and Toffler, *War and Anti-War*, p144, and Casper *et al*, p84.

[136] Davis, p48. Owens, *Lifting the Fog of War*, p14. See also, Jablonsky, pp33-34. Interestingly, Jablonsky regards a more immediate relationship between cause and effect on the battlefield as rendering war more Clausewitzian, in that there is a more direct relationship between war and policy.

[137] An example of a war being concluded with just one decisive battle is Alexander's defeat of Porus at the Battle of Hydaspes. For an account of the battle see Fuller, *The Generalship of Alexander the Great*, pp180-199.

[138] Libicki, *The Mesh and the Net.*

so decisive that one side would capitulate without combat. [139] On balance however, Libicki suggests that the transparency created by the information age will render the offensive use of physical force less viable. He has professed that physical expression of force acts merely to serve information. [140] If Libicki is not claiming that information will be decisive in the future, he is coming very close to it. Finally, a concept of future war with the primacy of information very much at its core is 'cyberwar'. When defining this concept, Arquilla and Ronfeldt unequivocally state that victory goes to those who have the better grasp of information. [141] Although varying in their levels of intensity, the above authors all have information at the heart of their visions of future war. Information is perceived to be the decisive factor in conflict. As noted, some even go as far as to suggest that disruption of a foe's C^2, or recognised information dominance, will prove independently capable of ensuring victory, thereby removing violence and destruction from the act of war. In procurement terms, one author's advice is "Don't scrimp on C^3 to buy more bullets." [142] Aside from deemphasing the implements of firepower, there are obvious dangers in the formation of a military culture which expects the nature of war to be a significantly less violent undertaking.

Strategy is once again the leading element in the chorus of counterclaims against these information-dominated visions of the future. For instance, the demands of strategy may dictate that the enemy's forces should be physically destroyed. This is in direct contrast to claims that destructive force is wasteful. [143] Prior to D-Day, the Combined Chiefs of Staff issued the following directive to Eisenhower: "You will enter the continent of Europe and, in conjunction with the other Allied Nations, undertake operations aimed at the heart of Germany and the destruction of her armed forces." Eisenhower goes on to note that "This purpose of destroying

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[139] In Book 1, Chapter 1, Clausewitz states that to force the enemy to do your will, you must: " *either make him literally defenseless or at least put him in a position that makes this danger probable.* " An acknowledged information dominance is one way to make such a situation probable. Clausewitz, p.85.

[140] See Martin C. Libicki, 'The Emerging Primacy of Information', *Orbis*, Vol. 40, No. 2, Spring 1996, pp261-274. And Libicki, 'Dominant Battlespace Knowledge and its Consequences', in Johnson and Libicki (eds), *Dominant Battlespace Knowledge*, pp23-49.

[141] Arquilla and Ronfeldt, 'Cyberwar is Coming', p23.

[142] Colonel Owen E. Jensen, 'Information Warfare: Principles of Third-Wave War', *Air Power Journal*, Vol. VIII, No. 4, Winter 1994, p40.

[143] See Richard Szafranski, 'Neocortical Warfare? The Acme of Skill', in Arquilla and Ronfeldt, 'In Athena's Camp', pp398-9.

enemy forces was always our guiding principle." [144] Likewise, the Union's strategy in the US Civil War was designed around a perceived need to destroy Lee's army. [145] Commenting on counter-guerrilla warfare, Leroy Thompson stipulates that the main military aim "is to find, fix, and destroy them." [146] Such operations reveal the complementary nature of the relationship between information operations and the application of physical firepower. As Thompson asserts, the task of finding and destroying enemy guerrilla forces requires good information, usually from the local population. [147] These thoughts are not intended to suggest that the destruction of enemy forces is always a wise strategy, it is merely to note that certain circumstances conspire to create a situation in which one's objectives are most readily achieved through the annihilation of enemy forces. Clearly, in this respect COIN campaigns cannot rely solely upon the application of firepower. In fact, excessive firepower can prove counterproductive in strategic terms. Similarly, in contrast to the Union's strategy during the US Civil War, it is argued that the Confederates' wisest course of action would have been to avoid battle, and thereby prolong the war in an attempt to break the will of the North. [148] Although, such an approach may have raised concerns in the Confederacy similar to those directed at Fabius Maximus in the Roman Republic. Namely, that the public expected some form of action to be taken against the enemy. An important act of strategic judgment is knowing when and when not to fight the enemy. Also, Leonhard is right to point out that war is concerned with imposing one's will rather than killing. [149] However, against an enemy such as the Third Reich, destruction may be the most, if not the only, assured method of imposing one's will. Disruption and destruction are not necessarily mutually exclusive approaches to war. Indeed, when destruction is required, it may often prove profitable to disrupt and then destroy. An opposing force that has lost its cohesion will in all likelihood present less effective resistance.

What is missing from the 'disruption' literature is recognition that the enemy's

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[144] Dwight D. Eisenhower, *Crusade in Europe*, (London, William Heinemann Limited, 1948), p247.
[145] Hayden, p89.
[146] Thompson, *Ragged War*, p147.
[147] ibid, p147.
[148] Hayden, p89.
[149] Leonhard, p222.

cohesion often can be broken through the application of firepower and physical destruction. Clausewitz recognised the effects physical destruction could have on the intangibles in war: "Physical casualties are not the only losses incurred by both sides in the course of the engagement: their moral strength is also shaken, broken and ruined." [150] The USMC also declares that inherent in manoeuvre warfare "is the need for violence, not so much as a source of physical attrition but as a source of moral dislocation." [151] It seems that this form of moral dislocation is a far more potent weapon then simply disrupting the enemy through attacks against his C^4I networks. The former is arguably more difficult to recover from, and therefore has longer lasting effects, with the added bonus of physically depleting the enemy's capabilities. When considering the most effective method of warfare, bearing in mind the strategic objectives of any campaign, it is difficult to disagree with Clausewitz's call for an uncomplicated approach. [152] NCW and its derivatives would seem to rely upon a very good understanding of the enemy's network structure and operational procedures. In a similar vein, Owen Jensen advocates operations that produce the minimum changes to behavior required to fulfill the objectives. [153] Approaches such as these could potentially lead to overly complex and fine-tuned operations that are not as tolerant of error or change. They also presume levels of precision which military instruments do not posses. Also, as Clausewitz notes, rapid and simple enemy actions can wreck these fine-tuned operations.

Staying with the demands of strategy, Wylie's concept of control may require the occupation of territory. Information dominance can help achieve this end, but cannot occupy territory nor protect nor control a population itself. A disrupted foe on the wrong end of an information asymmetry may still be in physical possession of 'key ground'. This scenario is reminiscent of the position the Iraqis found themselves in during the Gulf War of 1991. Despite the Coalition's information dominance, the liberation of Kuwait required the application of destructive physical force. More importantly, the policy objectives of the war called for the destruction of the Iraqi Republican Guard. It was believed that regional stability partly rested on

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[150] Clausewitz, p273.
[151] Hayden, p68.
[152] ibid, p270. In this context, Parker contends that the plan for the 1588 Armada was too complicated. Parker, *The Grand Strategy of Philip II*, p188.
[153] Jensen, p42.

the removal of the offensive threat posed by such forces. Rick Atkinson correctly notes that this objective did not require the obliteration of every last Republican Guard platoon, what was needed was the disabling of the Guard as an effective force. [154] However, some destruction was required. It is unlikely that mere disruption would have neutralised the threat to Iraq's neighbours posed by the Guard. To paraphrase the maritime strategist Julian Corbett, an enemy force that is merely disrupted poses a threat as a 'force in being'. [155] In the same manner by which an enemy fleet in being in theory could dispute command of the sea, an enemy force in being in theory could dispute 'control'. Of course, the question of disruption and/or destruction is dependent upon circumstance and strategic objectives. However, a disrupted enemy surely has more potential to return as an effective force than one that is largely destroyed. It is interesting that the USN, from which NCW originated, appears to have ignored Corbett's writings on the threat posed by a 'fleet in being'. As noted earlier, one of the authors of the NCW work expressed a preference for disruption as opposed to destruction. In response, it is sufficient to note that a disrupted enemy fleet can regain cohesion, while a sunken enemy fleet remains sunk.

When considering whether the future nature of warfare can be non-violent, it is important to reiterate the point that no one society controls the future of war. War is an interactive activity in which an enemy can always reintroduce violence and destruction. In fact, when faced by an RMA competent enemy, it may prove strategically advantageous for a foe to wage a violent form of conflict. Charles Dunlap describes this technique as 'neo-absolutist war'. Referring to the incident in Somalia in which the body of a US serviceman was dragged through the streets of Mogadishu, Dunlap declares that a strategy of neo-absolutist war relies upon the leverage to be gained from the horror felt by a casualty-averse opponent to such a display. [156] Herein lies a potential vulnerability of a military/strategic culture that emphasises less destructive forms of warfare. Another method by which a foe can reintroduce extreme levels of violence is through the

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[154] Rick Atkinson, *Crusade: The Untold Story of the Persian Gulf War*, (Boston, Houghton Mifflin Company, 1993), p299.

[155] The concept of a 'force in being' is equivalent to Corbett's notion of a 'fleet in being'. See Corbett, p201.

[156] Charles J. Dunlap, JR., '21st-Century Land Warfare: Four Dangerous Myths', *Parameters*, Vol. XXVII, No. 3, Autumn 1997, p29. See also Charles J. Dunlap, 'Sometimes the Dragon Wins: A Perspective on Information Age Warfare', in Schwartau, pp436-453.

use of Weapons of Mass Destruction (WMD). Gray correctly points out that the twenty-first century is not only the information age, it is also the second nuclear age. [157] WMD proliferation and use can reflect many different motivations. These include domestic political concerns, or regional power politics. Interestingly, WMD may be the weapon of choice for an opponent facing a foe who is RMA competent. Indeed, Mike Moore suggests that pursuing the RMA will render the US less secure precisely because it will encourage the proliferation of WMD. [158] Ironically, the quest for information dominance may also help retain the destructive nature of war. *Joint Vision 2010* foresees information superiority campaigns that rely upon the physical destruction of enemy C^4I, as well as non-physical acts, including EW and intrusion into enemy networks. [159]

Strategic requirements, in addition to the actions of the enemy, will ensure that war remains a violent and destructive undertaking. Information has always been an important resource in the conduct of war. As Bennett reminds us, it facilitates a more economical use of force. [160] Information will retain a significant role in the future; indeed it is likely that it may become more directly relevant. Ajay Singh's comment that information is not an end in itself, is right most of the time. [161] Although it is not impossible that a perceived information dominance or dislocation of the enemy could be enough to ensure victory, to raise the value of one factor in war, such as information, above the others, commits the error of oversimplifying the conduct of war. R. L. DiNardo and Daniel J. Hughes reflect this well when they note that "All the information in the world will not help poorly motivated, badly trained, and undisciplined soldiers led by indecisive leaders fighting without sound doctrine...". [162] To this list of disadvantages one could also add 'in the service of poor strategy'. [163]

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[157] Colin S. Gray, *The Second Nuclear Age*, (Boulder, Lynne Rienner Publishers, 1999), p8.
[158] Mike Moore, 'Unintended Consequences', *The Bulletin of Atomic Scientists*, Jan/Feb 2000, Vol. 56, No. 1, http://www.bullatomsci.org/issues/2000/jf00/jf00moore.html
[159] *Joint Vision 2010*, p41.
[160] Bennett, p9.
[161] Ajay Singh, 'Time: The New Dimension in War', *Joint Force Quarterly*, No. 10, Winter 1995-1996, p60.
[162] R. L. DiNardo and Daniel J. Hughes, 'Some Cautionary Thoughts on Information Warfare', *Airpower Journal*, Vol. IX, No. 4, Winter 1995, p76.
[163] In a similar vein, Brent Stuart Goodwin states that "technology is a poor offset for unsound strategy and policy." See Goodwin, p216.

A Future of Friction

Although the RMA literature does not directly discuss the banishment of friction from future war, much of the optimistic pronouncements concerning the efficacy of RMA forces at best undervalue the influence of friction, and at worst seem to ignore it completely. As an example, Colonel Owen E. Jensen, in a work which develops principles of third-wave warfare, advises readers to "[a]chieve total situation awareness." He suggests further that they "[e]nsure rapid, insightful, accurate battle damage assessment." [164] Similarly, Daniel T. Kuehl declares that one must have "comprehensive situational awareness." [165] While this is undoubtedly wise counsel, Colonel Jensen's work would benefit from a reaffirmation of Clausewitz's cautionary note that "Everything in war is very simple, but the simplest thing is difficult... so in war it is difficult for normal efforts to achieve even moderate results." [166] In our understanding of the nature of war friction plays a critical role because "[f]riction is the only concept that more or less corresponds to the factors that distinguish real war from war on paper." [167] That being the case, ignorance of friction in the planning and conduct of future operations, as with the case of expecting certainty on the battlefield, could leave a force unprepared and ill-equipped to cope with the reality of war. The phenomena of friction in war is not an independently occurring factor. Rather, friction is the product of various other conditions. In which case, in theory the removal or reduction of these factors should consequently remove or reduce friction. However, as will be shown, the causes of friction are so numerous and so inveterate to warfare that any study of the future must accept this element of the nature of war.

Clausewitzian friction has many sources. In his excellent work *Clausewitzian Friction and Future War,* Barry D. Watts identifies eight broad factors that produce the 'unified concept of general friction'. These factors are: danger; physical exertion; uncertainties and imperfections in information; resistance within one's own forces; chance events; physical and

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[164] Jensen, p39.

[165] Daniel T. Kuehl, 'Strategic Information Warfare and Comprehensive Situational Awareness', in Campen, Dearth, and Goodden, *Cyberwar: Security, Strategy, and Conflict in the Information Age*, (Fairfax, AFCEA International Press, 1996), p185.

[166] Clausewitz, pp138-139.

[167] ibid, p138.

political limits on the use of force; unpredictability emanating from interaction with the enemy; and disconnects between ends and means. [168] Invariably, many of these different factors overlap and interact to enhance friction. It has already been argued that uncertainty and violence cannot generally or totally be removed from war. It was also shown that often strategy would demand the physical presence of humans. The continued presence of humans in the activity of war, both physically and mentally, helps ensure the existence of friction. These humans, exposed to the dangers and physical pressures of warfare, will, as Clausewitz noted, retain the potential for friction. [169] The next two causes of friction in Watts' taxonomy, chance events and limitations on the use of force, found expression in the 1999 Kosovo conflict. As described in greater detail in Chapter Four, the chance event of cloud cover significantly affected British bombing missions. Similarly, political concerns that compelled NATO bombers to operate above 15 000 feet helped limit the efficacy of operations, especially those against Serbian forces in Kosovo. This conflict also presents an example of how unpredictability can arise from interaction with the enemy. In this case, the Serbian intensification of ethnic cleansing impacted on NATO operations and strategy. As will also be argued in Chapter Four, NATO's bombing campaign revealed how friction can emanate from the choice of inappropriate means in the pursuit of the desired ends. What these examples, and the preceding sections of this chapter reveal, is that the entrenched, general sources of friction will continue to manifest themselves. Geography, an ever-present factor in the practice of strategy, contributes its own sources of friction: "the landscape can sometimes present a tenacious friction that constrains, or even curtails, operations. Examples include Flanders during World War I and Burnside's American Civil War Mud March of 1863." [170] Harold Winters, the author of these words, rightly accepts that technology can help reduce the friction produced by geography. [171] However, the negative influence of this feature of strategy will never be eradicated.

These constant, generic causes of friction may be joined by other sources of friction

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[168] Watts, p32.
[169] Clausewitz, p138.
[170] Winters *et al*, p267. See Chapter 5 for discussion on why physical geography will remain central in the conduct of strategy.
[171] Ibid, p270.

more prevalent in the information age. Riper and Scales suggest that the envisaged enlarged battlefields of the future, in which formations are further dispersed and operations are accelerated, will produce higher levels of friction. They suggest that the corresponding increase in danger and fatigue will be intensified by the negative psychological effects of a lack of proximity to other units, and the reduction in periods of inactivity. In short, the future battlefield could become a more stressful and exhausting place to be. [172] As an aside, Marshall indicates that better situational awareness could lead to higher levels of morale, simply because units have the knowledge that their flanks are assured by friendly forces. [173] Information age operations and technology are not immune from the touch of friction. Adams reports that during operations in Bosnia JSTAR images failed to reach their intended destination when a primary server crashed and a backup computer incorrectly sent the images to a fax machine, thereby making the pictures unintelligible. [174] Similarly, information overload caused enough friction in an EXFOR exercise to compel the headquarters commanders to revert to following the battle on maps and acetate overlays. [175] It should be remembered that this occurred in a peacetime exercise, not within the stressful environment of battle. Watts' study highlights the possibility that novel weapon systems and operations associated with future warfare will in all likelihood create non-linear and unpredictable outcomes. He concludes that these non-linear dynamics, allied to human foibles, inaccessible information, and increased opportunity for deception in an information rich environment, all produce the potential for future friction. [176]

This emphasis on the pervasive nature of friction should not be taken as evidence that friction cannot be reduced or manipulated. It has already been noted in Chapter One that Clausewitz and Gray both indicate that friction can be reduced by various measures. The application of information technology, resulting in increased situational awareness, should help reduce friction that emanates from uncertainty. However, the potential for information overload and an increase in stress and lethality in the battlespace, could somewhat counteract the reduction

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[172] Riper and Scales, p9.
[173] Marshall, p87.
[174] Adams, *The Next World War*, p88.
[175] ibid, p115.
[176] Watts, pp126-127.

in friction produced by better battlespace awareness. On balance, it is not those sources of friction more specific to the information age that will ensure the survival of this constant feature of warfare. Rather, it is the more universal factors that form general friction which will ensure the continued relevance of the USMC's advice in *Warfighting* that "the greater requirement is to fight effectively within the medium of friction." [177]

Influences on the Future Battlespace

The character of the future battlespace will not be shaped exclusively by the technology and operations foreseen by advocates of the RMA. At least as significant in this respect will be the demands of strategy, interactions with the enemy, the polymorphous character of war, and the physical environment in which war must be conducted. These latter influences are the underlying factors which will in general ensure that the Clausewitzian nature of warfare retains validity. However, as noted throughout this chapter, much of the RMA literature either undervalues or ignores these influences on future operations. To avoid the mistake of preparing for the wrong kind of war, and to increase the chances of strategic success, military innovation should stress strategic requirements and be prepared for interaction with the enemy. James Fitzsimonds has noted what might be regarded as a theme of this study: "the 'goodness' of a military capability is ultimately determined by its contribution to the nation's strategic goals and the success of the strategic outcome." [178]

The requirements of strategy, and the influence of policy more generally, will influence the conduct of warfare in a number of ways. Policy objectives often require the physical presence of troops, and/or the destruction of enemy forces and resources. An example of this truism is counterinsurgency warfare. In such contingencies control of the population is often the key to success or failure. [179] Stand-off weapons simply cannot do this mission. To reiterate,

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[177] Hayden, p38.
[178] James R. Fitzsimonds, 'The Coming Military Revolution: Opportunities and Risks', *Parameters*, Vol. XXV, No. 2, Summer 1995, p35.
[179] Thompson, *Ragged War*, p135.

Wylie's helpful concept of 'control' is defined as being concerned with 'influence' and/or 'unchallenged presence'. [180] The British experience in the American War of Independence reveals the sometimes complementary relationship between population control and destruction of the enemy. At minimum, strategic success required the presence of British forces to protect loyalist sympathises and allow their numbers to grow. The destruction of Washington's army and the rebel militias would have contributed towards this protection, while at the same time reducing the will of the Patriots. [181]

The RMA literature should also take account of the fact that political concerns frequently place limitations on the use of force. In which case, RMA-based forces will often be unable to reach, or indeed approach, maximum operational efficiency. The use of airpower in both the 1991 Gulf War and the 1999 conflict over Kosovo present examples of the kind of limitations that can be placed on the military instrument. Airpower in these two conflicts presents a useful illustration for this discussion. In both cases, airpower, to some degree, represented the RMA vision of war by stand-off bombardment cued in by situational awareness assets such as JSTARS. With reference to the Gulf War, Riper and Scales remind us that the Al Firdos bunker incident reveals how political sensitivities "routinely preclude the unconstrained employment of military means ... the mere possession of advanced technology is no guarantee of its practical utility." [182] Kosovo is just as revealing. Concerns over allied casualties obliged ground attack bombers to fly above 15 000 feet, which diminished the operational efficacy of these attacks, particularly as it made them more vulnerable to acts of Serbian deception. Such limitations on the use of force will in all likelihood preclude the sufficient operational performance necessary to fulfill the hopes of RMA advocates like Parry. Ironically, the impulses which drive the desire for stand-off, post-heroic, forms of war, will ensure that ground forces will often be required for the attainment of policy objectives.

The nature of warfare could in theory be affected by significant technological and operational innovation, if the said innovations could be translated into assured success at the

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[180] Wylie, p88.

[181] See John Shy, *A People Numerous and Armed: Reflections on the Military Struggle for American Independence*, (New York, Oxford University Press, 1976).

[182] Riper and Scales, p9.

strategic level. Victory in war must be assessed at this higher level, tactical and operational success is not sufficient. Success at these lower levels, though beneficial, has little meaning if it cannot be translated into the attainment of policy objectives. That being the case, an RMA-based force (whether it be a force based around stand-off munitions or information operations) which performs flawlessly at the tactical and operational levels does not guarantee victory. The continued need for traditional operations ensures that there will be no fundamental change in the nature of warfare. Poor friendly strategy, or indeed asute strategy by the enemy, can render tactical and operational success impotent. The most prominent example in the twentieth century of this truism is Nazi Germany. Although generally displaying high levels of competence in the tactical and operational realms, the Wehermacht suffered from, and was ultimately destroyed by, disastrous strategic judgment. [183] Likewise, the great Carthaginian commander Hannibal could not translate a series of spectacular tactical and operational successes, most notably the battles of Cannae and Transimene, into strategic victory over the Roman Republic. Hannibal's failure may have been the result of his poor strategic judgment. A contentious historical debate still rages over the question of whether he should have marched on Rome after Cannae. Alternatively, his failure may have emanated from Rome's adoption of Fabius Maximus' strategy of avoiding battle under anything but the most favourable circumstances. This Fabian strategy gave Rome the time it needed to mobilise its resources and regenerate its forces. The response of Fabius Maximus to Hannibal's tactical superiority once again highlights the dialectical nature of strategy.

When considering the failure of the RMA advocates to pay sufficient attention to the strategic dimensions of warfare, Gray rightly complains that the RMA literature often wrongly equates bombardment with warfare. [184] In a similar vein, Riper and Scales bemoan the emphasis on quantifiable levels of destruction, i.e. number of PGMs on target. Instead, they remind us that strategic victory requires the enemy to be defeated in his mind. [185] More correctly, Gray postulates that victory can be attained either by psychologically or physically defeating the enemy. [186] Under certain circumstances destruction of the enemy's forces in the battlespace does translate into

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[183] Gray *Modern Strategy*, p25.
[184] Gray, 'The American Revolution in Military Affairs', p50.
[185] Riper and Scales, pp5-6.
[186] Gray, *Modern Strategy*, p210.

strategic victory. After all, Waterloo ended the career of Napoleon, and Alexander's victory over Porus at the battle of Hydaspes proved decisive. Every war is unique, and each opponent has unique vulnerabilities. Ultimately, success in war can only be measured in strategic terms. At times, the centre of gravity is the enemy's armed forces. In different circumstances the centre of gravity may be the enemy's will, capital, or popular support. All told, the RMA literature is correct to stress the desire for tactical and operational superiority. Where it falls down, is by not placing this tactical prowess into a larger strategic context, and recognising that often mere bombardment and quantifiable destruction of the enemy will not achieve the stated policy objectives.

The technological, political, or social innovations which form the basis of an RMA can be utilised in the service of various objectives. In this sense, strategy can influence the development of an RMA in a more direct manner, and therefore each so-called RMA can have various manifestations. Strategic demands can shape how innovation is utilised. This is nowhere better demonstrated than in the different uses to which mechanised armour was put by different European countries. Nazi Germany's development of blitzkrieg strongly reflected strategic goals which called for rapid offensive operations. In contrast, France, which had a defensive strategic outlook, distributed their armour throughout their infantry formations to enhance the firepower of the defensive. [187] The current RMA at present reflects the attitudes of the United States, with an emphasis on post-heroic warfare, through the increased application of stand-off munitions at the expense of more vulnerable ground forces, or the application of information power as an alternative to deploying physical expressions of military power. [188] It also reflects an American proclivity to emphasise the technological dimension of warfare. [189] However, the United States cannot dictate the nature or character of future war. A more offensively-minded, less-casualty sensitive foe could develop their own, very different, version of the information-age RMA. Even within the realms of SIW, which on the surface appears to be a form of non-lethal warfare (NLW),

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[187] Eliot A. Cohen, 'A Revolution in Warfare', *Foreign Affairs*, Vol. 75, No. 2, March/April 1996, pp51-52.

[188] See Libicki, 'The Emerging Primacy of Information'.

[189] As Ralph Peters notes, "We have fallen into the old American trap of seeking technological solutions to human problems." Ralph Peters, 'After the Revolution', p8.

an adversary could in theory inflict death and destruction by disrupting air traffic control systems, or attacking nuclear power stations. The nature of warfare as reflected by the current American RMA advocates, is just that, an American perspective on the subject.

The relationship between strategy and RMAs is not restricted to the former influencing the latter. RMAs can also affect the practice of strategy, and not always for the better. As mentioned earlier, a combination of technological developments and political sensitivities has produced concepts such as 'post-heroic warfare'. Admiral Owens has confidently claimed that the 'system-of-systems' has enabled a remarriage between United States military capability and its foreign policy. [190] Although strategy is the art of the possible, [191] and domestic political support for military action is an important consideration, limiting oneself to military action that is firstly judged for its domestic acceptability is too restrictive. [192] Admittedly, this mismatch between external strategic demands and internal political necessity does create somewhat of a dilemma for the practitioner. The answer to this dilemma is not to limit one's strategic options too severely, and therefore adopt post-heroic warfare wholesale, because an intelligent enemy will soon ensure that these limited strategic options are insufficient. Instead, a more prudent approach is to change current sensitivities to the realities of war. To reiterate Clausewitz's warning: "The fact that slaughter is a horrifying spectacle must make us take war more seriously, but not provide an excuse for gradually blunting our swords in the name of humanity. Sooner or later someone will come along with a sharp sword and hack off our arms." [193] This does not mean that the RMA should not be exploited in its potential to offer less direct and less lethal forms of warfare. Indeed, in this respect the current RMA can contribute positively to the practice of strategy. As Adam J. Baddeley and Libicki correctly note, adding RMA capabilities to existing military resources enhances an actor's strategic flexibility, and may offer greater strategic efficacy under certain circumstances. [194]

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[190] Owens, 'Introduction', in Johnson and Libicki (eds), p13.

[191] Williamson Murray and Mark Grimsley, 'Introduction: On Strategy', in Murray, Knox, and Bernstein, p22. This is also a central tenant of Gray's work.

[192] Michael Howard rates this 'social dimension' of strategy as one of the main four dimensions. See Michael Howard, 'The Forgotten Dimensions of Strategy', *Foreign Affairs*, No. 57, 1979, pp976-86. See also Gray, *Modern Strategy*, pp27-28.

[193] Clausewitz, p309.

[194] In this context Adam J. Baddeley discusses the relationship between the current RMA and

Of just as much concern as post-heroic warfare is Leonhard's concept of 'option acceleration'. In this particular example of overplaying the potential of the RMA, Leonhard advocates the abandonment of the principle of 'objective'. Rather than conducting a campaign with a set strategic goal, Leonhard favours a situation in which IT facilitates the rapid creation of new strategic objectives as the situation changes in theatre. Leonhard's idea is summed up by his statement: "Mission creep is *good*! It is an expression of option acceleration." [195] Although Leonhard is correct to note the value of flexibility in adapting strategic objectives to the changing reality, his notion should have every Clausewitzian reaching for the sanctity of *On War*. 'Option acceleration' surely falls within the realms of the military tail wagging the policy dog. It would also seem to have within it the clear potential for confused strategy and a lack of focus.

Strategy and policy will, and should, help shape the RMA. That being the case, the vision of the RMA as espoused by its most strident advocates is unlikely to be fulfilled in its entirity, nor will it represent the only possible version of an information age RMA. Strategic and political demands will at times call for the application of more traditional military forces and operations. These same demands could limit the operational efficiency of RMA-based capabilities.

Aside from the demands of strategy, the RMA will be shaped by the paradoxical logic of strategy. With its focus on the technological dimension, the RMA literature often overlooks the existence and influence of an intelligent enemy. The omnipotence of this fundamental aspect of strategy is splendidly expressed in the famous quotation by General George Pickett. When asked why the Confederates lost at Gettysburg, he replied "I think the Union Army had something to do with it." [196] It is all too easy to focus on the performance of one's own side without taking sufficient account of the dialectical nature of strategy. Libicki, overestimating the omnipotence and invulnerability of the mesh, acknowledges that deception and stealth will be utilised by those hunted by the mesh, but then declares that multispectral sensors will ensure that

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COIN operations. See A. J. Baddeley, 'Insurgency and Counter Insurgency in the Information Age', paper prepared for the BISA Annual Conference, 15-17th December 1997. University of Leeds. Libicki also discusses the wider utility of information age capabilities. See Libicki, 'The Emerging Primacy of Information'. These issues are discussed in more detail in Chapter 5.

[195] Leonhard, p157.

[196] Quoted in DiNardo and Hughes, p76.

the hunter triumphs in the final analysis. [197] In a similar vein, Admiral Owens gives only passing reference to countermeasures to the system-of-systems. He bases his confidence in the SOS on the robustness of modern communications technology, and the level of effort expended on the vulnerability question. [198] These statements of overconfidence focus primarily on the tactical and technical levels, and therefore fail to consider the application of paradoxical logic at the strategic level. This failure to address the issue of countermeasures to be faced at the strategic level shows yet again how many of the most strident advocates of the RMA restrict their analysis to the lower levels of strategy. As will be outlined below, an enemy wishing to counter an RMA-competent enemy, can do so at all levels: technical, tactical, operational, strategic, and political. One dimensional thinking on this subject is nowhere better illustrated than in Leonhard, *The Principles of War for the Information Age.* As noted earlier, in an attempt to prove the value of information in war, he uses the unusual counterfactual history method of applying information age technology to historical campaigns. Leonhard declares that had Robert E. Lee possessed capabilities such as JSTARS, UAVs, and ELINT, he would not have committed the errors that he did in 1862. [199] Although this latter claim by Leonhard is undoubtedly true, he, like Libicki and Owens, underplays the dialectical nature of strategy. Technological monopolies are usually fleeting. Where a significant technological edge does exist, an intelligent enemy will be aware of this and react accordingly. This suggests that in reference to Leonhard's own example, Lee would not have enjoyed the full potential benefits of his advanced information technology, at least not for long.

Unbridled confidence in the robustness of RMA capabilities to countermeasures should not go unchallenged. To declare that a technological system is immune to the actions of the enemy is tantamount to declaring that a historic and unique change has occurred in strategy. It is a claim for the final move. Every weapon system is countered eventually to some degree. This fact does not render the system in question strategically impotent, after all, manned platforms such as tanks and planes have continued to play major roles in modern warfare, despite the level of effort expended to thwart them. What Countermeasures have ensured is that the efficacy of these

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[197] Libicki, *The Mesh and the Net.*

[198] Owens, 'Introduction', pp8-10. See also Owens, *The Emerging System-of-Systems*, Strategic Forum 63, February 1996, http://www.ndu.edu/inss/strforum/forum63.html

[199] See Leonhard, Chapter 2.

systems is offset to some extent. Therefore, this has meant that warfare is not dominated by any one capability; rather is it characterised by combined and joint operations. This point is illustrated by the history of airpower. Since its introduction, airpower has developed into an extremely important asset for most practitioners of war. Despite the advantages offered by operating in the third dimension, and despite its continued evolution, airpower still represents only one element amongst the gamut of military capabilities. [200] Even the operational and strategic potential of nuclear-armed ballistic missiles can be offset by a series of countermeasures. These include civil defence, mobile ICBMs, BMD, and deterrent forces.

An intelligent foe can find a whole manner of ways, across all the levels of strategy, to offset and diminish an RMA-competent enemy. Evidence of this is provided in a myriad of historical examples. At the technical and tactical levels there can be few more original countermeasures than the Roman Republic's introduction of the 'Corvus' to negate Carthaginian naval superiority. This particular innovation enabled the Romans to grapple, physically pin, hold, and board their enemy's vessels, and thereby bring to bear the strength of their infantry forces at sea. [201] More recently, aerial combat in World War Two presents an example of how an advantage was translated into an Achilles' heel by the adversary. Rearward-looking radar was fitted to British bombers to locate approaching German fighters. The initial success of these devices was soon negated by German jamming efforts, and finally the radar became an Achilles' heel when German fighters used them to track the bombers. [202] The technologies that underpin the current RMA likewise have readily identifiable candidate vulnerabilities. GPS jammers could in theory inflict serious disruption on a digitised force, on the basis that modern navigation and guidance rely heavily upon this satellite-based system. [203] With a twist of irony, a future enemy could utilise information age capabilities to disrupt RMA-based forces. IW attacks could in theory disrupt logistics, [204] or attack the software which serves as the foundation upon which the whole RMA is

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[200] This is partly the result of operational countermeasures, but also the demands of strategy.
[201] Bagnall, pp61-62.
[202] Edward N. Luttwak, *Strategy: The Logic of War and Peace*, (Cambridge, The Belknap Press of Harvard University Press, 1987), p28.
[203] Cook, p23.
[204] Wilson, p5.

built. Indeed, software is often identified as the key vulnerability in the information age. [205] Just as potentially vulnerable is the silicon circuitry which acts as the 'physical' basis for the RMA. Unless well-hardened, IT is extremely vulnerable to either nuclear or non-nuclear induced EMP. [206] The US Army's *FM 100-6 Information Operations* identifies a more subtle method. By degrading the integrity of the information within a system, an enemy can erode confidence in that information. [207] To summerise, Brown declares that "[t]here should be no doubt that components of the emerging SOS will be targets of offensive information warfare." [208] The various merits of these different countermeasures are open to debate. However, once again, in a general sense the details do not matter. The purpose of discussing these few examples is to show that the dialectical nature of strategy at the technical/tactical level will not cease to operate in the information age.

Those faced with a RMA-equipped foe can opt for other, less technical, countermeasures. The Serbian use of UN hostages as human shields in Bosnia illustrates how a simple act can negate the advantages conferred by millions of dollars worth of RMA equipment. [209] Ground forces threatened by an enemy composed primarily of stand-off capabilities have various simple options available. These include dispersal, utilisation of the terrain and weather, and blending into local populations, to mention just three. [210] On this latter point, Libicki admits that the omnipotent sensors of the Mesh cannot distinguish between a civilian and a guerrilla. [211] At another level, as exemplified by Fabius Maximus when facing the tactical superiority of Hannibal, the conventionally superior force can be denied victory if the enemy refuses to take the field. Of course, this particular countermeasure is not universally appropriate. Being unable to face the enemy in battle can have negative consequences. Indeed, although Fabius Maximus saved the Roman army from destruction, his actions were not universally welcomed in Italy, primarily

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[205] See the Toffler and Toffler, *War and Anti-War*, p144, and Emmett, p23.

[206] See Wilson, p19, Carlo Kopp, 'The E-Bomb - A Weapon of Electrical Mass Destruction', in Schwartau, pp296-333, and O'Hanlon, *Technological Change*, p194.

[207] Colonel M. D. Starry, & Lt Colonel C. W. Arneson Jr., 'FM 100-6: Information Operations', *Military Review*, Vol. 76, No. 6, Nov/Dec 1996, pp.3-15.

[208] Michael L. Brown, 'The Revolution in Military Affairs: The Information Dimension', in Campen, Dearth, and Goodden, p51.

[209] Caldwell, p57.

[210] Colonel Volney J. Warner, 'Technology Favours Future Land Forces', *Strategic Review*, Vol. XXVI, No. 3, Summer 1998, p52.

[211] Libicki, 'Dominant Battlespace Knowledge', p31.

because his strategy enabled Hannibal to ravage the Italian countryside. [212]

A potential strength of the current RMA is that it enhances systems as well as individual weapons. However, even systems which seem dominant can be countered. The defensive systems in the early years of the First World War which seemed so impregnable, were eventually overcome with a mixture of technology, tactics, and operational art. [213] Likewise, in World War Two, German U-boats, which had spectacular early levels of success against Allied shipping, were offset by intelligence (the breaking of Ultra), tactical/operational measures (the convoy system), and at the strategic level (US resources). [214]

An enemy is not restricted to offsetting a dominant capability through asymmetric countermeasures; he might also acquire similar capabilities. In this context, Michael L. Brown correctly identifies that a significant problem arises for the visions espoused in the RMA literature if the enemy acquires similar capabilities. [215] However, when discussing operational art the RMA literature indirectly assumes a monopoly of these capabilities. This is particularly evident in Arquilla's discussion of 'control warfare', which he presents as an alternative to the more traditional paradigms of attrition and manoeuvre. [216] History suggests that operational and organisational innovations which confer advantage are usually offset and/or copied, and therefore attritional forms of warfare often re-emerge. Holden Reid suggests that in both world wars of the twentieth century, once Germany had failed to achieve quick and decisive victories, attritional forms of warfare ensued. [217] Although Krepenevich is correct to note that exploiting a RMA first usually confers advantages, modern history reveals that these advantages are fleeting and sometimes do not translate into strategic success. [218] In this respect, the examples of Napoleon and Nazi Germany once again suggest that operational efficiency is no guarantee of strategic victory. With history in mind, it is reasonable to assume that any monopoly in RMA capabilities could be

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[212] Bagnall, p186.

[213] Paddy Griffith, *Battle Tactics of the Western Front: The British Army's Art of Attack 1916-18*, (New Haven, Yale University Press), 1994.

[214] Henry C. Bartlett, G. Paul Holman Jr., and Timothy E. Somes, 'Force Planning, Military Revolutions and the Tyranny of Technology', *Strategic Review*, Vol. XXIV, No. 4, Fall 1996, p31.

[215] Brown, p42.

[216] Arquilla, 'The Strategic Implications of Information Dominance'.

[217] Holden Reid, p27.

[218] Krepenevich, p37.

negated, and therefore any revolutionary operational breakthroughs would cease to offer the same returns, and attrition could re-emerge. Also, rather than signaling an escape from attrition, it is not unreasonable to assume that when both belligerents posses RMA forces they could find themselves locked into an attritional struggle centred around IT assets. Due to the dialectical nature of strategy the contemporary RMA does not signal an irrevocable shift away from attrition. History reveals that warfare tends to be composed of many different features and paradigms. For example, the Punic Wars were characterised by surprise, deception, manoeuvre, and attrition. Any attempt to characterise this conflict, or any other, as being dominated by any one form or paradigm of warfare would be too reductionist. [219]

Much of the RMA literature fails to take sufficient account of the fact that warfare can assume various forms. Instead, the focus tends to be on high-intensity, regular conflict. [220] Indeed, Christopher Jon Lamb rightly observes that most of the RMA literature focuses its attention on large-scale conventional conflict. [221] Faced with a conventionally superior enemy, a foe may well adopt an asymmetric form of warfare. [222] In this respect, the options include small wars, SIW, or escalating the conflict into the realms of WMD. Commentating on the latter, Gray persuasively argues: "the absolute quality to nuclear weapons about which Bernard Brodie and his collaborators wrote so eloquently in 1946 means that an information-led RMA might be trumped by the 'old reliable' equalizer of a nuclear arsenal." [223] At times, academic literature has a tendency to pigeon-hole subjects. In this respect, it is all too easy to perceive the various futures in isolation from one another. To counter this, Gray performs a useful service by exploring how these various futures may interact. [224] Indeed, bearing in mind the relationship between the

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[219] Gray adopts a similar stance, by arguing that wars usually contain elements of attrition, manoeuvre, and control. *Modern Strategy*, pp159-62.

[220] Cooper, 'Another View of the Revolution in Military Affairs', p107

[221] Lamb, p247.

[222] On this issue Ralph Peters observes: "We confront, today, creatively organised enemies employing behaviours and technologies ranging from those of the stone-age to those at the imagination's edge." Peters, 'After the Revolution', p8.

[223] Gray, *The Second Nuclear Age*, p157. Similarly, Richard Betts suggests that a large conventional foe who stands at a disadvantage in the face of a digitised enemy, could escalate upto WMD as an asymmetric form of warfare. Richard Betts, 'The Downside', pp82-83. See also, Fitzsimmonds, p34.

[224] Gray, 'Three Visions of Future War'. Another work which considers a future which includes both the RMA and WMD is Wilson, *Preparing for Early 21st Century War: Beyond the Bottom-Up Review.*

American RMA and the cultural/political revulsion against overly violent or destructive forms of conflict, Dunlap and Applegate suggest that an adversary may actually opt for a savage form of warfare to act as a deterrent to a foe who wages post-heroic warfare. [225] These examples highlight a third underlying reason why the RMA vision will not come to pass in its entirety. Namely, an enemy, or indeed policy requirements, can impose a form of warfare which is less conducive to the current dominant vision of the RMA. Mao stipulates that many factors will determine the character of any particular war. Following this logic, we can conclude that each conflict has its own complex character. There are various examples of wars which cannot easily be attributed a place on the spectrum of conflict, for example in terms such as regular or irregular. The American War of Independence, Napoleon's Peninsula campaign, and Vietnam, all display elements of both regular and irregular forms of conflict. [226] The fact that war can take many forms clearly implies that the future will not solely be comprised of conflict between regular, RMA-equipped forces. Consequently, the nature of warfare as espoused, directly or indirectly, by the RMA literature, will not come to pass in its entirety. Those responsible for preparing for future war should take heed of Gray's assertion that war is a very adaptable phenomena. [227] Applegate concludes that what is required is a broad range of capabilities to avoid disappearing up a strategic cul-de-sac. [228] Too much emphasis on the RMA could leave a military both physically and culturally incapable of operating at lower or higher levels of intensity. To take small wars as an example; the theoretical and historical literature suggests that forces optimised for regular operations often fail to cope effectively with the different challenges posed by this form of conflict. Callwell reminds us that the conduct of small wars is a distinct art and that these forms of conflict present very diverse enemies and environments. [229] In contrast to the RMA literature's emphasis on quick and decisive operations with stand-off munitions, small wars are usually protracted, attritional, and people intensive. [230] Lawrence describes wars against rebels as 'messy and slow'. [231] The British FSR of

[225] Dunlap, 'Sometimes the Dragon Wins', pp436-453, and Applegate, p80.
[226] Harry G. Summers, 'A War is a War is a War is a War', in Thompson, pp39-40, and Gray, *Modern Strategy*, p198.
[227] Gray, 'Three Visions of Future War', *passim.*
[228] Applegate, p79.
[229] Callwell, p23.
[230] Gray, *Modern Strategy*, p179, and Callwell, p27.
[231] Lawrence, 'Severn Pillars', p182.

1920 declares that the varied enemies and terrain encountered in small wars require significant modification of the principles for regular warfare. [232] These types of operations also pose problems for regular forces in terms of their organisation. In this context, Callwell declares: "it is the elaborate organisation of the regular troops which cramps their freedom in the theatre of war," [233] Moreman notes that British battalions trained for conventional war were often unprepared for tribal conflict. [234] Finally, irregular opponents can utilise terrain to enhance their operations. [235] In this way, both geography and irregular warfare combine to further complicate the campaign of a regular force.

However, the mismatch between conventional and unconventional capabilities and tasks is a circle that can be, and has been, squared. The Roman imperial army consisted of legions designed to cope with high-intensity major conflicts, and the *auxilia* which functioned at the lower levels of intensity. [236] Similarly, Alexander the Great displayed an ability to transform his force from the regular formation which faced Darius III's Persian field army, to a much lighter capability during the conflicts with tribal enemies in more dense, mountainous terrain post-Guagamela. Also, it is important to pay heed to Gray's salient point that too much can be made of the asymmetric threat. Placing too much emphasis on this threat could lead to the erroneous assumption that being conventionally superior is a distinct disadvantage. [237] As noted earlier, some of the current literature also overemphasises the 'coming anarchy'. As an aside, it is worth reiterating Baddeley and Libicki's assertion that the RMA has applicability within irregular warfare. [238] In particular, the RMA offers various methods to employ force which is supposedly less destructive. In theory, more discriminating capabilities could prove useful in small war

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[232] cited in Moreman, p109.

[233] Callwell, p85.

[234] Moreman, p118.

[235] Callwell, p32.

[236] See Edward N. Luttwak, *The Grand Strategy of the Roman Empire: From the First Century AD to the Third*, (Baltimore, The John Hopkins University Press, 1979), p42. See also Lawrence Keppie, *The Making of the Roman Army: From Republic to Empire*, (London, Routledge, 1984), and John Peddie, *The Roman War Machine*, (London, Grange Books, 1997).

[237] This thought has been expressed on a number of occasions by Gray during conversations with the author.

[238] Baddeley, and Libicki 'The Emerging Primacy of Information'. The application of the RMA in small wars is also discussed in Steven Metz and James Kievit, *The Revolution in Military Affairs and Conflict Short of War*, July 25, 1994, http://www.cs.virginia.edu/~alb/misc/rmawarcollege.html

operations were minimum force is often required. [239] Being competent in the realm of conventional warfare is an advantage, so long as this competence does not leave your forces impotent in small wars. The future strategic environment will undoubtedly require balanced forces which exploit elements of the RMA, without opting for the radical version with its attendant drastic force structure reductions. Numbers serve as a safeguard against unexpected counters to innovative operations. The theme of this thesis is not to denigrate the current RMA, which does offer some significant operational advantages, but rather to note that the US version of the RMA is not omnipotent, nor does it come with a strategic guarantee. In strategic terms the RMA itself is neutral, it is neither good nor bad. The danger lies with how it is utilised, and if it is allowed to affect radically the conduct of strategy and the content of military culture.

A final underlying factor which will affect prospects for full realisation of the RMA, is the inescapable reality of geography and the ubiquitous nature of the elements. [240] In this context, geography is taken to mean the physical environment in which strategy is conducted. Historically, geography has been a major influence on the conduct of operations. Clausewitz himself notes: "geography and the character of the ground bear a close and ever-present relation to warfare." [241] Of course, geography is not an unconquerable dimension of warfare. Indeed, some of the most outstanding operational successes have been such precisely because geographical obstacles were overcome. Alexander the Great was a prime exponent of this. His capture of the mountain fort of Aornus, and his flanking manoeuvre to capture the Persian Gates from Ariobazanes, are just two examples of Alexander's ability to turn geography to his advantage. [242] An analysis of geography's role in strategy also reveals the presence of the paradoxical logic. An intelligent enemy can manipulate the physical environment to his advantage. For example, during the siege of the island city of Tyre in 333-332 BC, Alexander constructed a 200-foot wide mole

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[239] Lamb, p263-264.

[240] For an excellent assessment of just how inescapable geography is see Colin S. Gray, 'Inescapable Geography', in Colin S. Gray and Geoffrey Sloan (eds), *Geopolitics: Geography and Strategy*, (London, Frank Cass, 1999), pp161-177.

[241] Clausewitz, p416. Of course, weather also can have a significant affect on operations. Just how significant this factor can prove to be is outlined in N. A. M. Rodger, 'Weather, Geography and Naval Power in the Age of Sail', in Colin S. Gray and Geoffrey Sloan (eds), *Geopolitics: Geography and Strategy*, (London, Frank Cass, 1999), pp178-200.

[242] Fuller, *The Generalship of Alexander the Great*, pp248-254.

between the coast and the city. This enabled Alexander's land forces to attack the city directly. [243] In a similar vein, in 1672, the Dutch responded to the French invasion by opening the dikes to flood the land, and thereby hold back the invaders. [244] As Winters *et al* indicate in their seminal work *Battling the Elements*, good generalship enhances and exploits the geography to one's advantage. [245]

Military operations cannot be conducted without reference to geographical factors. [246] Terrain often shapes operations significantly. In this context, G. J. Ashworth suggests that the five most fundamental characteristics of urban warfare emanate from the physical urban environment. The geography of a large conurbation tends to fragment forces into small operational units such as squads or platoons; favours close-range weaponry, in which case small units become dependent upon organic firepower; the presence of civilian lives and property can impose restraints on movement, fields of fire, targeting, and weapon choice, therefore Ashworth concludes that infantry are the most useable capability; has a bias in favour of those on the defence; and absorbs large amounts of manpower, often through the requirement for a rapid rotation of units due to the stress of urban operations. [247] From his study of the Russian campaign to capture Grozny in the First Chechen War, Anatol Lieven also notes that urban warfare is mainly conducted at the section level and highlights the significance of infantry in such an environment: "It cannot be emphasised too strongly, therefore, that the key to success in urban warfare is good infantry." [248] Wilson concludes that an increased emphasis on urban operations "will likely call for a more infantry intensive force structure. Preparing for urban combat runs counter to the current planning imperative, which calls for military operations that minimise U.S. casualties." [249] Many of these thoughts do not fit well with the proposed RMA, and therefore highlights the fact that the RMA is

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[243] Ferrill, pp204-205.

[244] See Russell F. Weigley, *The Age of Battles: The Quest for Decisive Warfare from Breitenfeld to Waterloo*, (London, Pimlico, 1991), p59.

[245] Winters *et al*, *passim.*

[246] As Wylie notes, to a soldier terrain is everything, p42. It is equally true to state that warfare in the maritime, air, space, and infosphere dimensions is largely dictated by the uniques characteristics of each environment.

[247] Ashworth, pp116-122.

[248] Anatol Lieven, 'The World Turned Upside Down', *Armed Forces Journal International*, August 1998, p40.

[249] Wilson, *Preparing for Early 21st Century War,* p28.

not omnipotent and cannot be applied regardless of geography. The American Civil War reveals just how the pervasive reach of geography can extend into all the levels of strategy. Heavy undergrowth significantly shaped the outcome of The First Battle of the 'Wilderness' in 1863. Winters concludes that Hooker's failure to execute his masterful plan was the result of poor leadership plus the nature of the terrain: "[Hooker] let the vegetation fix his army."[250] At the operational level, the geology of the Eastern Theatre of the American Civil War heavily influenced the campaigns there. Again, Winters is persuasive when he argues: "it is clear that lines of movement for the largest maneuvers early in the war were based, more than any other factor, on [the] major geographic characteristics. Early in the conflict the Union would take full advantage of the Coastal plain and Chesapeake Bay to the East while the Confederates exploited the form and trend of the Appalachian topography." [251] Terrain and geography were equally important in the Normandy Campaign. Murray notes that from an Allied perspective Normandy possessed both advantages and obstacles. On the one hand, because it was flanked by swamp, the Seine, and the Atlantic, and therefore offered the Germans only one avenue of approach, "Normandy represented the ideal solution to the ... problem of achieving a lodgment on the European Continent." On the other hand, the bocage presented the Germans with an ideal environment to conduct a defence in depth. [252] At he strategic level, Murray also correctly draws attention to the fact that geography exerts an influence on a defence community's strategic culture: "the size and location of a nation are crucial determinants in the way its statesmen and military leaders think about strategy." [253] Like the above conflicts, the American war in Vietnam was heavily shaped by the physical environment. To take just one example, in the Battle of Lam Son 719, the terrain neutralised many of the advantages of American air-mobility and funneled the advance into the Ye Pon river valley. [254] Likewise, urban warfare tends to mould itself around the physical environment. In this case, streets tend to channel operations. Geography can neutralise the operational efficacy of certain war-forms. In 1941, German blitzkrieg failed to replicate the success of 1940, partly due to the

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[250] Winters *et al*, p104.
[251] Ibid, p122.
[252] Williamson Murray, 'Some Thoughts on War and Geography', in Gray and Sloan, p204.
[253] Ibid, p211.
[254] Bellamy, *The Evolution of Modern Land Warfare*, pp109-112.

sheer geographic depth and width of the Soviet Union. Similarly, weather has proven to be an important influence on the conduct of operations. It played a debilitating role both in 1812 and 1941, and a weather front exerted enough friction on Burnside's famous 'mud march' in 1862 to block his plans completely. [255] The elements have proven to be an ongoing influence on war, as NATO air operations over Kosovo prove. [256] However, as noted above, geography is not impenetrable. Certain technological, tactical, and operational innovations can offset the influence of terrain and the elements. The current RMA, in particular the exploitation of GPS, has already reduced the significance of cloud cover and the featureless nature of desert terrain. [257] Yet, physical geography is so pervasive, and so varied a dimension in warfare, that its influence can never be reduced significantly. This is only intensified by the fact that the enemy can make use of geography, and therefore, the geographic and paradoxical logic factors interact. Indeed, this thought can be extended further to illustrate how all four of the major influences on war can interact. Strategy may require operations to be conducted in a geographic environment which is less-conducive to an RMA force. The same policy rationale which dictated the location for operations may also call for the utilisation of infantry forces in close proximity with the enemy. This foe, taking note of both the environment and the conventional superiority of the enemy, may enact the paradoxical nature of strategy and opt to wage asymmetrical forms of warfare, perhaps concentrating on small wars (and thereby utilise the terrain to maximise small unit actions) and/or the employment of WMD.

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[255] Winters *et al*, pp34-39.

[256] Murray, 'Some Thoughts on War and Geography', p206.

[257] Winters *et al*, p270, and Gray, *Modern Strategy*, pp251-2.

Conclusion

Although the future battlespace will not witness any fundamental alteration to the nature of war, certain changes are likely to occur. One possible change that has credibility is the notion that information may become more *directly* relevant in war. Information has always been important in warfare, as Peter Emmett correctly observes by citing Wellington's statement: "All the business of war ... is to endeavour to find out what you don't know by what you do; that's what I called guessing what was at the other side of the hill." [258] In war, knowledge of the whereabouts and disposition of enemy forces has always been important. However, information may be acquiring a more immediate role. For example, once foot soldiers of the Roman Republic commenced battle, the outcome would be decided more by their fighting skills, morale, discipline, and tactical leadership, than directly by their access to information - aside from the rudimentary information collected by their organic senses. The same still applies to the infantryman of today. Yet, many of the weapon systems of the information age rely more directly on information to function effectively. The most obvious examples are those munitions which rely upon GPS for their guidance. Better information gives many of these weapons an edge in conflict. Also, although it has been argued that friction, the paradoxical logic, and geography, will in all likelihood diminish the operational potency of information-based warfare, it still seems likely that the reconnaissance-strike complex will result in more deadly firepower. In which case, Libicki's concept of hide-and-seek warfare has a certain validity. As noted earlier, where Libicki perhaps falls down is by overplaying information operations at the expense of physical expressions of power. Overall, as will be argued in Chapter Five, control of the infosphere has attained an unprecedented significance in recent years. In this sense, Leonhard is right to argue that information management must be an integral part of warfighting, and that IT assets, such as sensors, constitute part of combined arms warfare. [259] Whilst recognising and accepting the growing significance of information, it is important not to become information-centric. Organising one's operations and doctrine around information would be a mistake. Libicki is incorrect in his assertion that physical

[258] Emmett, p19.
[259] Leonhard, p178, and pp70-71.

force now 'serves' information. [260] If anything, the exact reverse is true. As noted in the USMC's *Warfighting*, waiting for that crucial piece of information could sacrifice the initiative. To this end, their citation of the following advice by General Patton still has resonance: "A good plan violently executed now is better than a perfect plan next week." [261] One example of placing far too much reliance on the promise of information is Campen's aforementioned assertion that the current RMA enables a downsizing of forces. Downsizing too vigorously entails unacceptable risks. In this sense, quantity serves as a safeguard against an intelligent enemy, poor strategy, and friction, all of which can negate the operational efficiency of an RMA-based force, and thereby reduce the decisiveness of the military instrument. Thomas P. M. Barnett notes that the USN's sacrifice of ship numbers to technology is occurring at a time when the USN is complaining about the stress these lower numbers place on operational tempo and global presence. [262]

Aside from the growing importance of information generally, another useful component of the RMA literature is its emphasis on the digitisation of the battlespace. All things being equal, a digitised force should be better able to co-ordinate its operations and thereby operate at a higher tempo. In addition, a common picture of the battlespace should facilitate more efficient command and control (see Chapter Three for a more comprehensive analysis of command in the information age). In this respect, it would be a mistake to underestimate the value of digitisation as a force-multiplier. However, the historical record should instill caution into our thoughts on the long-term impact of digitisation. The experience of blitzkrieg in World War Two reveals how successful operational innovation can be offset by a number of factors, including strategy, friction, logistics, resources, geography, and will. Howard proclaims: "[t]he inter-war dream of swift, skilful units operating against each other's supply lines, securing maximum decisions with minimum cost, turned into the reality of huge armies with massive 'tails', highly vulnerable to enemy air attack and demanding logistical ingenuity to keep them moving at all." [263] Similarly, it has been noted that despite the addition of mechanised armoured forces, World War Two

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[260] Libicki, *The Mesh and the Net*, p21.
[261] Hayden, p180.
[262] Thomas P. M. Barnett, 'The Seven Deadly Sins of Network-Centric Warfare', *Proceedings*, January 1999, p37.
[263] Michael Howard quoted in Holden Reid, p17.

eventually took on much of the character of World War One, with fortified positions being taken by large artillery barrages and infantry advances across open land. [264] In a broader sense, John Ellis notes that rather than being won by brilliant operational manoeuvres, World War Two became an attritional struggle which was decided by the balance of resources and production rates. [265] More recently, after-action reports on the conflict in Kosovo suggest that the success of the NATO campaign came close to being put in jeopardy by weapons shortages. [266] Operational innovation does not necessarily lead to strategic success, many things can stand in-between these two conditions. As a final thought on this subject, it should be noted that for a digitised force to be operationally effective will still require factors such as training, good leadership, high morale, and discipline.

This chapter has placed the role of humans at the heart of warfare, and has stated the need to retain the man on the scene with a gun as the ultimate guarantor of strategic success. However, this does not prevent unmanned vehicles of various designs performing useful functions in the future battlespace. Under certain circumstances there is no need to operate inhabited vehicles. For example, in the case of bombardment against static targets, stand-off munitions launched from UAVs or naval vessels could perform the job sufficiently, without the need to risk a pilot. This preservation of human life is not motivated purely by moral or political considerations, but also by the pragmatic need to preserve valuable and expensively-trained pilots. In air-to-air combat UCAVs also have the advantage of being able to operate at higher G-forces. Of course, UAVs are already playing an increasingly important role in surveillance and reconnaissance activities. On the ground, Peters sensibly suggests that in extreme threat environments remotely operated unmanned tanks should prove more usable than their manned counterparts. [267] Nonetheless, strategic considerations dictate that humans cannot be removed from the sharp end of warfare altogether. Pilots will still prove valuable when attacking mobile targets, especially if the potential exists to inflict collateral damage. Kosovo revealed that visual identification of some

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[264] See Paul Harris, 'Radicalism in Military Thought', in Bond and Melvin, p35, Bellamy, *The Evolution of Modern Land Warfare*, p95, and Ellis, *The Sharp End of War*.
[265] This is the central message of John Ellis, *Brute Force: Allied Strategy and Tactics in the Second World War*, (London, Andre Deutsch Limited, 1990).
[266] Bender, p3.
[267] Peters, 'The Future of Armoured Warfare', p52.

kinds of targets was usually desirable, sometimes was critical, and required a number of passes by the bombers. In this sense, pilots do not exist merely to push buttons which deliver munitions; they are also, and perhaps more importantly, expected to use their judgment when attacking a target. Manned vehicles with organic firepower also serve as a safeguard against potential future vulnerabilities of digital communication networks. The presence of humans in the front-line is especially unavoidable on the ground. Control will often require the physical presence of troops. These troops will in turn require organic firepower, and vehicles which provide protection for manoeuvre and firepower. Some future version of the tank or APC would seem to fulfil these requirements as they have done in the past.

Within the current RMA literature there is an abundance of varying ideas concerning the future character of warfare. The most prominent amongst these include Libicki's visions of fire-ant and hide-and-seek warfare; Admiral Owens' system-of-systems; Arquilla's control paradigm; Parry's post-modern warfare; Arquilla and Ronfeldt's cyberwar; and the USN's network-centric warfare. Taken together, these visions of information age warfare generally focus on regular, high-intensity conflict; information-dominated operations, with the battle over information proving decisive; the increasing fulfilment of Fuller's prophecy on the removal of humans from the activity of conflict; and an emphasis on less-destructive, less-attritional forms of warfare. [268] The literature of the RMA advocates portrays war as a highly controllable activity and one dominated by technological prowess. This perspective contrasts sharply with the Clausewitzian nature of warfare as outlined in Chapter 1, with its emphasis on destruction, uncertainty, chance, friction, and above all, infused by policy and the role of humans.

In contrast to much of the RMA literature, this chapter has suggested that four central factors will prevent the above visions of the RMA developing sufficiently to change the nature of warfare. These are the demands of strategy and the influence of policy; the polymorphous character of war; the paradoxical logic of strategy; and finally, the physical reality of geography in which all warfare is conducted. These four underlying factors mean 'control'

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[268] See Arquilla and Ronfeldt, 'Looking Ahead: Preparing for Information-Age Conflict', in odem, pp492-493, in which they proclaim that warfare will become less destructive and more disruptive. They also identify an 'information dividend', which enables an end to the need for large armed forces.

requires the presence of humans, and at times may require the destruction of enemy forces; that the operational efficiency of the envisaged RMA will be reduced; and that uncertainty will remain an integral part of warfare. As Clausewitz himself indicated, "... the very nature of interaction is bound to make [war] unpredictable." [269] The above thoughts can be refined further, so that war can be characterized by the *Constant – Variable – Constant Model.* Within this hypothesis the first set of constants which are always in play in whatever form are: policy demands, geography, and the enemy. As noted above, the existence of these factors produces a situation in which the whole phenomena of war can never be charcterised by one, omnipotent form. Consequently, these three constants produce the variable factor that is the polymorphous character of war. In turn, this inability of war to assume just one overriding form ensures that the features which constitute the Clausewitzian nature of war (violence, uncertainty, chance, and the human element) will remain constant. There also exists a direct link between the first set of constants and the nature of war. The future battlespace is not something which can be dictated and molded by any one defence community. Acknowledging this fact, Dunlap notes "We must plan our weapons to fight war where, when, and how the enemy chooses." [270] An example which draws together many of the elements discussed in this chapter is the loss of Varius' Roman legions in the Teutburg Forest. The legions of that period were considered to be at their peak, and the German tribal forces were equipped with inferior technology. The destruction of the legions can be attributed to a host of factors. Of particular note was geography, weather, clever diplomacy and strategy by Armitius, and a lack of flexibility on the part of Varius in the face of guerrilla operations. [271] Information age warfare cannot develop as an abstract process isolated from strategic, paradoxical, and geographic factors. Rather, future warfare will reflect these influences at least as much, if not more, than it reflects the attitudes of the American defence community and the development of technology. It would be an error to undervalue the advantages offered by the information age. Yet, an equally damaging error would be to equate the RMA literature's vision of warfare with reality.

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[269] Clausewitz, p161.

[270] Dunlap, 'Four Dangerous myths', p35.

[271] Richard A. Gabriel and Donald W. Boose, Jr., *The Great Battles of Antiquity: A Strategic and Tactical Guide to the Great Battles that Shaped the Development of War*, (Westport, Connecticut, Greenwood Press, 1994), *passim.*

Committing this particular mistake could allow these visions to dominate the development of military and strategic cultures, procurement policies, and/or dictate foreign policy. Future force structure, doctrine, strategy, and general preparation for war, should reflect the nature of warfare, not some idealised vision of the potential offered by the current RMA.

Chapter 3

Future Command and the Fate of Military Genius

"[war's] highest solution must be evolved from the eye and brain and soul of a single man ... Nothing but genius, the demon in man, can answer the riddles of war..." [1]

Introduction

One cannot fully appreciate Clausewitz's theory of war without understanding the role of the general. The pages of military history are adorned with the exploits of individual human commanders. Men such as Alexander the Great, Napoleon, and Field-Marshal Slim, to name but three, are credited with displaying the various qualities required to succeed in the art of command. Napoleon himself declared: "[r]ead and meditate upon the wars of the greatest captains," he continued: "[t]his is the only means of rightly learning the science of war." [2] It is because war is a human endeavour, the realm of chance, uncertainty, danger, physical exertion, and the contact point between the military instrument and policy, that Clausewitz reserved the accolade of military genius for those who, like the above, excel in the art of command within such an environment. [3]

Of course, command cannot be reduced simply to the attributes of the commander. As Gray postulates, because genius is rare, attention should be paid to the creation of a compensatory command process. [4] In this vein, van Creveld cites the Prussian General Staff as a successful example of this principle. [5] Indeed, Dupuy goes as far as to suggest that the explanation for the success of the Prussian/German General Staff can be found in its institutionalization of

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[1] Winston S. Churchill, quoted in M. Carver, 'Montgomery', in John Keegan (ed), *Churchill's Generals*, (London, Weidenfeld & Nicolson, 1991), p148

[2] Quoted in Chandler, *The Campaigns of Napoleon*, p139.

[3] Handel argues this very point when he suggests that the military genius is central to Clausewitz's theory of war becuase his temprement and intellect are the means with which to deal with the climate of war. See Handel, *Masters of War*, p153.

[4] Gray, *Modern Strategy*, p53 and p108.

[5] Martin van Creveld, *Command in War*, (Cambridge, Harvard University Press, 1985), p143.

'military genius'. [6] Nevertheless, even in the absence of a military genius, historically, every command system has been based upon the principle of hierarchy, with command responsibility resting ultimately with an individual. It is the combination of the commander's qualities, the command structure, and the command ethos, that lays the foundation for good command amid the ever-present stresses and chaos of war.

'Military genius' is a term used by Clausewitz to describe those individuals who posses an outstanding "harmonious combination of elements" required to excel in command. [7] Although the title of this chapter refers to genius, this is not meant to restrict the study of command to the very few individuals whom display something extraordinarily special. Rather, the Clausewitzian term 'military genius' can be used as a vehicle for understanding the qualities of good command more generally. The key point to note is that military genius is a human attribute which includes certain cognitive skills, certain moral qualities, and an understanding of human issues. Underneath these broad, umbrella terms Clausewitz identifies a number of characteristics which a commander should posses. These include physical and moral courage; incisiveness; presence of mind; strength of will and character; and an ambitious nature. However, Clausewitz gives particular prominence to a general's intuitive ability, his *coup d'oeil*, and the determination to see his decisions through. He also acknowledges the significance of leadership, as particularly evident in the task of supporting the men through the psychological trauma of battle. Finally, a Clausewitzian general must understand how military force relates to policy. [8] More recently, General De la Billiere has expanded on this latter requirement. Reflecting on his 1991 Gulf War experience, he notes that the commander must give considerable time during a campaign to the post-conflict settlement. [9] To this end, he must consider a range of factors including: political, moral, legal, socio-economic, and cultural issues. Such concerns surely require a skilled human touch.

In contrast to the 'bold' general in *On War*, Sun Tzu's ideal commander relies less

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[6] T. N. Dupuy, *A Genius for War: The German Army and General Staff, 1807-1945*, (London, MacDonald and Jane's, 1977), p307.
[7] Clausewitz, p115.
[8] See Clausewitz, Book One, Chapter Three.
[9] General Sir Peter de la Billiere, *Storm Command*, (London, HarperCollinsPublishers, 1992).

on intuition, and more on caution and measured calculation. [10] This approach reflects Sun Tzu's tendency to regard warfare as more controllable and dominated by the correct manipulation and utilisation of knowledge. In this respect, it is easy to appreciate why the Chinese theorist has appeal to the enthusiasts of the contemporary RMA. Whereas Clausewitz's military genius relies upon his intuition and determination to make the right decisions in the face of unreliable and contradictory information, Sun Tzu's general seeks to acquire and utilise knowledge as the basis for his actions. This difference between the two theorists is utilised by Ferris and Handel in their call for Clausewitzian generals to be replaced by 'calculating commanders'. [11]

The subject of command is of interest to this study because, indirectly, the RMA literature challenges the continued role of the individual human commander. In particular, two developments of the information age raise questions concerning who, or what, should conduct command, and what forms the command structure and ethos should take for the future. The first of these developments is the coming maturation of Artificial Intelligence (AI). [12] The potential exploitation of AI is not solely a product of increased technological capability in computer processing. Within the RMA literature there is a perceived need for the increased utilisation of computers in decision making. This requirement is driven by the need to process a greater abundance of information more quickly, in order to produce a higher operational tempo. It has been suggested that computers enable a higher level of performance in war, since their ability to handle and sort large amounts of information means that complex plans can be formed which can then be simplified in their execution. [13] The second feature of the information age that could challenge the role of the individual commander is the rise of the network structure. The digital era

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[10] See Sun Tzu, and Handel, *Masters of War,* p153. Despite his preference for a calculating commander, Handel notes that Sun Tzu's insistence on the need for speed and seizing the initiative also suggests that at times the commander must rely on his 'gut feelings'. Handel, *Masters of War,* p167.

[11] Ferris and Handel, p45.

[12] AI is understood to be the ability for computers to perform many of the functions of the human brain. As noted by Michael Gruber, this could include the facility to solve problems with novel solutions, the ability to learn, and the ability to show some common sense. Michael Gruber, 'In Search of the Electronic Brain', *Wired*, 5.05, May 1997, p144. David G. Stork posits that real AI is intelligence based on pattern recognition, insight, and strategy. See David G. Stork, 'The End of an Era, the Beginning of Another? Hal, Deep Blue and Kasparov', http://www.chess.ibm.com/learn/html/e.8./c.html

[13] Leonhard, p176

permits a high rate of information transfer that facilitates the dissemination of a common picture of the battlespace to every unit. It is this feature, allied to a potential increase in operational tempo, which has raised the possibility that the network structure should replace the hierarchy as the most effective organisational form through which to conduct command. When considering the fate of the Clausewitzian general, it is not just a question of whether he has become relatively less effective than an information age variant. Ferris and Handel go as far as to suggest that in the age of information plenty the attributes of the military genius may become counterproductive to the exercise of effective command. [14] It is the intention of this chapter to make some initial explorations into assessing the advantages and limitations of integrating the two developments of AI and networks into the art of command, and in particular to discuss the future of the individual human *commander.*

The Age of AI and Networks

In his 1985 work *Command in War,* van Creveld posed some interesting questions concerning the relative strengths of man and machines in the art of command, and in particular he raised the issue of how the burden of work should be divided between them [15] The development of AI in particular makes these questions even more pertinent for the coming decades. Exactly when AI will mature to a point at which a computer can do many of the things a human brain can do, such as produce novel solutions to problems, is disputed and uncertain. Some estimates suggest a wait of thirty to fifty years until the big breakthroughs appear. [16] However, we may already be on the path towards these developments through the technique of 'evolutionary computing', which has reportedly

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[14] Ferris and Handel, pp44-45.

[15] Martin van Creveld discusses how computers could perform the functions of the human brain. See *Command in War*, p3.

[16] Simson Garfinkel notes that we will have to wait thirty years for the big breakthroughs in AI. See Simson Garfinkel, '2001 Double Take', http://www.wired.com/wired/5.01/features/ffhal.html. Whereas Professor Paul Churchland, a Professor of philosophy and a member of the cognitive science faculty at the University of California, postulates that although there are neural networks which can already exceed humans in certain abilities, it could take fifty years for neural nets to achieve the capability to write symphonies for example. Quoted in Max More, 'Thinking About Thinking', http://www.wired.com/wired/4.12/features/churchland.html

rejuvenated the field of AI. [17]

Although it may be some time before AI reaches a sophisticated level of development, computers already engage in activities that traditionally have been the preserve of human decision making. The technique of 'knowledge engineering', which involves the uploading of human knowledge about a particular activity into a computer, is already a reality. This technique allows the so-called 'Robotrader' to look after $200m of funds on the world's bonds markets. In fact, the two organisations behind this project, Pareto Partners Ltd and Hughes Research Laboratories, have gone as far as to note that "... in the war for the world's markets, the mechanised divisions are going to win." [18] Chess is another area in which computer programs are superseding human abilities; in recent years this has occurred even at the grandmaster level. [19]

As computer-based decision making is introduced into an increasing number of human activities, it is unlikely that the art of command will escape this intrusion. Indeed, many of the AI labs in the United States were established and continue to be funded by the Defense Advanced Research Projects Agency (DARPA). [20] However, developing these technologies is only part of the challenge. A more important task is considering whether, and how, AI can be integrated into the art of command, bearing in mind that war is a domain infused by policy, humanity, uncertainty, friction, and the existence of an intelligent foe.

In relation to the second development of the current epoch, some analysts regard the rise of the network as a direct challenge to the relative efficacy of the hierarchical command structure. At the forefront of this discourse are Arquilla and Ronfeldt. Arquilla postulates that "[t]he information age implies generalship by the many, the decentralisation of authority." [21] Arquilla does temper this thought somewhat by noting that military organisations will always retain an element of hierarchy with someone who has ultimate command responsibility. Overall,

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[17] Gruber, p144.

[18] Robotrader is the product of uploading the expertise of Christine Downton, a star financial analyst at Pareto Partners Ltd. See Clive Davidson, 'Christine Downton's Brain', http://www.wired.com/wired/4.12/esrobotrader.html

[19] This is of course a reference to the defeat of World Chess Champion Gary Kasparov by IBM's computer, Deep Blue, in May 1997.

[20] Davidson.

[21] Quoted in Ashley Craddock, 'Netwar and Peace in the Global Village', *Wired*, 5.05, May 1997, p226.

Arquilla and Ronfeldt's ideas are best summed-up by the fact that they maintain that 'cyberwar', a form of warfare which centres around the battle for information, dictates a shift from 'command and control' to 'consultation and coordination'. [22] With these thoughts in mind, the future of the military command organisation may reside in the creation of hybrid organisational structures, which utilise elements of both hierarchies and networks.

Before embarking upon an analysis of AI and networks it is important to reiterate the main elements that constitute the nature of war, as this establishes the framework within which these two developments must operate. First, it has to be remembered that war is a political act, which should have no independent rationale of its own. [23] Second, despite the further development of concepts such as Unmanned Aerial Vehicles (UAVs), post-heroic warfare, and a tendency in some of the RMA literature to perceive war as merely an act of bombardment, warfare in the information age will remain fundamentally a human activity, and thereby infused by Clausewitz's climate of war. All told, the demands of strategy ensure that commanders will continue to lead men in circumstances of extreme danger and varied strategic circumstances. These considerations dictate how AI and networks should be integrated into the art of command.

The responsibilities of command can be delineated in a number of ways. Martin van Creveld chose to distinguish between function-related and output-related responsibilities. [24] Whilst recognising the importance of van Creveld's function and output related approach, for the purposes of this study, the responsibilities of command are perhaps best defined as being concerned with 'internal' and 'external' factors. Internal factors refer to those considerations which relate to the commander's own forces. These concern primarily the maintenance and well being of the forces. In this area, important concerns are the maintenance of morale, the motivation of the troops, and general preparation for war. Consequently, the internal role of command is often concerned with factors relating to human involvement. Another important element within the internal function is the management of information. In this respect, the US Army's *FM 100-6 Information Operations* is quite right to assert: "commanders must have information to command." [25] As information

[22] Arquilla and Ronfeldt, 'Cyberwar is Coming', p45.
[23] This is of course one of the central tenets of Clausewitz's work.
[24] van Creveld, *Command in War*, p6.
[25] *FM 100-6*, p4-1.

becomes more bountiful, sensible management of this resource becomes more salient in order to avoid the problem of information overload. [26] Therefore, the handling of information is perhaps gaining increased significance in the information age. Nevertheless, Campen's claim that information is the essence of C^2 is erroneous. [27] Although it represents an essential element of the command process, information constitutes just one aspect of the art. Just as important are those issues relating to leadership, strategy, and judgment. Montgomery correctly noted that leadership is predominately a battle for the hearts and minds of men.[28]

The external side of the command equation refers to interaction with enemy forces and commanders. To perform well in the external role, a commander must of course make the right decisions in the face of enemy actions, and importantly must retain the initiative. To conceive command in terms of these internal and external considerations presents a useful framework for analysis. Of course, the external and internal factors of command interact with each other considerably; each one affects the other. A commander must perform adequately in both of the functions outlined above.

Artificial Intelligence in Command

In 1969 a senior Soviet army engineer commented: "the means of automatic control of troops and weapons ... have become a most important form of military equipment." [29] This observation may have even more pertinence in the information age. Indeed, Libicki postulates that the existence of the mesh raises serious questions concerning the continued viability of human command. [30] There are a number of reasons to suggest why conducting command with AI may confer some advantage. The first and most obvious, which relates to the external consideration, is the requirement for

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[26] For an interesting assessment of the role information plays in the modern battlespace, see Ferris and Handel.
[27] Campen, p89.
[28] Field-Marshal Montgomery, *The Path to Leadership*, (London, Collins, 1961), p10.
[29] Quoted in Hartcup, p79.
[30] Martin C. Libicki, 'The Small and the Many', in Arquilla and Ronfeldt, *In Athena's Camp*, p210. See also James Hazlett, 'Just-in-Time Warfare', in Johnson and Libicki (eds)

speed in decision making relative to the enemy. Of course, a decision has to be correct as well as quick. A quick bad decision is still a bad decision, and may only result in bringing disaster more quickly. Yet, speed is at the heart of many of the great theories of war. In one of his most noted axioms Sun Tzu declares that "speed is the essence of war." [31] Clausewitz more specifically calls for rapid and decisive decisions. [32] The relative speed of decision making is the very essence of Colonel John Boyd's much praised OODA cycle. [33] At its heart, Boyd's theory is concerned with getting inside the enemy's decision making cycle, and thereby retaining the initiative. Similarly, the RMA literature often pays homage to the search for ever greater levels of operational tempo. For example, NCW places great emphasis on the need for speed in the process of command. To facilitate this, Admiral Cebrowski calls for greater automation in decision making and flattened hierarchies. [34] There is sufficient historical evidence to support such a focus on the speed of the decision making cycle. Griffith notes that one of the main problems encountered in the offensives of WWI, was that the tempo of C^2 was often insufficient to exploit break-ins of the enemy defences. Consequently, the much sort after break-out could not be achieved. [35]

The requirement for quick decision making may acquire even more saliency in the information age. As the battlespace becomes a place of greater lethality, getting your blow in first could confer a distinct advantage. This is certainly the perspective taken by James Hazlett, who asserts that success or failure in future war will be determined by who gets inside the enemy's decision making cycle first. [36] The United States Army's Mobile Strike Force Advanced Warfighting Experiment (AWE) has reported a significant increase in operational tempo for a digitised force. [37] Such exercises have created certain expectations within the military. *Joint Vision 2010* asserts that increased operational tempo and greater force integration will probably

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[31] Sun Tzu, p134.

[32] Clausewitz, p118. This characteristic is also identified by Edgar F. Puryear Jr. in *Nineteen Stars: A Study in Military Character and Leadership*, (Novato, Presidio, 1992), p396.

[33] OODA stands for observation-orientation-decision-action.

[34] Cebrowski, *Network-Centric Warfare: An Emerging Military Response to the Information Age*, p4.

[35] Griffith, p175.

[36] Hazlett, p116.

[37] Colonel Rolland A. Dessert Jr., 'Mobile Strike Force: An Experiment in Future Battle Command', *Military Review*, Vol. 76, No. 4, July-August 1996. p35. Blaker also concludes that RMA operational theory results in a higher tempo. See Blaker, p23.

create a more stressful and faster moving decision making environment. [38] Clearly, computers have the ability to process certain forms of information much more quickly than humans, and although one may shy away from the prospect of giving command authority to a computer, the danger exists that the enemy may not. This latter point can be termed the 'digital imperative'. Namely, that there is pressure to employ AI in command for fear that the enemy may do so whilst you do not. In such a scenario, a force under human command could have a much slower decision making cycle relative to one under the commanded of AI. In this respect, the existence of an intelligent enemy may in this case provide the impetus for radical change in the information age.

An AI commander also has the advantage of not being emotional, nor being susceptible to psychological pressure. Clausewitz identified a psychological fog of war, which is the product of man's emotional response to combat. [39] Within this context, Sun Tzu pays a great deal of attention to the art of playing upon the temperament of an opposing commander. For Sun Tzu a commander must be serene and controlled. [40] This is clearly an area of command in which AI can excel. Interestingly enough, although computers cannot be psychologically manipulated, computers do have the ability to psychologically affect human opponents. During his defeat at the hands of IBM's computer Deep Blue, World Chess Champion Gary Kasparov was reportedly put under severe pressure, in part by the enormous calculating power of his opponent. Kasparov unusually fell prey to his emotions, lost his objectivity, and fell into a well-known trap in the final and decisive sixth game. [41] It is easy to appreciate how the calculating power of Deep Blue could be off-putting when one learns that it can calculate approximately one quarter of a billion chess positions every second. [42]

The ability to calculate many options and plan well ahead is another useful attribute for a commander. Brigadier General Huba Wass de Czege, who has been involved in the United States Army's AWE, regards the ability to prepare alternative possible plans with the aid of

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[38] See *Joint Vision 2010*, p41.
[39] Cited in Riper and Scales, p9.
[40] Sun Tzu, p136.
[41] See 'Kasparov Down - But Not Out', http://www.chess.ibm.com/home/may11/story_2.html and Jeff Kisseloff, 'Kasparov's Back Against the Wall', http://www.chess.ibm.com/home/may10/story_3.html
[42] Stork.

information technologies as especially valuable. [43] Likewise, General Westmoreland reflecting upon his command of United States forces in Vietnam, comments: "it was essential for me to plan ahead constantly, to develop contingency plans for any eventuality" [44] The ability to calculate a quarter of a billion positions every second could be as useful in the conduct of war as it is in the game of chess. However, it must be borne in mind that in many of its aspects chess is a game of known variables. The contest takes place on a known and unchanging board, and the pieces have set attributes. War is a far more complex and uncertain undertaking, not least because it involves humans at all levels.

There are a number of other reasons that indicate that AI could perform well in command. As Napoleon stated, a prerequisite for performing well in command is to study the great commanders of the past, in order to attain a good knowledge of one's art. [45] To refer once again to General Westmoreland's experience in Vietnam, he had at his side a command historian "to provide historical background and precedent." [46] Returning to the grandmasters of chess, one of their great assets is the ability to draw upon a thorough memory of great chess games and moves. A computer can obviously hold a great deal of information on past commanders and their campaigns. In this sense, an AI commander can have a comprehensive knowledge of his art, which also could conceivably include a detailed familiarity with the performance parameters of the relevant equipment, and knowledge of the operational procedures and doctrine for all sections of a military organisation. In theory an AI commander could serve well as the commander of joint or multinational forces, because it would have no national or service bias. Such a commander could be programmed to be equally cognisant with reference to the different armed services within, and between countries.

In the information age it may in fact be necessary to involve AI in the process of command, simply in order to cope with the vast amounts of information produced in modern war.

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[43] Brigadier General Huba Wass de Czege, 'Mobile Strike Force: A 2010 Potential Force', *Military Review*, Vol. 76, No. 4, July-August 1996, p72.

[44] General William C. Westmoreland, *A Soldier Reports*, (New York, Doubleday & Company, Inc., 1976), p271.

[45] This is the advice of Field-Marshal Montgomery, who in turn reports that both Napoleon and Machiavelli gave the same counsel. Montgomery, p28.

[46] Westmoreland, p268.

Again, this is particularly pertinent in future conflict in which access to information, and the quick utilisation of that information, may prove increasingly significant. A common complaint from units involved in exercises with advanced information technology is that they sometimes become overwhelmed with information. Every command system has its limitations. As van Creveld notes, Napoleon's Imperial Headquarters, which had previously functioned well, became overwhelmed by the numbers of troops and distances involved in the campaigns of 1812-13. [47] There may come a point when human commanders are unable to cope effectively with the flow of information, and more importantly the requirement for timely decisions based upon that information. To this end, James R. Fitzsimonds is prepared to conclude: "An information-intensive battlespace may work to our advantage only if humans can be largely removed from the command loop." [48] Related to this, Colonel Dessert Jr postulates that a commander on an information age battlefield will have the daunting task of keeping track of a significantly extended battlespace. [49] In a similar vein, *Joint Vision 2010* notes "the accelerated operational tempo and greater integration requirements will likely create a more stressful, faster moving decision environment." [50]

An AI commander will not suffer from ill health or fatigue on the battlefield. [51] In theory, an AI commander could conduct a twenty-four hour battle day-after-day. In contrast, humans have physical and mental limitations. At Waterloo, Napoleon's deteriorating health forced him to leave the battlefield for a time. It was during this absence from the field that Ney undertook his ill-fated cavalry assault upon the Allied lines. It perhaps should be mentioned at this juncture, that although computers do not suffer from pain, flu, or fatigue, they could suffer from viruses and bugs.

Another important element of command in which AI should perform well, is

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[47] van Creveld, *Command in War*, p97.

[48] Fitzsimonds, p33.

[49] Dessert, p36.

[50] Joint Vision 2010, p41.

[51] Philip Katcher claims that Robert E. Lee's physical ailments left him in significant discomfort, which must have affected his thinking and command performance. Philip Katcher, *The Army of Robert E. Lee*, (London, Arms and Armour Press, 1996), pp22-23. Rommel also suffered throughout his military career with a severe stomach upset. David Fraser, *Knight's Cross: A Life of Field Marshal Erwin Rommel*, (London, HarperCollinsPublishers, 1994), p27. It is impossible to estimate just how severely these afflictions affected the ability of Lee and Rommel. Even though they both performed well in spite of their ailments, it must be assumed that illness reduces the capabilities of a commander to some degree.

familiarity with the terrain. This knowledge could include a familiarity with the ground from any conceivable angle, and the ability to calculate lines of sight. Knowledge of the terrain could be pre-programmed from images collected by satellite and other reconnaissance assets, and could be updated during the battle. Terrain analysis is an area in which computing power already has a role. For example, the 'Athene' system, in use with the French Army, already automates tasks such as terrain analysis. [52] Hazlett postulates that GPS-based 'Automated Terrain Assessment' could perform functions such as the identification of likely choke points. [53] However, the utilisation of computer-based terrain analysis does not facilitate the final subjugation of this source of friction. It has already been noted that Slim warned that the effects of terrain cannot be fully known until one is in it. Such advice is not just the musings of a historical figure from a bygone era. In 1991, De la Billiere was just as conscious of this problem, and felt compelled to physically drive upon the desert terrain on which his forces would operate in order to have a fuller understanding of its effects. [54] Also, physical geography is not necessarily a static phenomenon. Winters makes the important point that geography can change rapidly. A notable example of this is Burnside's aforementioned 'mud march'.

Finally, AI has a particular advantage when it comes to the question of moral courage required to bear the responsibility of command. The asset of moral courage is regarded by many a writer and practitioner alike as a requisite characteristic for a commander. [55] This is a quality that U. S. Grant is said to have possessed in abundance. It is said that he took decisions easily and without a great deal of agonizing. [56] There can be no finer example of an act of moral courage than Arthur 'Bomber' Harris' 'Millennium' raid against Cologne in May 1942. In an effort to prove the instrument of Bomber Command, Harris brought together virtually his entire bomber force, including reserves, in one attack. It must be remembered that this was at a time when Bomber Command was taking significant losses on most raids. The Official History

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[52] 'Athene Will Put Canadian Army in Command', *Jane's Defence Weekly*, Vol. 29, No 2, 4 March 1998, p7.
[53] Hazlett, pp126-7.
[54] General Sir Peter de la Billiere, *Storm Command*, (London, HarperCollinsPublishers, 1992).
[55] For example, see Clausewitz Book One, Chapter Three, and Field-Marshal Sir William Slim, *Courage and Other Broadcasts*, (London, Cassell & Company LTD, 1957), p5, and Puryear, p394.
[56] Holden Reid, p28.

describes the risks involved: "[s]uch a bold action might produce a great triumph, but, if anything went wrong, the disaster might well be irremediable" [57] John Terraine's assessment of this decision is undoubtedly correct: "Harris' calm, deliberate decision to stake his whole force and its future, on the night of May 30/31, showed the true quality of command." [58] In contrast to these positive examples, some leaders fail to perform effectively under the stress of command. Grant's predecessor as CO of Union forces, George B. McClellen, displayed ruinous levels of undue caution in the face of Confederate forces at Manassas despite having a significant superiority in numbers. James McPherson comments: "Military success could be achieved only by taking risks; McClellan seemed to shrink from the prospect. He lacked the mental and moral courage required of great generals." [59] As noted previously, Philip II's self-imposed burden of responsibility led him to adopt a style of command that proved to be unmanageable. The argument in favour of AI is that not all human commanders will be as blessed as Grant and Harris in the sphere of moral courage, and therefore AI eliminates this potential limitation in a commander's abilities. Arguably, AI would not suffer from the opposite human failing of overconfidence. This is an attribute that both Hitler and Napoleon exhibited, and which contributed to their eventual downfall. Arrogance and pride are not problems associated with computers.

There are clearly a number of reasons to suggest that certain aspects of command could be conducted more effectively by AI rather than humans. Yet, understandably the prospect of handing the command of our armed forces over to a computer software program may seem a fanciful, alien, and uncomfortable thought. Although, as van Creveld notes, some decision making has already been automated. This is particularly true at the technical level of warfare in areas such as anti-missile operations. [60] As warfare in the information age comes to rely more directly upon information, takes place in an increasingly extended battlespace, and the tempo of operations increases significantly, it may be time to spread the automation of decision making further up the

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[57] Quoted in John Terraine, *The Right of the Line: The Royal Air Force in the European War 1939-1945*, (Sevenoaks, Sceptre, 1988), p484.
[58] ibid, p485.
[59] James E. McPherson, *Battle Cry of Freedom: The American Civil War*, (London, Penguin Books, 1990), p365.
[60] van Creveld, *Command in War*, p2.

levels of war. At the very least, AI may have to play a role as an aide to a human commander. [61] The digital imperative may prove to be a powerful force in the information age. However, there are some fundamental reasons to retain the human role in command. The requirement for the continued presence of a human commander on the battlefield is an issue to which this chapter now turns.

Human Command (cont)

War by its nature is an act in the service of policy. [62] It is this most elemental of considerations which raises doubts concerning the role AI can play in the art of command. After all, politics is fundamentally the realm of human interactions. Just as war will remain a human activity in the information age, so will politics. It is doubtful whether even highly developed AI would be able to understand the complexities and subtleties of politics, nevermind the relationship between policy and the military instrument. A computer could be programmed to know political history and theory, but understanding how certain human political actors may respond in certain circumstances may be even more difficult for AI than it is for humans themselves. An AI commander may make a decision which is correct at both the tactical and operational levels, but which may be inappropriate at the strategic level. One possible method to keep an AI commander operating within a political framework is through detailed and extensive Rules of Engagement (ROE). However, strategy is more complex and subtle than mere ROE. Similarly, it is questionable whether an AI commander could be flexible enough, or sensitive enough to political considerations, within the varied and uncertain environment of war. Military forces are not merely units to be moved around a map, as Mao clearly recognised, they are also political actors. [63] Although his use of the term 'strategic' is somewhat misplaced, [64] Andy McNab, formerly of the Special Air Service (SAS), reveals an understanding of the concepts writers such as Mao and

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[61] For comments on the role of staffs play see Holden Reid, p28 and Vegetius, p80.
[62] van Creveld, *Command in War*, pp186-7.
[63] Mao, *passim*.
[64] See the discussion on the misuse of the term 'strategy' in following chapter.

Clausewitz identified when he states: "we're strategic troops". [65] The implication of this statement is that the actions of the soldier have effects beyond the tactical and operational arenas. Servicemen, including officers, are strategic instruments who have an impact, however indirectly, on the world of policy, and likewise are influenced by politics.

If we accept that warfare will continue to be characterised by Clausewitz's climate of war, and the man on the scene with a gun, then human attributes and considerations will remain crucial to the successful conduct of command. Although an AI commander will be able to cope with the pressures of battle command, this lack of emotion and empathy will in all probability prevent the same commander from being able to motivate the men under his charge. Vegetius, who recognised the prominence of fear on the battlefield, saw the commander's role as critical in response to this: "[a]n army gains courage and fighting spirit from advice and encouragement from their general." [66] Montgomery also stresses the relationship between the leader and the lead; for him command is fundamentally about trust. [67] Although one can have great trust in the ability of AI to process information quickly and accurately, will soldiers trust their lives to the decisions of a silicon chip that can never share their same sense of humanity?

Displaying sensitivity to the human character of warfare, Montgomery stresses the need to address the humanity of the troops in a personal manner. [68] A computer is nothing if not impersonal. One of Alexander the Great's outstanding qualities was the management of his forces. Alexander would endeavour to ensure that his men were well fed and got the required rest. He also took the trouble to visit the wounded in person, often when he was wounded himself. [69] The fact that Alexander was wounded so often in battle is testament to his physical courage and the example he set to his men. An AI commander could never set such an example. Lieutenant-

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[65] Andy McNab, *Bravo Two Zero*, (London, BCA, 1993), p8.

[66] Vegetius, p87. Commenting on General Robert Eichelberger, who commanded American forces in New Guinea in 1942, Rosen states: "Eichelberger himself was always at the front lines, and his example inspired his men.". Stephen P. Rosen, *Winning the Next War: Innovation and the Modern Military*,(Ithaca, Cornell University Press ,1991), p32.

[67] Montgomery, p9. Likewise, General Frederick M. Franks Jr., who commanded VII Corps in the 1991 Gulf War, notes that "Trust, I believe, is the basic bond of leadership." See General Frederick M. Franks Jr., 'Battle Command: A Commander's Perspective', *Military Review*, Vol. 76, No 3, May-June 1996, p4.

[68] Montgomery, p18.

[69] John Keegan, *The Mask of Command*, (Lonon, Penguin Books, 1988), p46.

General Horrocks showed that an alternative morale booster was ensuring that the local nurses attended the twice-weekly dances in Tripoli during the Second World War. [70] The actions of these human commanders, and many like them, reveal a common appreciation of the humanity of the troops under their command. Marshall notes that a commander cannot just concern himself with big operational and strategic manoeuvres, rather he must also deal with the welfare of his men. [71] In answer to the question of whether an AI commander could posses a similar understanding of human needs, the phrase 'it takes one to know one' is pertinent.

Staying with the human element of war, the command literature is awash with references to the need for a commander to meet with his troops face-to-face. [72] Marshall makes many references to this important aspect of command. In particular, he warns against the general becoming chained to communications technology, and thereby overlooking the value of his presence to the men. He postulates that men at the front gain confidence from the belief that a commander alongside them has a greater understanding of their tactical situation. [73] From the commander's perspective, Marshall argues that information on morale is best gained firsthand from face-to-face contact with the men. In this respect "... there is no substitute for personal reconnaissance." [74] Slim regarded morale as the key to victory. In this vein, he placed great importance on the need to explain the rationale of an action to the men face-to-face, and in terms and language with which they could identify. [75] In Slim's judgment, the leadership function of command is essentially concerned with the projection of personality. [76] Personality can only really be transmitted through face-to-face communication, during which all of the nuances of human personality can be appreciated. The United States' Army, which is at the forefront of efforts to digitise forces, appears to be keeping this human element in mind. *FM 100-6 Information Operations* is undoubtedly correct when it posits that commanders "will continue to inspire

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[70] Alan Shepperd, 'Horrocks', in Keegan (ed), *Churchill's Generals*, p236.
[71] Marshall, p190.
[72] See Puryear, p401.
[73] ibid, p102, and p105.
[74] ibid, p104, and quote taken from p95.
[75] Slim, *Courage*, pp19-20.
[76] ibid, p38.

subordinates through face-to-face communications and physical presence." [77] Brigadier General Huba Wass de Czege identifies at least three functions which face-to-face communication fulfills: it helps ensure understanding; allows the commander to gauge morale; and his presence contributes to the leadership role. [78] It has been noted that putting the commander forward helps reduce uncertainty and the influence of friction. [79] It is interesting that forces engaged in Experimental Force (EXFOR), who had at their disposal the latest digital communication technology, often resorted to radio communications due to the fact that voice allows the transmission of more information because it includes tone, stress, and nuance. [80] An indication of how significant the presence of the commander is can be demonstrated by General Westmoreland's claim that he committed four out of every seven days to visiting his troops. [81]

In order to motivate troops one must posses an understanding of the men in question. Major Deborah Reisweber notes that different subordinates require different motivating strategies on the part of the commander. [82] Again, Vegetius' comment that a general should know the officers under him reveals that the importance of this concept has long been understood. [83] It is said that Napoleon displayed a remarkable degree of familiarity of the men under his command. [84] It is questionable whether an AI commander could appreciate and understand his subordinates' personalities, or indeed the broader human dimensions of warfare. Huba Wass de Czege summarises well the limitations of command by AI: "[d]ecision support information technologies can help present and organise information and predict factors in war that are based on the laws of physics, but they are unreliable predictors of moral factors - the human element." [85] Through the process of evolutionary computing AI can have a great deal of knowledge and even experience of decision making, yet it can never posses the experience of managing men and the art of leadership

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[77] Captain Joseph S. McLamb, 'The Future of Mission Orders', *Military Review*, Vol. 77, No 5, September-October 1997, p73.
[78] Wass de Czege, p73.
[79] Hayden, p171.
[80] Adams, *The Next World War*, p114.
[81] Westmoreland, p269.
[82] Major Deborah Reisweber, 'Battle Command: Will We Have it When We Need it?', *Military Review*, Vol. 77, No 5, September-October 1997, p57.
[83] Vegetius, p83.
[84] van Creveld, *Command in War*, p64.
[85] Wass de Czege, p74.

in its human dimensions. For the many reasons outlined above, it appears that an inability to fulfil many of the internal responsibilities of command would reduce the efficacy of AI.

The security and well being of a commander is obviously an important consideration. In relation to this concern, humans are certainly fragile beings, and yet in many ways they are undoubtedly more robust than silicon-based commanders. Concerns that rightly worry the designers of digitised forces are issues relating to the security and integrity of information systems. Silicon-based systems are vulnerable to EMP and a host of information warfare attacks, such as viruses or semantic attacks, to name but two. Measures can be taken to minimise the chance that information systems and AI-based command can be taken off-line. Yet, even in the face of protective measures, it would seem ill-judged to place the burden of command on machines which can, and do, crash at times, or can produce catastrophic failures due to a few lines of incorrect code. A human commander can still function when his supporting silicon-based command structure has gone down. In such a contingency the human commander will be able to rely upon the valuable command assets of intuition and initiative. [86]

In light of the above discussion, it has to be concluded that humans cannot be removed from the process of command. However, the pressure of the digital imperative remains. As AI develops and becomes more available, those relying solely upon human commanders must fear losing the initiative to an AI foe. How can these two forces be reconciled? One answer would seem to be for humans to retain the final say in command decisions, but to supplement their capabilities with an AI aide. [87] In such an arrangement, AI could fulfill part of the role currently performed by the staff. An AI aide would interpret the mass of information on the modern battlefield, and then present a series of options for consideration by the human commander. The human commander would have the final say. He would provide the link of humanity to his forces, and also input judgments regarding human factors, such as estimates of morale, into the decision making process. This arrangement of course creates a situation were decisions are made and acted upon more slowly than if left entirely to AI. But, the political and human dimensions of warfare

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[86] Paul T. Harig, 'The Digital General: Reflections on Leadership in the Post-Information Age', *Parameters*, Vol. XXVI, No. 3, Autumn 1996, p138.
, pp138-9.
[87] Holden Reid, p28.

dictate that humans must retain ultimate command of forces. As Brian Hold Reid accurately asserts "Staffs should provide ideas - that is what staffs are for. Yet having a good idea is no guarantee of success." [88] Victory in war demands much more than good ideas.

In the long-term a more developed method by which to garner the benefits of both AI and humans, and yet sacrificing less speed in decision making, may be human augmentation. The direct link-up between humans and computers through silicon implants would supplement human mental capabilities, whilst still retaining the human commander to use his strengths, those of understanding and dealing with the human and political elements of war, and providing leadership. The requirement of trust should be retained by the fact that the final decision is still a human one. The prospect of human augmentation in the way described is obviously some way off, and may never be socially or ethically acceptable. [89] Yet it presents an interesting frontier possibility. Both the 'AI aide' and 'human augmentation' routes recognise the limits of AI and human command, and compensate for these by bringing together the strengths of both into one command process.

However, even when just considering the decision making function of command, the human and AI commanders should always complement each other. There should not be a strict division of labour in which the AI decides, and the human implements and provides leadership. Such a situation would rob human commanders of their ability to make decisions. Jomini also warns of the dangers of a general carrying out someone else's plan. He suggests that those who have not devised a plan can never have a full understanding of it. [90] The human commander must continue to see himself as a decision maker, with the ability to modify or reject the advice of his aide. Failure to retain these abilities could create catastrophic problems should the silicon elements of command go down. Also, because uncertainty will never be removed from the

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[88] ibid, p28.

[89] Although understandably a controversial issue, human augmentation in the manner described is not beyond the realms of possibility. Paul Churchland is of the opinion that the future will bring the implantation of computers - 'synthetic neurons' - into brains, either to replace damaged brain tissue, or to augment the functions of the brain. See More, 'Thinking About Thinking'. Alvin and Heidi Toffler note that ethical dilemmas will only delay the progress towards a direct link between silicon chips and the human nervous system. See Alvin and Heidi Toffler, 'The Discontinuous Future: A Bold but Overoptimistic Forecast', Review Essay, *Foreign Affairs*, Vol. 77, No. 2, March/April 1998, p139.

[90] Jomini, p58.

battlespace, Stephen J. Kirin posits that a commander's *coup d'oeil* will enable him to continue to deal with this ever-present feature of war. [91] This is in direct contrast to the assertion that increasing levels of knowledge are leading to a situation where systematic decision making is eclipsing intuition. [92] Aside from the fact that uncertainty makes systematic decisions problematic, the RMA literature on command commits another error by ignoring the existence of an intelligent foe. Whereas a human commander's intuition may perceive or at least suspect enemy deception, AI may just simply accept the information being fed to it. Paul T. Harrig correctly asserts that the intuition of the commander allows him to cut through an overabundance of information and analysis, and focus on feasible solutions. He also notes that too much reliance on hard data can stifle 'hunches' and the scope of different perspectives, in which case decision making may become sterile. [93]

Hierarchies and Networks: Shall the Twain Meet?

Although it has been concluded that AI will aid, rather than replace the human commander, generalship by the individual is challenged by another element of the information age, namely the network. In order to perform proficiently the command process has to adapt to changed circumstances. Napoleon's command system and the organisation of his forces, particularly the corps system, was an adaptation to the level of information available, and to the size and dispersal of the forces he commanded. [94] Today, information technology is facilitating the greater development of networks. In theory, the main challenge posed to traditional concepts of command emanates from the inability of hierarchical command structures to deal effectively with opponents who's C^2 is based upon a network form of organisation.

The RMA literature concerned suggests that a pure network possesses the following characteristics: all individuals are equal and autonomous, and all possible lines of communication

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[91] Kirin, p19.
[92] See Harig, p138.
[93] ibid, pp138-139.
[94] van Creveld, *Command in War*, p72.

can be used. A network has no single commander, rather it has multiple leaders, and decision making is conducted through consultative consensus-building. [95] The advantages that such an organisational structure holds over a hierarchy are that a network is far more adaptive and flexible in the face of changing circumstances. The rationale for this latter point is that information and the corresponding decisions do not have to flow up and then down a hierarchical chain. The individual units operate within a common consensus-based vision, but within that unifying objective they are autonomous. The absence of a head or single decision maker, and the existence of many lines of information flow, in theory makes an organisation far more robust and survivable. It is not vulnerable to decapitation. [96]

At first glance the network command structure does appear to present an attractive alternative to the hierarchy. Yet there are a number of problems and concerns with implementing such a structure into the environment of war. The first problem relates to the nature of humans. The notion of decision making by consensus is optimistic at best, and may in fact be no more than a utopian ideal. Attempting to achieve consensus amongst a group of humans, especially under the duress of a fast moving battle, would in all likelihood prove a forlorn objective. Jomini actually comments on this dilemma by noting that decision making by consensus often tends towards the lowest common denominator, and therefore creates decisions which are devoid of risk. [97] Conceivably, attempts to reach a consensus could also slow down the decision making process.

It is also important to remind ourselves of some of the human qualities required for command. These include moral courage, cognitive complexity, and a sufficient understanding of humanity. These traits are clearly not possessed by all. [98] Yet, the pure network structure appears to indirectly imply that everyone can possess these necessary command characteristics. To reiterate an earlier point, warfare will continue to be an activity characterised by men on the ground. Not all of these men will posses the qualities required for leadership and command. Consequently, they will need to be led, and this mitigates against the development of pure network

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[95] Arquilla and Ronfeldt, *The Advent of Netwar,* p45.

[96] See Bodnar and Dengler, pp93-107, and Arquilla and Ronfeldt, *The Advent of Netwar,* (Santa Monica, RAND, 1996).

[97] Handel, *Masters of war,* p155.

[98] Reisweber highlights the challenge of cognitive complexity in the art of command. See Reisweber, pp50-51.

command structures.

By its nature the network command structure is one in which decision making is highly decentralised. Although decentralisation of decision making is generally considered to a useful command philosophy, decentralisation can be taken to unnecessary and ruinous extremes. Philip Katcher notes that at Gettysburg JEB Stuart was given too much autonomy. This autonomy, combined with what William C. Davis describes as JEB Stuart's natural desire for 'flash and dash', meant that his cavalry failed to make any impact upon the decisive battlefield. [99] General Franks, who commanded VII Corps in the 1991 Gulf War, postulates that the art of command lays in balancing the central direction of the commander's intent with decentralised decision making. [100] General Schwarzkopf has been criticised for giving his commanders too much leeway in the Gulf War. In particular, concerns have been raised over his "penchant to allow each service to fight the war as it saw fit." [101] Equally, the escape of much of the Iraqi Republican Guard is put down to the fact that Schwarzkopf failed to send his Third Army commander, Yeosock, to the front line to directly oversee the advance of XVIII and VII Corps. Gordon and Trainor contend that this was an inappropriate decision since Schwarzkopf knew that General Franks was known not to be aggressive. [102] This example not only highlights the dangers inherent in decentralization, but in the case of Yeosock also reveals the value in having the commander at the front to supervise and inspire his subordinates. In light of these thoughts, the institutionalisation of a totally decentralised command process would seem inappropriate. Although decentralisation could become even more important in an information age battle, the whole enterprise must still be conducted within the framework of the commander's intent and vision. This vision, to reiterate a point, is the product of a complex cognitive process and the determination and leadership to see it through. A commander must retain the ability to intervene if required to keep everyone in pursuit of his intent. Although, of course, a commander must be disciplined and resist the temptation to micromanage the battle.

The debate over command structures in the information age does not have to be an

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[99] See Katcher, p26, and William C. Davis, *The American Civil War: A Historical Account of America's War of Secession*, (London, Salamander Books Ltd., 1996), p401.
[100] Franks, p12
[101] Gordon and Trainor, p74.
[102] ibid, p431.

either/or dilemma between the hierarchy and the network. In a comparable manner to which AI and human commanders can complement each other, so there exists a possible compromise that draws upon the strengths of both hierarchies and networks. The result is a hybrid structure. [103] One such possibility is the 'Command Network'. The essential ingredients of the command network are: it retains a hierarchical structure, but there is a free flow of information horizontally or vertically, or information can jump echelons as the task at hand requires. This flow of information enables a more flexible and quicker adaptation to events, because those who need the information can get it, and therefore those who are part of the decision making process at anytime, whatever echelon they are operating at, can retrieve the information they require. Whilst retaining the essence of a hierarchy, the command network is designed to be a flexible structure that changes form as required. The ethos of this particular command structure follows the theory of 'command by negation', in which the higher commanders only intervene when necessary. Decisions are made in a hierarchical framework due to time pressures. [104] Both van Creveld and Rosen concur on the point that centralised planning enables quicker decision making. [105] This latter point would seem to indicate that there is some disagreement over whether a network or a hierarchy can produce quicker decisions. [106] As is often the case, the answer to this particular quandary may lay somewhere in the middle. The command network, working through a system characterised by the free flow information and decentralisation of decision making, but retaining the basic hierarchical ethos, can facilitate a process in which decisions are made at the appropriate level. To function correctly such a system relies upon a clear common doctrine of command, and disciplined commanders who are prepared to command by negation.

Those familiar with military history will note that the ethos of the command network has familiar elements to it. Decentralisation of decision making, operating within a commander's broad vision, has been the hallmark of many successful command methods of the past. In

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[103] For a discussion of hybrid command structures see Arquilla and Ronfeldt, 'Looking Ahead: Preparing for Information-Age Conflict', pp439-501. Indeed, Arquilla and Ronfeldt suggest that success in future war will depend on learning to interlace hierarchical and network principles. See 'Cyberwar is Coming', p27. See also *FM 100-6*, p1-12

[104] The concept of the Command Network is developed in Bodnar and Dengler.

[105] van Creveld, *Command in War*, p98, and Rosen, p39.

[106] Westmoreland makes reference to sluggishness of information transfer at times in the hierarchical command chain. Westmoreland, p269.

particular, both sides in WWI operated such a system later in the war. [107] This command culture is also at the heart of the USMC's doctrine of 'Maneuver Warfare' and 'mission tactics'. [108] However, the information age does present some opportunities for change and improvement on this traditional system. The free flow of information potentially empowers lower echelons, and allows them to ensure that their local initiatives stay co-ordinated within the overall effort. A more direct information-sharing relationship between the higher and lower levels of command may induce other changes, including the removal of some of the middle echelons of the command structure. [109]

Conclusions

Technological (AI) and organisational (networks) developments of the information age, as well as the character of future war, suggest that command as it is practiced today may have to adapt. Certainly, the digital imperative could lead to an increased use of AI as a significant aide to the human commander. [110] However, despite these coming developments, command will still retain many of its essential attributes from the past. Warfare, and therefore command, will remain essentially human and political activities. In this context, the presence of humans in the art of command, and in particular the requirements for leadership and strategic judgment, will ensure that the future will not be without great individual figures to whom the title genius is attributed. *Warfighting* persuasively argues "our philosophy of command must be based on human characteristics rather than on equipment and procedures." [111] Leaving humans as the primary actors in command will also help insure against possible failures of network information systems or silicon-based commanders. A human commander will still be able to rely upon his initiative

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[107] See Griffith, and Charles Messenger, *The Art of Blitzkrieg*, 2nd Edition, (London, Ian Allan Ltd., 1991), Chapter 1 'Origins'.
[108] Hayden, pp68-69.
[109] See 1st Lieutenant Gary A. Vincent, 'A New Approach to Command and Control: The Cybernetic Design', http://www.cdsar.af.mil/apj/vincent.html This is a point also made by Arquilla and Ronfeldt in 'Looking Ahead', p463.
[110] See *FM 100-6*, p1-5.
[111] Hayden, p69.

and intuition even in the absence, or overabundance, of information. [112] The USMC's doctrine manual *Warfighting* has identified an appropriate balance between humans and computers in the functions of command: "where judgment is needed you need people; where the rapid retrieval and manipulation of data is needed, you need computers." [113] Greater transparency may enable more effective C^2 of troops, but it will not ensure inspired leadership. [114] The RMA literature concerned with command tends to make the same error as that which comments on operations more generally, too much emphasis and expectation is placed upon increased levels of information. This is typified by Leonhard's assertion that command is all about information flow, and that this alone should dictate who makes the decision. [115] As this chapter has argued, command is concerned with much more than simply having the right information. Much of the RMA literature on command regards more information as a panacea for the difficulties of dealing with uncertainty. Greater knowledge can undoubtedly help a commander, but it cannot eliminate uncertainty, nor guarantee success. In fact, Marshall warns that the desire for more information has often overburdened commanders at the lower echelons. [116] You must be careful what you wish for.

This chapter has concentrated primarily upon battle command. Other military activities, such as those that fall under the rubric of small wars, may well require an even greater degree of human involvement in the art of command. In such operations the political component is often more immediately prominent, and consequently the situation may be far more sensitive. [117] Likewise, a commander may have to consider the human dimension not only in relation to his troops, but conceivably with regard to a civilian population as well. [118]

The increased flow of information will empower lower echelons and facilitate the adoption of a more network-based command structure. This fact, alongside the character of future war, can only enhance the requirement for decentralisation of decision making down to the lowest possible levels, but always operating within the broader vision of the commander. The many

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[112] Marshall, 93.
[113] Hayden, p191.
[114] *FM 100-6*, p1-14.
[115] Leonhard, p201.
[116] Marshall, p93.
[117] Gray, *Modern Strategy*, p284.
[118] Mao was acutely aware of the need for his troops to treat the local populace with respect.

attributes required for conducting command effectively, such as the need for leadership, moral courage, and cognitive complexity, mean that command cannot be performed by all. This leads to the conclusion that pure networks are ill suited to the demands of battle command. Somebody in the end will have to lead. However, the possibilities inherent in the network structure may enable the stripping away of intermediate echelons. Although they are correct to highlight the advantages of hybrid systems, Arquilla and Ronfeldt's tendency to equate success with the use of certain command systems is reductionist. As Gray notes, strategy is a multidimensional activity, and success requires competence in all of the dimensions. [119] Similarly, Griffith notes how the whims of the individual commander and friction more generally can influence the performance of the military instrument, regardless of established systems and operating procedures. [120]

Keegan is undoubtedly correct when he claims that the requirements of command are different over time and between cultures. [121] This truism could facilitate a different approach to command in the information age. Yet, AI commanders can only ever be decision makers. An AI general would be rational, calm, and able to make quick decisions, and could also posses boundless energy. Yet, in the final analysis it is important to remember that good commanders of the past were never just decision makers. They were also, and perhaps more importantly, leaders. In this respect, an AI commander could perform well in some aspects of the external functions of command. This relates especially to the requirement for speed in decision making, although acts of deception, as well as an inability to understand the traits of opposing generals, cast doubts over whether AI could produce the appropriate decisions. When assessing the potential of non-human commanders it is the internal functions that raise the main concerns. Philip Katcher, quoting John W. Thomason, reminds us that the Confederate armies were led by personalities. [122] As mentioned earlier, the key to leadership is the projection of personality. The significance of leadership is exemplified by the following definition of leadership in *Warfighting*: "Leadership is the personal ability to influence the performance of human beings in the pursuit of a goal." [123] The manual goes

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[119] Gray, *Modern Strategy*,
[120] Griffith, p27.
[121] Keegan, *The Mask of Command*, p1.
[122] Katcher, p7
[123] Hayden, p130.

on to observe that the function of the operational commander is to decipher when and where his presence is required most. [124] War is about many things aside from just what happens on the battlefield. As de la Billiere is aware, commanders have to consider post-conflict settlements during a campaign. This brings them into contact with issues relating to political, moral, legal, socio-economic, and cultural factors. Despite the changes that may characterise the information age, command in war will remain predominately an activity in which the human individual is paramount. The most succinct advice on the art of command once again comes from the USMC: "our philosophy of command must be based on human characteristics, rather than on equipment or procedures." [125] The art of command in the future must also reflect the nature of warfare. Therefore, the attributes that constitute a military genius will continue to represent the most important traits for command in the information age, because the nature of war will remain essentially the same.

[124] ibid, p130.
[125] Hayden, p69.

Chapter 4

How Strategic is Strategic Information Warfare?

"Our security, economy, way of life, and perhaps even survival, are now dependent on the interrelated trio of electrical energy, communications, and computers." [1]

Introduction

Potentially the biggest change to the existing character of warfare, and therefore also the most substantial challenge to the nature of war, is posed by Strategic Information Warfare (SIW). The ability to conclude wars by attacking the National Information Infrastructure (NII) of an enemy through cyberspace, would seem to question significant aspects of the nature of warfare as outlined in Chapter One. Like strategic bombing, SIW seeks to bypass enemy surface forces to strike directly at the perceived enemy Centre of Gravity. However, whereas air power still works through the application of destructive firepower and physical force, SIW primarily operates through such non-violent means as 'malicious software' and electromagnetic pulses. [2] In this sense, SIW does not constitute an act of physical violence, nor does it involve any real degree of physical exertion. Although destruction can be the final result of SIW, for example by causing plane crashes through the disruption of air traffic control systems, the instrumental aim of SIW is more often than not to create strategic effect via disruption rather than destruction.

As the opening quotation of this chapter reveals, critical importance is being attached to the security of the NII. The potential vulnerability of the NII to SIW attacks has spurred a great deal of literature and speculation. However, in a strategic context merely

[1] *The President's Commission on Critical Infrastructure Protection: Report Summary*, http://www.info-sec.com/pccip/web/summary.html

[2] There is an ongoing debate about what actually constitutes 'information warfare'. It is certainly true that NIIs can be attacked by physical acts of destruction. However, Schwartau has defined (pure) information warfare as "the total absence of bombs, bullets, or other conventional tools of physical destruction." See Schwartau, p464. Although it is accepted by this thesis that SIW can be waged with conventional tools of physical destruction, this chapter will test the strategic efficacy of SIW in its 'pure' form. Schwartau's information warfare poses the greatest challenge to the nature of warfare. Also, even if SIW contained some limited instances of conventional physical attacks, the change in the character of warfare would still prove substantial if malicious software and its like comprised the majority of the attacks.

identifying vulnerability is not enough. As Gray notes: "The strategic thinker must ask 'So What?' and 'How?' when presented ... [with] the latest wonder weapon.". [3] SIW will only substantially change the nature of warfare if it proves to be independently strategically effective. As Robert A. Pape notes in relation to coercive air campaigns, measuring success "is not about assessing *combat* effectiveness but *strategic* effectiveness." [4] In this respect, Wylie rightly criticises strategic bombing theory for assuming that destruction equals 'control'. [5] If SIW does not prove to have independent strategic decisiveness, then other, more conventional (physical and violent) forms of warfare will maintain their role. That being the case, the traditional nature of warfare will remain. Although, the fact that SIW exists at all may call for some revision of our perspective on the nature of war. Consequently, when trying to assess whether SIW will change the nature of war, the question that acts as the title of this chapter is central. To restate, 'how strategic is strategic information warfare?'

To answer the above question, this chapter will firstly, and briefly, explain what the term 'strategic' means. Like 'nature', strategic is a term that is often misused or used loosely in the literature. From that foundation the chapter will proceed to establish what constitutes SIW. This will include an outline of its perceived potential, the various weapons and methods of waging it, target sets, and any other pertinent features of this method of warfare. The most glaring problem to be faced when assessing the strategic efficacy of SIW is the absence of any historical examples of a comprehensive campaign. The history books are not completely vacuous though. There is a substantial history of hacker activities, as well as examples relating to the insertion of viruses or worms into systems, while exercises such as 'Eligible Receiver' provide us with some sense of the potential of SIW. However, the absence of a comprehensive SIW campaign means that as a strategic instrument SIW is untested. One way to overcome this problem is to use the theory and practice of strategic bombing as an instructive case. Such a comparison is justifiable on the grounds that the theory, objectives, and target-sets of the two forms of warfare are very similar. In 1963 Noble Frankland noted that the British strategic bombing offensive against Nazi Germany

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[3] Gray, *War, Peace, and Victory*, p23.

[4] Robert A. Pape, 'The Limits of Precision-Guided Air Power', *Security Studies*, Vol. 7, no. 2, Winter 1997/98, p95.

[5] Wylie, p61.

was the logical successor to naval blockade. [6] It may be the case that SIW proves to be the next evolutionary step in strategic warfare, and thereby serves as the successor to strategic bombing. [7] In order to facilitate this comparative approach the theory behind strategic bombing will be presented to reveal the similarities with SIW. From this, a brief history of strategic bombing will show how it has thus far failed to act as an independent war-winning strategic instrument. At this juncture, it is worth noting that the vulnerability of societies to strategic bombing has often been overestimated. [8] Likewise, even if vulnerability to physical destruction exists, as in the case of Japanese cities to American incendiary attacks in World War Two, this vulnerability does not necessarily translate into strategic success. A number of reasons are presented which have reduced the efficacy of strategic bombing. The chapter will then examine whether the factors that have plagued strategic air campaigns will likewise negatively affect SIW, and to what degree they will reduce its strategic efficacy. Of course, SIW is a distinct method of waging war, and therefore it has a number of unique characteristics. Again, these characteristics will be assessed in order to determine whether they reduce or increase the strategic effect of this method of waging war.

'Strategic' Errors

The following statement by Colonel John A. Warden well illustrates the tendency to misuse the term 'strategic': "strategic warfare is a different animal than the warfare we have known throughout history." [9] All warfare, past, present, or future, has strategic effect. Meaning, that the war is merely a *means* to a policy *end*. In this respect, Clausewitz defined strategy as "the use of

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[6] Quoted in Keaney and Cohen, p90.

[7] See the discussion on the following page regarding the ambiguities surrounding such terms as 'strategic warfare'.

[8] For example, in the official history of Britain's air offensive against Nazi Germany, Charles Webster and Noble Frankland note that the vulnerability of the German economy was overestimated, as was the operational capability of Bomber Command. See Sir Charles Webster and Noble Frankland, *The Strategic Air Offensive Against Germany 1939-45, Volume III: Victory, Part 5*, (HMSO, London, 1961), p285.

[9] Colonel John A. Warden III, *The Enemy as a System*, http://www.airpower.maxwell.af.mil/airchronicles/apj/warden.html

engagements for the object of the war." [10] Mark J. Conversino's article *The Changed Nature of Strategic Air Attack* illustrates some of the confusion surrounding this issue. Conversino correctly notes that strategic should not be applied, as it is in some cases, merely on the basis of a weapon's range or the nature of its intended targets. Instead, Conversino offers the following definition of strategic attack: "The offensive employment of airpower assets to allow the joint force to achieve a decision with minimum contact between opposing military forces, by striking targets that most generally and directly relate to the opponent's ability to maintain military forces in the field as well as his will to resist." [11] With this interpretation Conversino has correctly moved a considerable distance from some strategic bombing advocates who would not apply the term strategic to attacks against enemy military forces. Rather, they would reserve the term for attacks against enemy centres of gravity, which in their perspective relates to the inner rings of Warden's five-ring model. These inner rings comprise leadership, organic essentials, infrastructure, and population. [12] However, the above definition still clings to the notion that strategic attacks are somehow more direct in their application than other forms of attack. Whereas, in fact, a British infantryman attempting to break through German trenches at Neuve Chapelle on 10 March 1915 is still undertaking a strategic attack. His efforts may not be as immediately decisive as other actions, yet he still represents a *means* to an *end*. More direct routes to victory are no more strategic than less direct ones, perhaps they just represent better strategy. Although, as Vegetius notes, in certain circumstances a protracted route to victory can serve as the most appropriate strategy. [13] For example, it can be argued that a more direct North Vietnamese strategy would have been counterproductive during much of the United States' involvement in Vietnam. An overt invasion of South Vietnam would have constituted a clear violation of the Geneva Accords, which conceivably could have solidified United States and Western opinion against the North. Had this occurred during the early period of the United States' involvement, America's resolve may have proved more robust. Furthermore, a more direct conventional attack would have played to the

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[10] Clausewitz, p146.

[11] Mark J. Conversino, *The Changed Nature of Strategic Air Attack*, http://carlise-www.army.mil/usawc/Parameters/97winter/conversi.htm

[12] See Warden, *The Enemy as a System*.

[13] Vegetius, p81.

strengths of United States forces and doctrine.

If, as is argued above, 'strategic' refers to all military instruments that serve as means to a policy end, then why do certain forms of warfare, such as strategic bombing and SIW, have 'strategic' as an integral part of their name? In the case of strategic bombing, and potentially in reference to SIW, strategic is used to imply a direct and independent relationship between the means and ends. For example, in reference to strategic air power, Billy Mitchell, one of the three great theorists of the interwar period (the other two being Giulio Douhet and Hugh Trenchard), was explicit about the independent potential of air power: "The old theory that victory meant the destruction of the hostile main army, is untenable. Armies themselves can be disregarded by air power if a rapid strike is made against the opposing centers." [14] In a similar vein, Douhet predicted that air power could "strike mortal blows into the heart of the enemy." [15] Although, in line with the views of Gray, this author regards such a use of the term strategic as misleading, this chapter will test the strategic efficacy of SIW *on its own terms*, namely that it can be independently decisive. [16]

What is Strategic Information warfare?

Before analysing the potential strategic potency of SIW, it will prove profitable to examine its characteristics, and in particular its presumed potential. Within the academic literature, government circles, and in the media, the existence of SIW as a distinct method of waging war has been increasingly legitimised. [17] In the wake of a series of RAND war-gaming exercises, Molander *et al* were emphatic that SIW should be taken seriously as a strategic concern: "new strategic threats and new strategic vulnerabilities surface. It is increasingly clear ... that the evolution in strategic warfare will include a dimension of cyberspace threats and vulnerabilities

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[14] Quoted in Richard P. Hallion, *Storm Over Iraq: Air Power and the Gulf War*, (Washington, DC, Smithsonian Institution Press, 1992), p7.

[15] Giulio Douhet, *The Command of the Air*, (London, Faber and Faber, 1943), p18.

[16] For a sensible discussion of the semantics surrounding strategy, and the meaning of strategy in general, see Gray, *War, Peace, and Victory*, especially Chapter 1.

[17] For example, see Matthew Campbell, 'US at Mercy of Cyber Terrorists', *The Sunday Times*, 17 May 1998, p26.

worthy of the label 'strategic information warfare'." [18] This sentiment is echoed in James Adams' book *The Next World War: The Warriors and Weapons of the New Battlefields in Cyberspace*, in which he declares that SIW could inflict 'strategic' damage on the United States. [19] Just as starkly, Kenneth A. Minihan, the then Director of the National Security Agency, states: "Dependency on IT has become a clear and compelling threat to our economic well-being, our public safety, and our national security." [20] At the governmental level, aside from the concern expressed via the creation and findings of the President's Commission on Critical Infrastructure Protection, operational 'cyber' forces have been established. These forces include the recently formed 'Joint Task Force on Computer Network Defense' (JTF-CND), and the USAF's 609th Information Warfare Squadron. [21] Concern over SIW is not restricted to the United States. In March 2001, Robin Cook (British Foreign Secretary) told the House of Commons: "A computer-based attack could cripple the nation more quickly than a military strike." [22]

There is a considerable body of evidence that seems to justify the identification of this new method for waging war, and the subsequent formation of such units as those described above. It has been estimated that as far back as 1995, (which is a considerable passage of time in the world of computers, and especially in reference to the development of cyberspace) the Department of Defense's computers were subject to approximately 250 000 hacker attacks in that year. Such figures only represent attacks that are detected. The actual number of attacks is likely to be significantly greater. The General Accounting Office (GAO), which compiled a report on this issue, declared that these attacks could pose a serious threat to the national security of the United States. [23] Recent exercises, designed to simulate a SIW attack, have produced some

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[18] Molander *et al.*

[19] Adams, *The Next World War*, p184. Note once again the loose usage of the term 'strategic'.

[20] Kenneth A. Minihan, 'Defending the Nation Against Cyber Attack: Information Assurance in the Global Environment', in *CyberThreat: Protecting US Information Networks, USIA Electronic Journal*, Vol. 3, No. 4, November 1998, http://usinfo.state.gov/journals/itps/1198/iipe/toc.htm

[21] See Bryan Bender, 'US Cyber-Defence Task Force is Now Operational', *Jane's Defence Weekly*, Vol. 31, no. 3, 20 January 1999, p4, and Chris O'Malley, *Information Warriors of the 609th: Air Force's 609th Information Warfare Squadron*, http://www.infowar.com/mil_c4i/mil_c4i_100397a.html-ssi See also Mark Walsh, 'US Task Force Promotes Cyber Crime-Fighting Team', *Defense News*, September 15-21, 1997, p20.

[22] George Jones and Michael Smith, ['Hacking is Now Bigger Threat Than Terrorism'], *The Telegraph*, 30 March 2001, www.telegraph.co.uk/et

[23] *GAO Executive Report - B-266140*, http://www.infowar.com/civil_de/gaosum.html-ssi

significant results that would seem to tally with the GAO's conclusions. For example, during the June 1997 exercise 'Eligible Receiver', National Security Agency (NSA) computer specialists launched an attack against Pentagon computers, and allegedly could have shutdown the C^2 structure of Pacific Command, as well as the United States' entire electrical infrastructure and air traffic control systems. During 'Eligible Receiver' military logistic operations were also disrupted. [24] Alongside this evidence that infrastructure attacks do occur, and that they can potentially cause significant damage, there is increasing evidence that these capabilities can, and are being acquired. The aforementioned GAO report indicates that over one hundred and twenty countries are developing computer attack capabilities. Likewise, the NSA reports that potential adversaries of the United States are collecting intelligence on the United States' systems and the methods required to attack them. [25] The proliferation of SIW capabilities is possibly unique, in that the hardware and software required to wage it are readily available, even to individuals. [26] A computer is the epitome of dual-use technology, and the various hacking software and techniques are widely available on the Internet. [27] These facts have led Adams to declare that the 'Hacker Chronicles', a CD-ROM of hacker tools and information, is a weapon of war. [28] Winn Schwartau concludes: "the informed reader now can assume capability..." [29]

The techniques and weapons of SIW are quite varied. [30] They include various forms of 'malicious software', including viruses (which themselves include polymorphic viruses which

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[24] Bill Gertz, 'Pentagon Fortifying Computer Networks to Block Hackers', http:www.washtimes.com/nation/national.html, and Adams, *The Next World War*, pp187-188. A comprehensive resource detailing a vast range of hacker activities, as well as general information on computer security issues and information warfare generally can be found at Infowar.com As an aside, it is important to note that many of these figures have been questioned. See in particular George Smith, 'An Electronic Pearl Harbour? Not Likely.', *Issues in Science and Technology Online*, Fall 1998, http://205.130.85.236/issues/15.1/smith.htm

[25] See *GAO Executive Report.*

[26] Robert Anderson reports that the capabilities required to conduct SIW attacks are quite widespread. See Robert H. Anderson, *Securing the US Defense Information Infrastructure: A Proposed Approach*, http://www.rand.org/publications/mr/mr993

[27] The accessibility of SIW capabilities is stressed in the GAO report, as well as by John M. Deutch (former Director of Central Intelligence), see John M. Deutch, 'Foreign Information Warfare Programs and Capabilities', *Statement for the Record to the U.S. Senate Committee on Governmental Affairs; Permanent Subcommittee on Investigations*, 25 June 1996.

[28] Adams, *The Next World War*, pp162-163.

[29] Schwartau, p400.

[30] It is not the intention of this thesis to provide a detailed description of each form of SIW weapon. For such details see the following sources: Schwartau, Adams, Infowar.com, and Douglas Waller, 'Onward Cyber Soldiers', *Time*, Vol. 146, No. 8, August 21, 1995.

change appearance in order to complicate the job of anti-viral software), logic bombs, and trojan horses. Alternatively, one may wish to resort to 'chipping', or a 'Denial of Service' attack by flooding an enemy system with e-mail. There is also the increasing threat of EMP devices. Carlo Kopp has described these weapons as the nuclear weapons of the information age in reference to the enormous and wide-scale damage they can inflict on electrical systems. Kopp notes that commercial networked computer systems are particularly vulnerable to this form of attack. [31] SIW techniques can be quite varied and indirect. For example, Adams notes how one might attack the computers underlying the Stock Exchange by manipulating the air conditioning within the building and thereby create enough heat to impair the functions of the computers. [32]

Like the techniques and tools for waging SIW, the target sets are also varied. The PCCIP categorises five main target sets. These are Information and Communications; Banking and Finance; Energy and Power production; Physical Distribution; and Vital Human Services. [33] A factor central to the scale of vulnerability is, as Molander *et al* suggest, that post-industrial societies rely upon interconnected network control systems. [34] In this vein, Frank j. Cilluffo and Curt H. Gergely postulate that "virtually every facet of an industrial nation's existence depends upon a functioning telecommunications system and the interconnected, networked information systems..." [35] Often highlighted as a key target and vulnerability is the Public Switched Network (PSN). [36] As will be shown later, the overlap in some of these target sets with those of strategic bombing is both evident and quite significant, as is the identification of key node targets such as the PSN. Just as apparent in both methods of waging war is an emphasis placed upon the interconnectedness of modern societies and economies.

There does appear to be enough evidence to support the notion that SIW does

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[31] See Kopp. A description of the growing availability and capabilities of non-nuclear EMP devices can be found in Adams, *The Next World War*, pp149-51.
[32] Adams, *The Next World War*, p175.
[33] See PCCIP. Schwartau produces a similar list of targets. He identifies four main categories, which are: the power grid, communications infrastructure, the financial infrastructure, and the transportation infrastructure. See Schwartau p43.
[34] Molander *et al.*
[35] Frank j. Cilluffo and Curt H. Gergely, 'Information Warfare and Strategic Terrorism', *Terrorism and Political Violence*, Vol. 9, No. 1, Spring 1997, p87.
[36] Kevin Soo Hoo, Seymour Goodman, and Lawrence Greenberg, 'Information Technology and the Terrorist Threat', *Survival*, Vol. 39, No. 3, Autumn 1997, p141.

indeed constitute a new method of waging war. The capability evidently exists. This has led some commentators to make extravagant pronouncements concerning the strategic impact of SIW. The United States Joint Chiefs of Staff (JCS) proclaimed in 1996 that the convergence of vulnerable information infrastructures with traditional critical infrastructures had resulted in a "tunnel of vulnerability previously unrealised in the history of conflict." [37] It is interesting to note, in relation to strategic bombing, that in the eyes of the JCS the addition of information infrastructures takes us beyond the vulnerability of strategic bombing theory. Timothy L. Thomas is also guilty of making extraordinary claims concerning the potential of SIW when he claims that the consequences of an attack are comparable to those of a nuclear weapon, but without the physical destruction. [38] Robert L. Ayers, chief at the Centre for Information Systems Security, DISA, concludes that "we are not prepared for an electronic Pearl Harbour." [39] Finally, and perhaps most interestingly, a Joint DoD-DCI Security Commission claimed: "This technology is capable of deciding the outcome of geopolitical crises without the firing of a single weapon." [40] This last statement in particular may be guilty of equating operational capability with direct and independent strategic effect. As the following section on strategic bombing will show, this link is far from guaranteed.

SIW: Resurrecting an Old Face of War

The old face of war in question is strategic bombing. Before giving a brief history of strategic bombing, and the many reasons why it has failed to reach the dizzy heights set by some of its proponents, the theory of strategic airpower will be outlined to reveal the similarities between it and SIW.

Following John Pimlott's definition, at its simplest strategic bombing is "the aerial

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[37] Quoted in Andrew Rathmel, 'Cyber-Terrorism: The Shape of Future Conflict?', *RUSI Journal*, October 1997, pp42-43.
[38] Timothy L. Thomas, 'Deterring Information Warfare: A New Strategic Challenge', *Parameters*, Vol. XXVI, No. 4, Winter 1996-97, p90.
[39] Quoted in John C. Coale, 'Fighting Cybercrime', *Military Review*, Vol. LXXVIII, No. 2, March-April 1998, p80.
[40] Danial J. Ryan, and Julie J. C. H. Ryan, 'Protecting the National Information Infrastructure Against Infowar', in Schwartau, p628.

bombardment of the enemy's homeland, hitting industrial and civilian targets in hope of destroying the capacity and willingness to wage war." [41] Herein lies the core similarity between the two forms of warfare, both rest their hopes of victory on destroying either the will or capability of the enemy to continue fighting. In conventional bombing the will of enemy populations is designed to be broken by the death and destruction wrought by high explosives (HE), incendiary devices, and possibly as Douhet envisaged, chemical weapons. In SIW, it is envisaged that modern information age societies will not stand firm once their power-generating systems, banking and finance, food distribution, and air-traffic control systems, to name just four targets, cease to function. To reiterate the statement by the PCCIP: "Our security, economy, way of life, and perhaps even survival, are now dependent on the interrelated trio of electrical energy, communications, and computers." [42] Both strategic bombing and SIW rest on the notion that modern, either industrial age or information age, armed forces rely upon a functioning economy back home. In this sense, theories on the vulnerability of target sets are quite striking. The potency of SIW rests heavily upon the interconnectedness of information age networked societies. A similar focus can be found in much of strategic bombing theory. For example, in 1938 at the United States' Air Corps tactical School (ACTS), the 'Air Force' text read: "... the economic structure of a modern highly industrialised nation is characterised by the great degree of interdependence of its various elements. Certain of these elements are vital to the continued functioning of the modern nation. If one of these elements is destroyed the whole of the economic machine ceases to function...". [43] This notion in the United States became known as the 'Industrial Web' theory. [44] As previously noted, in the information age the key node is often identified as the PSN, whereas in strategic bombing theory the critical target may be oil, transportation, or electricity. This belief that certain

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[41] John Pimlott, 'The Theory and Practice of Strategic Bombing', in Colin McInnes and G. D. Sheffield (eds), *Warfare in the Twentieth Century: Theory and Practice*, (London, Unwin Hyman, 1988), pp113-139.

[42] *PCCIP*

[43] Quoted in Tami Davis Biddle, 'British and American Approaches to Strategic Bombing: Their Origins and Implementation in the World War II Combined Bomber Offensive', *The Journal of Strategic Studies*, Special Issue on Airpower: Theory and Practice, John Gooch (ed), Vol. 18, No. 1, March 1995, p111.

[44] See Daniel T. Kuehl, 'Airpower vs. Electricity: Electric Power as a Target For Strategic Air Operations', in Gooch (ed), pp237-266, and Robert A. Pape, *Bombing to Win: Air Power and Coercion in War*, (Ithaca, Cornell University Press, 1996), especially pp62-64.

key nodes exist, and that their destruction will have catastrophic effects on the whole system, is still central to modern air power thinking. For example, in his article *The Enemy as a System*, John Warden stipulates that unless very high stakes are involved, an enemy would capitulate when his power-generation system was destroyed or even put under sufficient pressure. For Warden, the more complex a system the greater the vulnerability of its key nodes. [45] Therefore, we see not only that there exists striking similarities between classical strategic bombing theory and SIW, contemporary air power theory also shares similar notions.

Some of the SIW literature itself identifies these similarities. Douglas Waller draws comparisons between the bombings of cities such as Dresden and Tokyo, and the methods of SIW. He proclaims that SIW may represent a refinement of the techniques used to destroy those cities. [46] When assessing the potential of an E-Bomb attack, Kopp draws parallels with strategic air power theory and in fact utilises Warden's 'five ring' model of the enemy state in his analysis. [47] Arquilla and Ronfeldt are even more explicit in drawing comparisons. They postulate: "In many ways, IW in the coming years may resemble the early phases of aerial bombardment." [48]

The literature on SIW often implies that it represents an independent war-winning instrument. This is an element that is also evident in much of the strategic bombing theory. Of course, Gray is correct to note that judging air power solely upon this criteria is inappropriate in that it fails to recognise the many roles air power can play. [49] Nonetheless, it is a criteria established by some of the air power theorists themselves, and as the recent war against Yugoslavia reveals, by some policy makers also. Most famously, Douhet wrote in the interwar period how air power "can strike mortal blows into the heart of the enemy with lightning speed." [50] In line with the ideas expressed in the writings of theorists such as Warden and Douhet, the practitioners of strategic bombing have expressed faith in its independent war-winning ability. General Spaatz stated in 1945: "In my opinion we can bring Japan to her knees by B-29 bombing

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[45] Warden, *The Enemy as a System*.
[46] Waller, p32.
[47] See Kopp, p323.
[48] Arquilla and Ronfeldt, 'A New Epoch', p14.
[49] Gray, *Explorations in Strategy*, p58.
[50] Douhet, p18. It is interesting to note that in 1929 Douhet wrote that air power may not be the sole factor of victory, but it would still be the decisive one. See p204.

before the ground troops or the navy ever land on the shores of the main island of Japan." [51] Although it is true that Japan surrendered before an invasion of the main island became necessary, as will be argued below, it is debatable whether this was solely down to the B-29s and the bomber offensive. Arthur 'Bomber' Harris, commander of RAF Bomber Command in World War II, shared Spaatz's optimism for an independent victory. Harris commented that "... the Lancaster force alone should be sufficient ... to produce in Germany by 1 April 1944 a state of devastation in which surrender is inevitable." [52]

As the above discussion illustrates, a comparison between the theories of strategic bombing and SIW reveals a number of striking similarities. These include similar target sets, similar objectives, the potential for independent victory, and in particular an emphasis on the vulnerability of interdependent societies and economies. Therefore, it will be instructive to analyse the history of strategic bombing as a guide to the potential strategic efficacy of SIW.

A History of Failure

The 'failure' referred to above is not the failure of air power *per se*, nor is it the failure of strategic bombing to make significant contributions to a war effort. Clearly, both air power in general, and strategic bombing in particular, have proved to be valuable strategic instruments. The particular failure in question refers to the inability of strategic bombing campaigns to produce independent war-winning effects. This section of the chapter is designed to show the level of effort expended in various bombing campaigns from World War Two to the war over Kosovo. Exploring the levels of effort, operational efficacy, and context of the various campaigns, will prove instructive in the following analysis of SIW.

Although urban areas were bombed during World War One, the level of effort was of such a restricted nature that these campaigns do not represent an adequate test of strategic

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[51] Quoted in Kenneth P. Werrell, *Blankets of Fire: United States' Bombers Over Japan During WWII*, (Washington DC, Smithsonian Institution Press, 1996), pp238-9.
[52] Quoted in Ellis, *Brute Force*, p185.

bombing. The significance of these limited raids lies in the lessons that were learned by the interwar theorists. The first notable test for strategic bombing came during World War Two in both the European and Pacific theatres. The British bomber offensive against Nazi Germany suffered from a number of significant limitations for approximately the first three years of the war. Amongst the most important of these were inadequate equipment both in numbers and quality, and various operational problems mainly associated with navigation, weather, and German air defences. However, between March 1943 and March 1944 Bomber Command became operationally mature. Indeed, by 1944, Bomber Command was predominately composed of very capable heavy bombers such as the Lancaster and Halifax III, as well as the Mosquito light bomber. [53] Just as importantly, November 1943 saw the introduction of the P-51 Mustang long-range escort fighter, which could engage the Luftwaffe over Germany and thereby significantly reduced Combined Bomber Offensive (CBO) losses. [54] The CBO entailed attacks against the enemy's morale, primarily through Bomber Command's area bombing campaigns, alongside the United States Eighth and Fifth Air Forces' precision attacks that followed the premise of the aforementioned Industrial Web theory. The most striking example of the latter are the raids against Germany's ball-bearing industry, concentrated mainly at Schweinfurt. Relative to more recent wars, the bombing campaigns in World War Two did not suffer undue restrictions as a result of political or ethical concerns. [55] In this sense, to a great degree, the air commanders were able to conduct the campaigns they desired, albeit within the confines set by operational limitations.

Therefore, in the latter stages of the war against Germany, the CBO had both the instrument and the will to launch enormous raids against German cities and industry that inflicted staggering levels of destruction. In all, the Allies dropped 1.2 million tons of bombs on Germany,

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[53] Terraine, p513 and p605.

[54] Richard Overy, *Why the Allies Won*, (London, Pimlico, 1996), p123.

[55] This point is recognised by the official United States Army Air Forces' history, which notes that the air commanders enjoyed great latitude in conducting their campaigns. See John E. Fagg, 'The Climax of Strategic Operations', in Wesley Frank Craven and James Lea Cate (eds), *The Army Air Forces in World War II, Volume Three, Europe: Argument to V-E Day January 1944 to May 1945*, (Chicago, The University of Chicago Press, 1951), p721. The lack of 'negative' objectives in World War Two is also noted by Mark Clodfelter, in *The Limits of Air Power: The American Bombing of North Vietnam*, (New York, The Free Press, 1989), p4.

destroyed over forty percent of the urban areas of its seventy largest cities, and killed roughly 305 000 of its civilians. [56] The intensity of this effort is also worthy of note. Most of the tonnage, seventy two percent, was dropped after 1 July 1944. [57] The levels of destruction that could be inflicted by such an instrument are typified by the fire-storm at Hamburg on July 27-28 1943. This attack, which to a large extent became the model for future area-attacks, killed fifty thousand Germans, and destroyed sixty one percent of Hamburg's housing. [58] Of course, this operation was repeated on a larger scale at Dresden in February 1945. Referring to its narrow streets of timber houses, Harris described Dresden as "built more like a fire-lighter than a human habitation." [59]

Alongside these area-attacks, designed to break the will of the German population, various key-node targets were identified and attacked. There was at the time, and still is amongst historians, a great deal of debate regarding which, if any, target set represented the Achilles' heel of the German economy. The debate usually focuses upon oil and the railways. [60] What is certainly true is that both of these target sets were severely crippled towards the end of the war. For example, by April 1945, German oil production stood at five percent of its pre-attack levels. [61]

Ultimately, although the strategic bombing campaign against Germany contributed significantly to the Allied war effort, it took a crushing land campaign into the heart of the Reich to bring final victory. The area bombing offensive never succeeded in breaking German morale. Also, it is worth noting that despite the bombing, by March 1945 German armament production was still fifty percent above its January 1942 level. [62] Just as significantly, Pape notes that oil shortages resulted from a number of factors aside from the strategic bombing campaign. These included pressure from ground campaigns which compelled German forces to consume oil; the seizure of German oil fields in Rumania by Soviet land forces; and the collapse of the German

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[56] Pape, *Bombing to Win*, pp254-255.
[57] Fagg, 'Mission Accomplished', in Craven and Cate (eds), p787.
[58] Terraine, pp546-547.
[59] ibid, p677.
[60] For example, Alfred C. Mierzejewski has identified the railways as the key target, whereas Max Hastings regards synthetic oil as the jugular vein. See Alfred C. Mierzejewski, *The Collapse of the German War Economy 1944-45: Allied Air Power and the German National Railway*, (Chapel Hill, The University of North Carolina Press, 1988), and Max Hastings, *Bomber Command*, (London, Michael Joseph, 1979), p223.
[61] Fagg, 'Mission Accomplished', p794.
[62] Terraine, p281.

transport system in February 1945 which was due to tactical air power flying from air bases liberated by Allied ground forces. [63] Overall, despite the enormity of the bombing effort, a joint force, multinational war-effort, in which strategic bombing played only a part, defeated Germany.

In many respects Japan presented even more favourable conditions for a strategic bombing campaign. The predominately wooden Japanese cities were ideal targets for incendiary raids. Inadequate air defences, certainly in comparison to those over Germany, compounded this factor. James Lea Cate and Wesley Frank Craven report that Japan never developed effective defences against night raids. [64] The Japanese also had to contend with the B-29 heavy bomber, which proved a very destructive instrument once many of the problems plaguing the programme were mitigated. In addition, United States air commanders had few, if any, significant negative controls placed upon them. It has been noted that Curtis LeMay, the commander of XXI Bomber Command, "generally did as he pleased." [65] Again, in contrast to Germany, Japanese responses to the bombing were slow and mostly inadequate. This was particularly the case with regard to the dispersal of industry in the face of bombing raids, which was enacted too late and was badly organised. [66] Faced with this permissive environment, when the United States' bomber offensive reached its operational maturity, levels of destruction could be wreaked on Japan that equaled, and in some senses surpassed, that inflicted on Germany, and with less expenditure of resources. The B-29s burned 180 000^2 miles of Japanese cities, which related to approximately forty three percent of the sixty-six largest urban areas. In all, this effort killed 330 000, injured 476 000, and destroyed 2.5 million buildings. 56.3^2 miles of Tokyo alone were destroyed. [67]

The strategic impact of the bombing offensive against Japan raises more controversy than the German case. This results primarily from the fact that Japan surrendered before an invasion had to be launched against the mainland. Also, there is some evidence that directly links the decision to surrender to the bombing campaign. For example, Prince Konoye stated:

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[63] Pape, *Bombing to Win*, pp278-279 and p282.

[64] James Lea Cate and Wesley Frank Craven, 'Victory', in James Lea Cate and Wesley Frank Craven (eds), *The Army Air Forces in World War II, Volume Five, The Pacific: Matterhorn to Nagasaki June 1944 to August 1945*, (Chicago, The University of Chicago Press, 1953), p751.

[65] Conrad C. Crane, *Bombs, Cities, and Civilians: American Airpower Strategy in World war II*, (Kansas, University Press of Kansas, 1993), p122.

[66] See Werrell, p230, and Cate and Craven, p752.

[67] For these and other details of the raids see Crane, p140, and Werrell, p227.

"Fundamentally the thing that brought about the determination to make peace was the prolonged bombing by the B-29's." *Premier Suzuki echoed this opinion.* [68] However, to explain the Japanese surrender purely in relation to the efforts of the B-29s falls far short of telling the whole story. For instance, the collapse of the Japanese economy was as much, if not primarily, a result of the sea blockade of the home islands. As Kenneth Werrell notes, the B-29 offensive was bombing an economy already mortally wounded by the blockade. [69] There were other factors that appeared to have influenced the Japanese decision to end the war. A major factor in this respect was the entry of the Soviet Union into the war against Japan, and in particular their defeat of Japan's Kwantung army in Manchuria. [70] Furthermore, it should be remembered that the strategic offensive against the Japanese homeland was conducted from airfields captured by ground and naval forces. Once again, victory in the Pacific War, as in the European theatre, was the result of joint operations.

The American war in Vietnam presents a good example of how strategic air power can be misused. Many of the issues relating to this misuse will be dealt with in the following section of the chapter. Vietnam is also an interesting case because it throws up a whole range of issues concerning the relationship between air power and the political and geographic context of a war. At this stage it is sufficient to outline the basic structure of the air campaigns, and in particular to address the issue of whether the 1972/73 Linebacker II campaign coerced North Vietnam into accepting American peace terms.

Vietnam was a complex war, and precisely defining its strategic nature is difficult to achieve with any degree of certainty. However, it is reasonable to assert that between 1965-1968 the war in South Vietnam was predominantly a guerrilla-based insurgency. This translates into a low requirement for logistical support for the communist forces. To this must be added the fact that North Vietnam was principally an agricultural society and economy. Consequently, within the confines of traditional strategic bombing doctrine, the number of strategic targets was limited. Robert McNamara, President Johnson's Secretary of Defence, was apparently aware of this

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[68] Quoted in Cate and Craven, p756.

[69] Werrell, p233.

[70] This is a point made by Barry D. Watts. See Barry D. Watts, 'Ignoring Reality: Problems of Theory and Evidence in Security Studies', *Security Studies*, Vol. 7, No. 2, Winter 1997/98, pp152-155.

problem. [71] Despite these features of the war, the initial United States bombing campaign, 'Rolling Thunder', remained faithful to the aforementioned 'Industrial Web' theory. [72] Indeed, the Joint Chiefs of Staff advocated a bombing strategy that followed the traditional objectives of breaking the North's will and capability to support the war in the South. [73] Rolling Thunder, which lasted three years, dropped 643 000 tons of ordnance, destroyed sixty five percent of the North's oil storage capacity, fifty nine percent of its power plants, and fifty five percent of its major bridges. [74] A number of factors were involved in limiting the strategic efficacy of the campaign. They include poor strategy, operational problems, and political limitations placed on the campaign. However, it appears that even if many of these errors and problems had been avoided the result would have been roughly the same. The character of the war at that time, an insurgency, allied to the will of the North, made it unlikely that strategic bombing could make any decisive impact on the conflict.

By 1972, the year of the Linebacker campaigns, a number of changes had occurred in the war. The North was conducting a more conventional, regular conflict, as typified by the 'Easter Offensive'; President Nixon had shifted United States objectives, importantly he was now engaged on a policy of withdrawal from the war; there was a significant relaxation of the limitations placed on previous campaigns; the external political environment had changed, reflecting a period of detente between the United States and its two main Communist adversaries, the Soviet Union and China; and the United States was able to employ more precise weaponry, Vietnam saw the first use of Laser-Guided Bombs (LGBs). Important features of the Linebacker campaigns were greatly increased intensity, and the less restricted nature of the effort. The first campaign helped stop the Easter Offensive, and influenced the North's decision to make concessions during peace negotiations, but ultimately failed to produce a lasting settlement. [75] However, it is the second Linebacker campaign, the so-called 'Christmas bombings', which attract

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[71] R. F. Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1961-1984, Volume 2*, (Alabama, Maxwell Air Force Base Air University, 1984), pp259-260.
[72] Diego M. Wendt, 'Using a Sledgehammer to Kill a Gnat: The Air Force's Failure to Comprehend Insurgent Doctrine during Operation Rolling Thunder', http://www.airpower.maxwell.af.mil/airchronicles/apj/4sum90.html
[73] Clodfelter, p75.
[74] ibid, p134.
[75] ibid, especially pp167-168.

the most controversy. Some commentators believe that Linebacker II had finally fulfilled the promise of strategic air power. Admiral Moorer (Chairman of the Joint Chiefs of Staff) concluded: "The 11-day air campaign of December 1972 will, I am certain, go down in history as a testimonial to the efficacy of air power the way it should be used..." [76] In a similar vein, Sir Robert Thompson espoused "In my view, on December 30, 1972, after eleven days of those B-52 attacks on the Hanoi area, you had won the war. It was over! ... They would have taken any terms." [77] In support of Admiral Moorer's perspective, Linebacker II was certainly an intensive campaign. During eleven days of bombing, 20 000 tons of bombs were dropped, some of which were precision-guided. [78] Also, Hanoi, and the principal port of Haiphong were attacked. There are however some important caveats to the enthusiastic assessments above. If one examines the content of the peace accords signed after Linebacker II, it is clear that they were far from being a disaster for the North. In particular, the North was legally permitted to retain troops in the South. [79] Also, the peace agreement did not ensure the sovereignty of South Vietnam for very long, which was conquered by the North in 1975. Indeed, Hawkins declares: "This apparent victory of air power, however, proved hollow. The Hanoi regime had signed a piece of paper, but it was not fundamentally changed in composition or outlook. It remained committed to its goal of conquering the South." [80] Overall, it is difficult, if not impossible, to claim that strategic bombing achieved the goals set for it by the early theorists. Aside from the above argument, it has to be remembered that for North Vietnam Linebacker II came at the end of seven years of ground war against the United States and its Southern ally. Strategic airpower had not been the only form of pressure applied on the Communists.

It may be argued that prior to the 1990s a mixture of operational, political, technological, and organisational factors had retarded strategic bombing campaigns. From this standpoint, the 1991 Gulf War represents an effective test for this method of waging war. In many respects, the Gulf War presented air power with a permissive environment. Despite the density of

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[76] Quoted in Futrell, p270.
[77] Quoted in Futrell, p271.
[78] Clodfelter, ppix-x.
[79] ibid, p199.
[80] William R. Hawkins, 'Imposing Peace: Total vs. Limited Wars, and the Need to Put Boots on the Ground', *Parameters,* Vol. XXX, No. 2, Summer 2000, p78.

air defences around Baghdad, which were seven times as dense as those around Hanoi during Linebacker II, the coalition air forces quickly attained air supremacy, and in this sense could almost bomb at will. [81] The Iraqi air force hardly contested command of the air throughout the war, and Iraq's Integrated Air Defence System (IADS) was neutralised on the first night of the campaign. [82] The Gulf War Air Power Survey (GWAPS) concludes that air superiority was attained by the end of the first night. [83] Aside from good intelligence and operational performance that facilitated the successful air superiority campaign, the Coalition also had a distinct technological advantage. It is claimed that the F-117A has air superiority built in, although the loss of a Nighthawk over Yugoslavia may challenge this view. [84] This event underlines the fragility of any technology to countermeasures. Cruise missiles also enabled the Coalition to keep up the pressure of precision strikes on Iraq throughout the hours of daylight. [85] A range of sophisticated surveillance and intelligence assets gave the Coalition what Colin Powell described as the best intelligence in the history of warfare. [86] Although this might be somewhat of an exaggeration, it is not too far from the truth. The desert environment also provided its usual advantages to the employment of air power. In the political domain, there was very little interference with the campaign, certainly not until the Al Firdos bunker incident on the night of 12-13 February. Before this incident, and unlike Vietnam, there were no sanctuaries for the enemy. [87] The campaign was also well co-ordinated. [88]

These, and other factors, resulted in a strategic campaign that was both of high intensity, and achieved levels of precision and penetration unobtainable in previous wars. The intensity of the campaign is revealed in the fact that approximately seventy percent of the 'strategic' targets were hit in the first three days. [89] The Iraqi electrical power grid was virtually

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[81] For details on the Iraqi air defences, see Hallion, p163.
[82] Williamson Murray, *Air War in the Persian Gulf*, (Baltimore, The Nautical and Aviation Publishing Company of America, 1995), p32.
[83] Keaney and Cohen, pp56-57.
[84] ibid, p245.
[85] ibid, p14.
[86] ibid, p133.
[87] ibid, p220.
[88] ibid, p145.
[89] Pape, *Bombing to Win*, p228.

shut down; eighty eight percent of its installed generating capacity was rendered unavailable, the remaining twelve percent was isolated to particular localities. [90] Added to this, is the fact that within ten days Iraq's refined oil production was totally eliminated. [91]

Nevertheless, despite the range of advantages this campaign had over previous ones, once again a strategic air campaign failed to produce victory independently. The leadership and C^2 campaigns failed to produce the desired coup against Saddam's regime. [92] Although the Iraqi C^2 was seriously degraded, this part of the air war failed in its aim to cripple the regime's C^2 of its forces. Evidence for this can be found in the fact that the Iraqi leadership was able to redeploy its ground forces once the Coalition ground campaign had begun. [93] The GWAPS similarly indicates that Saddam continued to order the launch of Scud missiles to the end of the war. [94] Even more telling is the undeniable fact that the war had to be concluded by ground forces. This is not to underestimate the role played by air power as a very significant enabling factor to the ground war, but merely to note that the enemy did not capitulate to air-based coercion, rather his forces were defeated on the ground. There is no more stark appraisal of this fact than General Calvin Waller's statement: "Let's get real ... ultimately ... you've got to go on the ground and take it back." [95]

The final air campaign to be assessed is both the most recent, and perhaps the most controversial. The NATO bombing campaign against Yugoslavia had a mixture of advantages and disadvantages over its predecessors. On the positive side, NATO had at its disposal levels of precision previously unobtainable. Also, as in the Gulf War, there was never any real challenge to NATO's command of the air from enemy air forces. [96] However, a number of negative factors detracted from the campaign's efficacy. Poor strategy, emanating from poor political judgment at the beginning of the campaign, produced low levels of intensity early on. In this respect, the campaign began to resemble Rolling Thunder with its emphasis on graduated response. This was

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[90] Keaney and Cohen, p73.
[91] Hallion, p193.
[92] This objective is identified by Gordon and Trainor, p474.
[93] See YuLin Whitehead, 'Information as a Weapon: Reality versus Promises', http://www.airpower.maxwell.af.mil/airchronicles/apj/apj97/fal97/whitehead.html
[94] Keaney and Cohen, p70.
[95] Quoted in BBC, *The Gulf War*, Television Broadcast, January 9th, 1996.
[96] For other NATO advantages see Barry R. Posen, 'The War for Kosovo: Serbia's Political-Military Strategy', *International Security*, Vol. 24, No 4, Spring 2000, p49.

compounded by the fact that the NATO alliance included a number of countries that had reservations about the conflict. The initial poor strategy included extraordinary announcements by certain NATO leaders that ruled out a ground campaign. In his writings, Wylie warns of the dangers of having only one plan, because the enemy would eventually discern it and then counter it. [97] In the Kosovo conflict, NATO not only had just one plan initially, they also saved the enemy the trouble of identifying it. The weather and terrain in the Balkans also provided serious obstacles. These were aggravated by an insistence on the part of casualty averse political leaders that the campaign be waged from 15 000 feet and above. This was a serious restriction in the face of an entrenched enemy who practiced a competent campaign of deception.

The controversy surrounding NATO's conflict against Yugoslavia emanates from the fact that the Serbian leadership capitulated before a ground campaign had been launched. This has led some commentators to suggest that air power had finally achieved an independent victory. For example, Keegan declares 3 June 1999 as a turning point in the history of warfare "when the capitulation of President Milosevic proved that a war can be won by air power alone." [98] Strictly speaking, the Serbs did submit to NATO demands prior to a ground offensive. However, a number of factors aside from the bombing campaign may go some way to explaining this result. In the recent aftermath of the conflict it is perhaps too soon to declare with any degree of certainty why the Kosovo conflict concluded as it did. What follows therefore is a speculative assessment.

The Serb decision to withdraw its forces from Kosovo may have had more to do with the actions of its Russian allies, than with the NATO air campaign. As the conflict progressed, Russian support for the Serb effort abated. [99] Indeed, Lieutenant General Sir Mike Jackson stated in an interview: "The event of June 3 [when the Russians backed the West's position and urged President Milosevic to surrender] was the single event that appeared to me to have the greatest significance in ending the war." [100] It is also important to note that the Serbs

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[97] Wylie, p71

[98] John Keegan, ['Please Mr Blair, Never Take Such a Risk Again'], *Sunday Telegraph*, 6 June 1999, www.telegraph.co.uk/et

[99] Posen, 'War for Kosovo', p71.

[100] Quoted in ['Russia, not bombs, brought end to war in Kosovo, says Jackson'], *Sunday Telegraph*, 1 August, 1999, www.telegraph.co.uk/et

were under mounting pressure from KLA ground forces in Kosovo. [101] The Serb leadership may also have begun to take more seriously the increased discussion of a NATO ground offensive. This latter point fits with Wylie's assessment that even if the man on the scene with a gun is not needed, he must be potentially available, and be seen to be so. [102] In this respect, the NATO bombing campaign, although it was not having a great deal of success against Serb forces in Kosovo, perhaps acted as an indicator of NATO's resolve to continue with the conflict. Milosevic may have assumed that it was only a matter of time before a ground offensive would come. Also, Posen reminds us that Serbia actually obtained a better deal than that they were offered at Rambouillet prior to the conflict. [103] As an assessment of strategic bombing, it should be remembered also that NATO's air campaign was not directed solely against targets that fall within Warden's four inner rings. As the conflict progressed, NATO increasingly attacked Serb forces in Kosovo. This part of the campaign would more easily fit Pape's denial strategy, rather than coercion through punishment. Finally, remembering that NATO's primary strategic objective was the return of the refugees to Kosovo, it is clearly inaccurate to imply that the air campaign was strategically decisive on it own. The primary goal was only obtainable with the deployment of ground forces into the province. Recent reports indicate that the levels of damage inflicted on Serb forces were significantly lower than at first estimated. [104] In addition, it is claimed that despite the air campaign, Serbian forces in Kosovo retained enough tactical freedom to continue with the expulsions of Albanians. [105] This would appear to suggest that the bombing campaign alone could not have broken either the will or capability of the Serbs. Indeed, the bombing campaign appeared to strengthen Milosevic's position inside Serbia during the conflict. Overall, the campaign against Serbia in some respects is reminiscent of the campaign against Japan. In each case, a ground invasion was not required to achieve victory. However, pressure from sources other than the bombings probably had as much influence in the final outcome.

The function of this section has been to show that even with the levels of effort,

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[101] See Goulding, p6, and O'Hanlon, *Technological Change*, p129, who also places emphasis on the Russian diplomatic role and the signals coming from NATO about a ground offensive.
[102] O'Hanlon, *Technological Change*, p72.
[103] Posen, 'War for Kosovo', pp79-81.
[104] ibid, p64
[105] ibid, p65.

destruction, and increasingly precision, attained in the above historical examples, strategic bombing has thus far failed to provide an independent means to achieve strategic decision. This is an important point to bear in mind when we read the SIW literature. The chapter will now examine the reasons for this failure in more detail, and speculate how much these same reasons could degrade the strategic efficacy of SIW.

Limits on Strategic Warfare

The practice of strategic bombing has been plagued by a variety of factors that have served to limit its strategic efficacy. Some factors are obviously more damaging than others, but all help to reduce its performance. Many of these factors are usually in play simultaneously, in which case a strategic bombing campaign has many obstacles to overcome. As noted earlier, thus far, no campaign has yet managed to overcome these impediments to a point at which it can claim independent strategic victory. It is the intention of this section to assess the significance of these factors, and how much they will impinge upon the performance of SIW. It will be shown that SIW cannot escape from the normal constraints under which all other forms of warfare, and strategic bombing in particular, have to operate.

The first category of restraints is best described by the somewhat ambiguous term *operational difficulties*. This simply refers to the practicalities of a bombing campaign, the act of delivering bombs on target. Within this category some difficulties are plainly more restrictive than others. One area that usually raises problems, particularly in the early stages of a campaign, concerns the instruments of bombing. As noted earlier, it took approximately three years for Bomber Command to become operationally mature. Before that point, the bombing offensive was conducted with aircraft, like the Manchester, which were clearly inadequate. [106] In Vietnam, the 'Century Series' of fighter-bombers had been designed to deliver nuclear payloads and therefore were not ideally suited for a conventional bombing campaign. For instance, the F-105 suffered

[106] The Manchester suffered from a number of inadequacies. These included insufficient engine power, a low ceiling, and vulnerability to shrapnel bursts. See Hastings, pp148-9.

from poor manoeuverability, and lacked the robustness required to engage in hundreds of conventional sorties. [107] Staying with the Vietnam War, the North's air defence system forced some bombers, such as the F-51, to fly at night, this meant that the pilots had to contend with blinding flashes from rockets and gunfire. [108] Even when the platforms themselves are adequate, problems with munitions can limit efficacy. It has been estimated that fourteen percent of bombs dropped by the United States over Germany were defective. [109] More significantly, Ellis reports that the United States bombs that did explode were too small to be effective against machine tools, engineering, construction, and transport equipment, except with a direct hit. [110]

In the operational realm the main challenge is finding, hitting, and destroying the assigned targets. It is hard to underestimate the difficulties that have historically been encountered in the field of navigation. An extreme but illustrative example is provided by the United States 2nd Bombardment Division on 1 April 1944. In particularly bad weather they not only failed to find and hit their target in Germany, but also mistakenly proceeded to bomb the border city of Schaffhousen in Switzerland. [111] GPS has helped eliminate the seemingly perennial problem of navigation for bombing campaigns. Yet, even when the challenge of navigation was overcome, hitting the target with any real degree of precision was still an enormous problem. In World War II, precision could be negatively affected by a host of factors, including poor visibility, malfunction of the bombsight, or the lead bombardier being shot down. [112] Even in the times of PGMs precision cannot be totally taken for granted. During the 1991 Gulf War, the bomb-damaged physical environment over which they were flying apparently confused some TLAMs. [113] Precision, and therefore the intensity of a bombing campaign, has continued to be negatively affected by the weather. Terraine correctly describes the weather as the everlasting enemy of

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[107] See Hallion, pp14-15, and Kenneth P. Werrell, 'Did USAF Technology Fail in Vietnam?: Three Case Studies',
http://www.airpower.maxwell.af.mil/airchronicles/apj/apj98/spr98/werrell.html
[108] Clodfelter, p21.
[109] Fagg, 'Mission Accomplished', p795.
[110] Ellis, *Brute Force*, p214.
[111] Crane, *Bombs, Cities, and Civilians*, pp69-70.
[112] ibid, p64.
[113] Hallion, p250.

Bomber Command. [114] This same enemy still had a high profile in the Gulf War, during which approximately half of all sorties were either cancelled or diverted because of bad weather. [115] The problem has still yet to recede fully as the cancellation of raids over Yugoslavia in 1999 revealed. [116] Within the realms of environmental effects, it is not just weather that retards precision, industrial haze or smoke from bomb-damage can also play havoc with dumb bombs and LGBs alike. [117]

Many of these specific operational problems should not prove applicable to SIW in any substantial and direct manner. Many of the weapons of SIW are simple pieces of software. In which case they are relatively easy to produce and use effectively. This latter point does not take account of SIW defences, the potential of which will be discussed later. Although a great deal of SIW operates within the distinct geographical environment of cyberspace, some of the techniques of this form of war will suffer from constraints similar to those faced by strategic bombing. For example, Kopp notes that the effects of the atmosphere reduce the lethality of EMP. [118] Because of this, and the problems of estimating the robustness of target equipment in the face of EMP, creating EMP devices with assured effects could prove somewhat problematic. In contrast, on the issue of navigation, the nature of cyberspace, which is increasingly being designed to be navigable, allied to the skills of hackers, seems to suggest that locating targets should not pose a significant problem. However, the issue of operational difficulties is not really concerned with the direct relevance of strategic bombing problems to SIW. Whilst recognising that SIW should not suffer from some of the limitations endured by strategic bombing over the years, the point to be made is that friction will occur and place limits on the operational, and thereby the strategic, efficacy of SIW campaigns. SIW will undoubtedly suffer from its own unique operational difficulties. These will consequently limit the levels of damage that can be inflicted on enemy targets and systems.

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[114] Terraine, p459.

[115] Crane, *Bombs, Cities, and Civilians*, p154.

[116] See Michael Evans, ['Weather Holds up the Bombs'], *The Times*, 31 March 1999, p2.

[117] Terraine notes how Essen was shrouded in an industrial haze. See Terraine, p475. RAF Harrier crews encountered similar problems on their first raids into Kosovo. On this occasion smoke from earlier TLAM raids obscured their targets and interfered with their Laser guidance systems. See Michael Evans and James Landale, ['High-Tech Harriers are Blinded by Smoke'], *The Times*, 26 March 1999, p3.

[118] Kopp, p318.

As a final point, it should be remembered that in strategic bombing the difficulties of finding targets and putting munitions on them have been substantially reduced. The improvements in the lethality of strategic bombing have not been followed by the fulfillment of the theories of Douhet and Warden. We should be careful not to overestimate the impact of the above difficulties. After all, even during the relatively primitive days of World War II, enormous levels of destruction were attained. It would seem that operational problems are not the main reason for the strategic failure of strategic air power.

Institutions conduct any military campaign, including strategic bombing and SIW. In turn, individuals with varying personas, egos, and agendas man these institutions. These *institutional/organisational problems*, revolving around intra- and inter-institutional relationships, can impact on the efficacy of bombing campaigns, particularly by reducing operational and strategic focus. A classic example of these issues centres on 'Bomber' Harris. Harris had very definite ideas about the role of Bomber Command. To simplify, he saw area-bombing as the most promising use of this new instrument, and regarded precision attacks against key nodes as the pointless search for panacea targets. Likewise, he fought hard against the diversion of Bomber Command's assets to other roles, including those in support of the Normandy campaign. Consequently, these views, allied to Harris' stubborn personality, brought him into conflict with both the Air Staff and the Ministry of Economic Warfare. Harris' relationship with the latter has been described as a 'running battle'. [119] These conflicts of interest and opinion amongst those responsible for the bomber offensive resulted in a lack of focus to the campaign. [120] Biddle goes as far as to suggest that had Portal, Chief of Air Staff, been able to dominate Harris the war could have ended sooner. [121] The air campaign in Vietnam is another example were institutional problems afflicted the bombing effort. Mark Clodfelter is of the opinion that the absence of a single air commander, which resulted in autonomy for PACFLT and PACAF, produced a chaotic air war. [122] Vietnam also witnessed the negative influence of personalities and bureaucratic arrangements. Reminiscent of the tensions surrounding Harris in Bomber Command, tensions

[119] Terraine, p493.
[120] This is a point made by Webster, pp293-5.
[121] Biddle, p124.
[122] Clodfelter, p128.

were said to exist between Defence Secretary McNamara and the JCS Chairman, General Wheeler. By respecting the chain of command Wheeler's recommendations had to go through McNamara, a man who at an early stage had lost faith in Rolling Thunder. [123]

It is naive to think that SIW would be immune from the kind of personal and institutional tensions described above. Indeed, at present there are many information warfare organisations appearing in the United States. These include the Air Force Information Warfare Centre (AFIWC), the Fleet Information Warfare Centre (FIWC), and as mentioned earlier, the JTF-CND, to name but three. This proliferation of organisations has led Peter D. Feaver to declare: "The IW arena is among the most highly compartmentalised in the entire US defense establishment. The right hand quite simply does not know what the left hand *can do*, let alone what it is in fact doing." [124] Tensions may be exacerbated as those conducting SIW seek to prove its worth. In these conditions each armed service and institution may attempt to lay claim to be the natural home of SIW, and therefore conflict rather than co-operation of effort could result. After all, proving the efficacy of the strategic bombing instrument was the prime motive for Harris' zealous advocacy of area bombing. However, once again we should avoid laying too much blame at the door of institutional difficulties. Unified command was achieved during the 1991 Gulf War, and yet despite this, and despite solving many of the operational problems of earlier wars, independent strategic victory still proved elusive.

A particular problem that has plagued strategic air campaigns since World War II is concerned with the role of *doctrine.* Doctrine has many sources. These can include a particular strategic or service culture, personal loyalty to particular methods, and past experiences. The United States proclivity towards precision bombing (Curtis LeMay excepted) may be a reflection of its belief in technological answers to strategic dilemmas, as well as a throwback to the marksmanship of the frontier days. [125] Whatever the particular origins of a doctrine, history reveals that loyalty to the established methods can shape a bombing campaign regardless of the specific requirements of the war in question. The Vietnam War presents an obvious case in point.

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[123] ibid, p123.
[124] Quoted in Adams, *The Next World War*, p301.
[125] See Crane, *Bombs, Cities, and Civilians*, p20.

Prior to the war the USAF had prepared to fight a nuclear war against the Soviet Union. As a consequence, the doctrinal manual for 1964, the year before Rolling Thunder began, included no provisions for strategic bombing without nuclear weapons. [126] This was significant because the delivery of conventional munitions required greater accuracy than the delivery of nuclear weapons. Add this to a continued allegiance to the Industrial Web theory, and the USAF was ill-prepared to wage the kind of campaign required in Vietnam. It seems that doctrine had blinded the USAF to the lessons of Korea, which like North Vietnam had few industrial targets. [127] The GWAPS finds similar mistakes in the 1991 Gulf War. It complains that target categories were based as much on doctrinal considerations as on intelligence of the Iraqi system. [128]

Although at present there appears to be no official doctrine for waging SIW, the literature that has appeared thus far reveals significant similarities with the theory and doctrine of strategic bombing. It is yet to be seen if institutions that acquire responsibility for waging SIW develop the sort of institutional and doctrinal loyalty evident in the other armed services. Based on the history of strategic bombing, the prospects do not look good. The influence of doctrine is important, for if a service is unable to display sufficient flexibility in the face of the varied nature of strategic circumstances, then at times it will in all likelihood be condemned to fight the wrong kind of war.

Strategic bombing campaigns rely heavily upon the quality of *intelligence* available on the enemy system. Knowing how the system functions, how much pain it can take, and where to inflict that pain, are all critical prerequisites. It is ironic, and significant, that the performance of the intelligence function in support of bombing has often been poor. As Sir Charles Webster succinctly notes in relation to the bombing campaign against Germany, poor intelligence can lead to under-bombing of key targets. [129] Poor intelligence can also lead to the bombing of the wrong targets. In the Kosovo conflict, an intelligence failure led to the politically embarrassing and damaging bombing of the Chinese embassy in Belgrade by NATO aircraft. Failures in intelligence can occur at any of its stages: gathering, analysing, or dissemination. It should be noted that

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[126] ibid, p150.
[127] Werrell, 'Did USAF Technology Fail in Vietnam?', p7.
[128] Keaney and Cohen, pp136-7.
[129] Webster, p304.

although some of these failings are attributable to bad practice, some are simply the result of the enormity of the task. Pape highlights the size of the task involved in trying to undertake an accurate macrolevel analysis of the German economy in World War Two. He notes that the required information was simply not available. [130] The problems associated with the volume of information required is augmented by the fact that in most cases the intelligence acquired is based on a peacetime analysis of the enemy, rather than when they have mobilised their economy for war. The difficulties involved in understanding how a complex interconnected modern economy works are highlighted by the fact that even modern historians, with all the benefits of historical research and hindsight, still disagree over which component of the German economy, at which period in the war, represented its Achilles' heel.

Aside from the enormous amounts of information required for planning and conducting a strategic bombing campaign, the gathering and analysis of this information can be done poorly. For example, in Vietnam the Defence Intelligence Agency (DIA) has been criticised for adopting a numerical and quantifiable approach to intelligence gathering, rather than focusing on the North's strategy. [131] Likewise, Britain's MEW is chastised for suffering from intellectual conformity, and hasty analysis of intelligence as a result of strict deadlines. [132] To refer back to the previous section, intelligence organisations also suffer from institutional tensions and difficulties. Such problems were as evident during the 1991 Gulf War as in World War II. [133] Shortcomings in intelligence can lead to spectacular errors. In 1944, the Allies underestimated German aircraft production by a half. [134]

Despite Colin Powell's aforementioned confident assertion that the Coalition forces during the Gulf War had the best intelligence in military history, this conflict still reveals that intelligence difficulties can even beset a campaign with as vast an array of intelligence assets available as those during the 1991 war. The GWAPS identifies a number of shortcomings in this area. The war had to be waged with an incomplete and out of date national database on Iraq,

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[130] Pape, *Bombing to Win*, p275.
[131] Clodfelter, p130.
[132] Mierzejewski, pp179-180.
[133] Keany and Cohen, and Mierzejewski, p180.
[134] Fagg, 'Mission Accomplished', p793.

which resulted in significant gaps in the Coalition's understanding of the entire Iraqi system; a rift existed between those organisations responsible for intelligence and those in charge of planning the campaign; dissemination of intelligence was often poor; some targets, such as the 'hide sites' for mobile scud launchers, were never located; and the significance of certain targets was never appreciated. [135] Reflecting a strong Clausewitzian influence, the GWAPS concludes: "uncertainties are endemic to intelligence functions." [136]

Intelligence difficulties do not cease once the war has begun, in fact they often multiply. A particularly difficult area during a war is Bomb Damage Assessment (BDA). The history of strategic bombing is replete with BDA problems and failures. Weather has continued to be an obstacle to this activity. The GWAPS once again provides us with a striking example of BDA related difficulties, despite the array of assets available for the task. In fact, BDA in the Gulf War has come under particularly heavy levels of criticism. A host of problems afflicted the task, these included: an inadequate number of trained personnel who were swamped by data; the weather; the fact that those responsible for reconnaissance were not involved in campaign planning; a lack of specific training in BDA before the conflict; the speed of the air campaign which hampered the analysis; and problems of imagery interpretation. This latter point was particularly evident with penetration munitions, which revealed entry into a structure, but not the damage inflicted inside. [137] Similar failings were evident in World War II, when structural damage to buildings (especially roof coverage) was too readily linked to production losses. [138]

Intelligence is an area in which SIW could well suffer difficulties similar to those described above. The difficulties of understanding the complex relationships amongst different sectors in an industrial economy have already been noted. An information age economy would appear to present similar, if not greater, difficulties. Matthew G. Devost *et al* postulate: "The sophistication of network analysis necessary to 'bring down' a national information infrastructure is substantial." [139] Aside from the difficulties of comprehending the workings of the enemy's

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[135] See Keaney and Cohen, pp130-138.
[136] ibid, p121.
[137] ibid, pp138-143.
[138] Fagg, 'Mission Accomplished', p794.
[139] Matthew G. Devost, Brian K. Houghton, and Neal Allen Pollard, 'Response to Cilluffo and Gergely', *Terrorism and Political Violence*, Vol. 9, No. 1, Spring 1997, p96. This is also noted by

system, predicting the complex interactions instigated by an attack would also stretch intelligence organisations. As Libicki notes, this could well make SIW an uncontrollable activity. [140] BDA also presents some significant problems for SIW. During the 1991 Gulf War, an attack on the Iraqi electrical system with cruise missiles carrying carbon filament warheads was successful but left no obvious damage to the structures, consequently these targets were needlessly attacked again. [141] As this sort of non-destructive form of attack is inherent in certain methods of SIW, it is reasonable to assume that similar difficulties for deciding whether or not a target has been put out of operation will continue. Kopp highlights these problems of 'kill assessment' in regards to E-bombs. [142] Overall, these difficulties connected with intelligence functions should not be underestimated. For either strategic bombing or SIW to prove effective, good intelligence on the enemy system is a crucial prerequisite. The difficulties outlined above are only half of the story. Intelligence must also be collected on the will of the enemy to withstand such attacks. The historical record on this issue is not promising. In this sense, Williamson Murray is undoubtedly correct when he notes that the real measures of success are the intangibles, such as the effect of attacks on the morale of the enemy. [143] The difficulties associated with collecting accurate assessments of these intangibles will be as applicable to SIW as they are to strategic bombing.

A common complaint by the advocates and practitioners of strategic air power has been the frequent *diversion of their assets* to 'non-strategic' tasks. Terraine identifies seventeen significant diversions of Bomber Command's resources during the whole of World War Two. These activities include the support of ground offensives, the Battle of the Atlantic, and attacks against V-weapons. [144] Likewise, during the Gulf War strategic assets were diverted to engage in 'Scud hunts', to 'dig-out' the Iraqi airforce hiding in aircraft shelters, and to engage in 'tank plinking' against Iraqi armour. [145] Strictly speaking, the activities described above do entail the diversion of air assets from attacking strategic target sets. To assume that resources can, and will,

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Smith, 'Electronic Pearl Harbour?'.

[140] Martin C. Libicki, 'Deterring Information Attacks', in Schwartau, p594.

[141] Murray, *Air War in the Persian Gulf*, p32.

[142] Kopp, p318.

[143] Murray, *Air War in the Persian Gulf*, p36.

[144] Terraine, p691.

[145] Keaney and Cohen, *passim*.

be concentrated in only one direction would be both naive and inadvisable. Modern wars are complex affairs, and tend to be won by prevailing in many areas, in which case, placing all your eggs in one basket would be unwise and probably unsuccessful. Also, as writers on both World War II and the Gulf War have stated, we should not overplay the significance of these diversions to the overall results of strategic bombing campaigns. During both of these conflicts enormous damage was inflicted on strategic target sets despite the diversion of resources to other roles. [146] In this respect, it is likely that in future conflicts SIW activities will be siphoned-off in more direct support of ground operations. One such diversion may entail attacks against information systems that support logistics. This may represent a significant draw on resources because as *FM 100-6* notes, mobilisation is an information-intensive activity. [147] But, as the history of strategic bombing reveals, this should not prove too damaging to the overall SIW campaign. Nor should the practitioners of strategic campaigns complain. Terraine sensibly reminds us that these so-called diversions are nothing of the sort, in fact they "add up to the war itself." [148]

To repeat the Clausewitzian dictum, war is a political act. That being the case, strategic bombing cannot be conducted in a political vacuum in which only military rationale is relevant. This leads us inevitably to the observation, backed by numerous historical examples, that strategic campaigns are limited by *political restraints*. These restraints do not necessarily emanate from a sound balancing of the policy objective and military means, they don't always represent good strategy. Political restraints on bombing can have many sources. These include domestic political considerations, foreign policy concerns, and ethical issues. When assessing how significant such restraints can be on the conduct of a campaign, the conclusions reached represent a mixed bag. As will be noted shortly in relation to the Vietnam War, political considerations can greatly influence, one might say dictate, the campaign. However, World War II presents us with an example in which there were few, if any, political constraints on the conduct of strategic bombing. Looking to the future of SIW and strategic bombing, it is wise to assume that such campaigns will rarely be able to operate without such interference from the realm of politics.

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[146] See Keaney and Cohen, pp83-84, and Webster, p310.
[147] *FM 100-6.*
[148] Terriane, p278.

Often, bombing campaigns have to contend with various political restrictions operating simultaneously. In the war against Iraq, the campaign was waged in such a way that casualties on both sides were restricted; little or no damage was inflicted on sites of cultural, religious, or historic value; and the Iraqi economy suffered no long-term damage. [149] Raids against the Iraqi regime's administrative support structure were severely curtailed after the Al Firdos bunker incident, in which the families of the Iraqi political elite were mistakenly killed. Murray suggests that this hamstrung the campaign against this particular target set for the rest of the war. [150] Murray may well be right in his assertion, but we have to question whether continuing with this section of the campaign would have produced any decisive results. Limiting target sets provides your enemy with sanctuaries from the bombing. In the Iraqi case, this enabled the Defence Ministry to relocate to the Ministry of Youth building. [151] The much-maligned Rolling Thunder campaign in Vietnam provides us with yet further instances of the kind of political restraints that can be placed upon a bombing campaign. President Johnson had a number of dominant 'negative' objectives that to a large degree dictated how the campaign was waged. The fear of escalating the war by bringing in the China or the Soviet Union, meant that Johnson took no action which appeared to threaten the Hanoi regime, nor seemed likely to threaten Chinese territory or Soviet advisors and technicians operating in the North. In the early stages of the war, Johnson was reluctant to conduct a large-scale conflict for fear of distracting attention away from his domestic political program. Political sensitivities also ruled out what were arguably the two most promising strategic target sets in North Vietnam, namely the food supply and the population itself. [152] Political restraints can often occur when war is waged by a coalition. General Klaus Nauman, Chairman of NATO's Military Committee during the Kosovo conflict, admitted that the NATO air campaign had been lengthened due to restrictions placed upon the campaign in the interests of alliance political unity. [153] NATO also stopped bombing downtown Belgrade for two weeks after

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[149] See Hallion, Keaney and Cohen, and Pape, *Bombing to Win.*

[150] Murray, *Air War in the Gulf*, p34.

[151] William M. Arkin, 'Baghdad: The Urban Sanctuary in Desert Storm?', http://www.airpower.maxwell.af.mil/airchronicles/apj/spr97/arkin.html

[152] Clodfelter, pp43-44, and p140.

[153] See http://news.bbc.co.uk/hi/english/world/europe/newsid_334000/334879.stm

the bombing of the Chinese Embassy. [154] The political objectives of a war can impose limits on the bombing effort for perfectly sound strategic reasoning. In the context of using air power for colonial control, the doctrine of 'minimum necessary force' was the guiding principle. It was feared that excessive use of force would further alienate colonial subjects. This posture resulted in the dropping of warning leaflets prior to an attack, so as to avoid civilian casualties. [155]

As with the many other factors which have retarded the conduct of strategic bombing, it seems reasonable to speculate that SIW will likewise be susceptible to political restrictions. Many of the above reasons that create political constraints on a strategic campaign will almost certainly be in play in the world of SIW. Diego M. Wendt is right when he notes: "As long as there are wars, there will be political restrictions upon actions and targets." [156] SIW may well display certain unique characteristics, but like all other forms of warfare it will operate in the Clausewitzian world, in which politics informs the military instrument.

SIW does not come with an owner's manual containing detailed instructions on its proper usage. Like all military instruments, even if the technological, tactical, and operational levels are adequately well done, the whole project can be dashed by *poor strategy*. There is no guarantee that the decision makers who control the strategic conduct of a war will perform well. The air campaign against Yugoslavia offers an instructive example. NATO had many factors on its side, including better technology, numerical superiority, competent personnel, and good performance at the operational and tactical levels of war. However, ineptitude at the strategic level arguably came close to negating these many advantages.

Mistakes in strategy can take many forms, ranging from reliance on a particular form of war, such as strategic bombing, within the wrong context, to an inappropriate strategy within the form of warfare itself, i.e. the form of warfare itself may be appropriate, but it is waged inappropriately. The correct strategy is dependent on many factors, including the character of the war, the enemy, policy objectives, and the available instruments. The Rolling Thunder campaign

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[154] Posen, 'War for Kosovo', p70.

[155] See David E. Omissi, *Air Power and Colonial Control: The Royal Air Force 1919-1939*, (Manchester, Manchester University Press, 1990), pp154-159.

[156] Diego M. Wendt, 'Using a Sledgehammer to Kill a Gnat: The Air Force's Failure to Comprehend Insurgent Doctrine During Operation Rolling Thunder', http://www.airpower.maxwell.af.mil/airchronicles/apj/4sum90.html

in Vietnam was handicapped by poor strategy in a number of ways. Firstly, when the war was predominately an insurgency in the South, and the insurgency's sponsor in the North was primarily an agricultural country, an 'industrial web' bombing campaign was ill-suited to the task. In conjunction with this many Vietnamese perceived the war as an anti-imperialist struggle for national unity. The strong will that such a cause engendered was unlikely to be broken by the graduated escalation of Rolling Thunder. References to poor strategy assume that the leadership at least has identified an obvious strategy for the bombing campaign. This is not always the case. It has been reported that the 'Tuesday Lunches', during which Rolling Thunder was planned, never really dealt with strategy, rather the meetings tended to get bogged down in issues of targeting. [157] War does not always present us with the luxury of taking a form that suits the instruments at our disposal. For example, like Vietnam, North Korea was endowed with few strategic targets for the USAF to attack. The result of this fact was that by 25 September 1950 all the major strategic targets in Korea had been destroyed. [158] In relation to both strategic bombing and SIW, there is no guarantee that all future wars will be waged against well-developed enemies who happen to posses industrial or information age infrastructures. The length of a conflict can also impinge upon the strategic efficacy of strategic warfare. If strategic bombing is to have significant impact on a war, it is more likely to occur in a protracted struggle during which the deprivations wrought by the bombing can take effect. [159] However, as Vietnam reveals, a protracted conflict is no guarantee of success for strategic bombing campaigns.

Poor strategy can have many negative manifestations. In the case of the rebelling Sudanese Nuer, Britain identified cattle as the most valuable target to strike. Paradoxically, this particular form of economic destruction merely aggravated the political situation. [160] During both the Gulf War and World War II, strategic bombing advocates failed to realise that if there were indeed centres of gravity in these cases, the most likely candidates were the armies of Iraq and Germany. [161] The strategies of both these continental powers were centred on their ground forces.

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[157] Clodfelter, p124.
[158] Wendt, and Crane, *Bombs, Cities, and Civilians*, p148
[159] Pape, *Bombing to Win*, p75.
[160] Omissi, pp156-7.
[161] Keany and Cohen, p57.

Many, if not all conflicts need to be concluded on the ground, in this sense, both air power and SIW suffer from their inability to seize and hold territory. Bombing campaigns can also often fail through the absence of continuity, or by falling into the trap of measuring success by quantifiable calculations, for example by gauging progress by the acreage destroyed. [162] Operating through such notions tends to be simplistic, as wars are usually complex affairs in which the real keys to success tend to be the intangibles. The challenge of strategy is essentially the same whichever form of warfare you have at your disposal. The matching of means to ends will be no easier for SIW than for any other military instrument. As Gray asserts, friction occurs within the relationship between war and politics, and therefore good strategy cannot be guaranteed. [163]

Thus far, the discussion has focused on limiting factors that are primarily concerned with those who prosecute a strategic campaign. In all wars there is of course another party to the conflict, the other belligerent. The existence of an intelligent foe brings with it the fact of *countermeasures*. Often, the theorists advocating some form of 'strategic' warfare indirectly assume that the enemy will remain passive, or at best will not provide significant obstacles to the success of the campaign. Assumptions that 'the bomber will always get through', and that targets will be identified, hit, and destroyed as a matter of course, have been found wanting in the crucible of reality.

An enemy can counter the attacker's activities in a manner of ways. Various methods have been designed to limit precision in bombing campaigns. These techniques include searchlight dazzle of the bomber crews, which has been described as significant an obstacle as cloud and haze. [164] An even simpler method is the production of smoke screens over the targets. [165] Aside from affecting the precision of attacks, target societies have undertaken various means of deception. In Germany, dummy fires created outside of towns were designed to ape those laid down by the pathfinder bombers. [166] During the Gulf War, the Coalition destroyed a substantial number of high-fidelity ballistic missile decoys, which according to United Nations' inspectors

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[162] Fagg, 'Mission Accomplished', and Hastings, p46.
[163] Gray, *Modern Strategy*, p25.
[164] Terraine, p516.
[165] Crane, *Bombs, Cities, and Civilians*, p10.
[166] Ralph Barker, *The Thousand Plan: The Story of the First Thousand Bomber Raid on Cologne*, (Shrewsbury, Airlife Publishing Ltd., 1992), p143.

were only identifiable as fakes twenty-five yards away on the ground. [167] Tribes under colonial bombardment also displayed a high degree of ingenuity in the face of attack. This would often entail the establishment of an early warning system. In 1925, Zeidi troops in the Aden Protectorate captured British cloth signals that had been designed as a signal to the RAF not to bomb in that particular area. [168] BDA is another area vulnerable to deception. The North Koreans would remove sections of bridges themselves in order to fake bomb damage. [169] Civil defence measures also become routine for those under sustained attack. An enemy can employ very simple man-intensive measures as well. For example, the North Vietnamese employed 500 000 labourers to repair their lines of communication. [170]

The above techniques are but a sample of the various means by which the enemy can attempt to degrade the efficacy of strategic bombing. Perhaps the most effective measures have been achieved in the form of active defence. This is certainly relevant to the Luftwaffe's defence of the Reich. German night-fighters in particular posed an acute danger to the Combined Bomber Offensive. Referring to operation 'Pointblank', which had the aim of destroying German fighter production, Frankland declares how "... The German Air Force in being had proved capable of protecting the German Air Force in production." [171] It has been noted by a number of historians that German defences came close to victory in 1943-44, and that given a freer hand by Hitler they perhaps could have defeated the CBO. [172] It does not take much imagination to conceive that societies under SIW attack will develop equally ingenious ways to offset the efficacy of the information age variant of strategic bombing. Indeed, the threat and activities of hackers have already spawned a myriad of defensive measures. Schwartau declares that the technology and tools already exist to defeat and defend against the information warrior. [173] Similarly, Lawrence Freedman concludes that information systems are not as vulnerable as often assumed, simply

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[167] Keaney and Cohen, p86.
[168] Omissi, p121.
[169] Clodfelter, p22.
[170] ibid, p132.
[171] Quoted in Terraine, p558.
[172] Hastings, p234, and Overy, p118.
[173] Schwartau, p589.

because defensive measures are already part of many of those systems. [174] Also, Smith has noted that the antivirus industry is well developed and has created a number of good countermeasures. [175] It is not claimed here that such measures will make SIW impotent, the paradoxical logic of strategy will forbid that, but merely that SIW's impact will be degraded by countermeasures.

In the previous section, the dialectic nature of strategy was added to the complexities of waging a strategic campaign. There is, in this sense, another elementary problem for those waging either a strategic bombing or SIW campaign that should not be underestimated. The essence of this factor is best captured in Adam Smith's statement "There is a lot of ruin in a country." [176] Modern industrial societies, and therefore conceivably information age societies, have shown remarkable *resilience* in the face of significant levels of destruction. This presents obvious problems for strategic campaigns that seek to undermine the will and/or capability of the enemy to wage modern war.

The most revealing illustrations of this resilience are to be found amongst the enormous levels of destruction suffered by Germany and Japan in World War II. Despite the aforementioned scale of destruction carried out by the B-29s, the USSBS concludes that in 1945 Japanese worker absenteeism only stood at eight percent. Perhaps even more remarkable is the estimation that three quarters of Hiroshima's industrial plants could have resumed normal operations within thirty days of the atomic attack. [177] The German experience provides equally striking examples. The level of destruction inflicted on Hamburg during the July 1943 fire-storm has already been noted, what is just as significant as the physical damage done is the fact that only 1.8 months of industrial production were lost as a result. [178] It has been estimated that direct production losses due to strategic bombing for 1943 and 1944 were only nine and seventeen percent respectively. [179] These results are not inconsequential, but they certainly fall far short of representing independent war-winning effects. One problem in particular that prevented more

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[174] Freedman, *Information Warfare: Will Battle Ever be Joined?*, p8.
[175] See Smith.
[176] Quoted in Bernard Brodie, *Strategy in the Missile Age*, (Princeton, Princeton University Press, 1959), p6.
[177] Pape, *Bombing to Win*, pp23 and p153.
[178] Terraine, p548.
[179] Hastings, p227.

significant results, was the fact that German industrial machinery and machine tools often survived an attack even if the factory they were housed in was destroyed. [180] More generally, the German economy simply had much greater capacity and ability to adapt than the air power enthusiasts had assumed. Resilience was also a feature of certain target sets in the Gulf War. This is particularly true of the Iraqi national telecommunications system, which proved to be more robust and have greater redundancy than at first thought. [181]

Resilience is not just a naturally occurring phenomena of modern economies, although that certainly appears to be evident to some degree, it is also facilitated by the enemy's actions. In Germany, in response to attacks on the Schweinfurt ball-bearing plants, a number of steps were taken. These included dispersal of production to other locations, and the redesigning of equipment to reduce ball-bearing requirements. Germany could also offset the impact of attacks on tank production facilities by introducing more effective infantry anti-tank weapons such as the Panzerfaust and Panzerschreck. The North Koreans also displayed some simple but effective countermeasures to offset attacks against their irrigation dams. One such method was to reduce the water level prior to attacks, in which case, the raids had to breach a significantly thicker section of the dam structure. [182] These examples would seem to suggest that hitting critical components often proves strategically ineffective because they tend to produce responses from the enemy.

The historical record of strategic bombing clearly reveals that modern industrial economies are far more resilient to bombing than the air power advocates assume. There is no reason to believe that information age economies should prove any different. Indeed, some of the SIW literature acknowledges this fact. Robert H. Anderson of the RAND Corporation has made a sensible statement to that effect: "In general, our country's infrastructure is very resilient, as various natural disasters and various incidents to date have shown." [183] Like industrial age economies, information age variants surely possess similar levels of capacity and redundancy. Schwartau notes how businesses operate 'Hot Sites', which are essentially backup computer and

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[180] Pape, *Bombing to Win*, p271.

[181] Keaney and Cohen, pp69-70.

[182] See Pape, *Bombing to Win*, p274, p76, and pp163-164.

[183] Robert H. Anderson, 'Risks to the U.S. Infrastructure from Cyberspace', *Verbal Testimony to the Permanent Subcommittee on Investigations*, 25 June, 1996.

communication facilities in the event of natural disasters. [184] More specifically, in reference to the capability of E-Bombs, Kopp notes that a wider use of fibre optics, hardening, and redundancy, would all increase the robustness of targets to this form of attack. [185] The principles of strategy do not cease to operate just because we have entered the information age. In all likelihood, modern economies will continue to display high levels of resilience to attack, and certainly those under attack will develop methods to offset the effects of SIW.

The most potent restriction on the efficacy of strategic bombing has been left until last. Since war is essentially a battle of wills, the success or failure of strategic bombing or SIW ultimately rests upon the decisions of the enemy. It is he who must decide whether the pain he has endured outweighs the issues at stake. [186] In this sense, both forms of warfare, especially when they have the *will of the enemy* as their prime target, are somewhat uncontrollable means to an end. Yulin Whitehead is correct to note: "The will to fight is an elusive target." [187] An asymmetry in will appears to lie at the heart of America's difficulties during the Vietnam War. The North Vietnamese regime simply cared more about the issues at stake, and consequently was prepared to suffer greater levels of pain than the United States.

The strength of the enemy's will can prove problematic for strategic bombing on a number of levels. Firstly, despite the enormous levels of destruction possible, the target population can simply become accustomed to it. This phenomenon was evident both in Germany, and in British colonies were local tribes would acquire a familiarity which diminished the terror of the early raids. [188] However, even when the population's morale becomes fragile as a result of bombing, the result tends to manifest itself in political apathy, rather than political movements against the government demanding an end to the war. History reveals that people concentrate on their day-to-day survival rather than the greater political issues. This absence of political activity is often compounded by repressive measures on behalf of the government. [189] Just as a state's economy achieves greater levels of robustness during a war, so its powers of political control also

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[184] Schwartau, p528.
[185] Kopp, pp304-319.
[186] Pape, *Bombing to Win*, p13.
[187] Whitehead.
[188] See Crane, *Bombs, Cities, and Civilians*, p100, and Omissi, p132.
[189] Pape, *Bombing to Win*, p272.

increase in a time of national emergency. [190] This creates somewhat of a paradox. Just at the time when you are trying to undermine the political stability of the enemy state, you also give it the excuse it requires to shore-up that stability. Max Hastings notes how resilient and loyal the German population proved to be. Even in heavily bombed and ruined cities, they still queued to pay their taxes. [191] Attacks against the enemy's population centres and infrastructures can prove counterproductive in other ways. Merely by presenting them with a serious external threat, a bombing campaign often produces a feeling of solidarity between the population and their government. After all, it is the government who provides air defences and relief organisations. It has been extensively reported that those who were opponents of Milosevic prior to the bombing rallied somewhat to support his regime. [192] Indeed, Tom Walker of *The Sunday Times* comments: "If ever there was a way to unite a troubled people with a history of fierce struggle, General Wesley Clark and his bombers have found it." [193] Ironically, PGMs have tended to weaken effects on the population's morale and political behaviour. The levels of precision now possible remove some of the terror from being a citizen of a bombed country, and yet the unifying effect of the external aggression still exists. [194] The context of a bombing campaign can be such that victory by defeating the enemy's will is almost excluded from the realms of possibility. Pape indicates that the political and personal nature of the Nazi regime made surrender a non-option for them. [195]

The notion that a population, or state, would surrender as a result of its electricity or banking system going down as a result of SIW is difficult to accept in light of the experience of strategic bombing. Dunlap correctly identifies a degree of ethnocentrism in these notions, when he stipulates that perceiving these infrastructures of modern life as essential facilities is a very Western perspective. [196] It is more likely that these sorts of ideas do not even represent Western views. Pape correctly identifies that modern states have very high pain thresholds when important

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[190] ibid, p33.
[191] Hastings, p232.
[192] See Pape, *Bombing to Win*, p272, and Roger Boyes, ['Serb Unity is the Deadliest Weapon Confronting NATO Alliance'], *The Times*, 30 March 1999, p6.
[193] Tom Walker, ['Outgunned Underdogs Await Day of Revenge in a "man-to-man" Battle'], *The Sunday Times*, 28 March 1999, p2.
[194] Arkin, p10.
[195] Pape, *Bombing to Win*, p296.
[196] Dunlap, 'Sometimes the Dragon Wins', p447.

issues are at stake. [197] Likewise, it is difficult to disagree with Pape's observation that having your modern infrastructures rendered unusable is not comparable to being firebombed. [198] If a population's will can withstand Dresden and Tokyo, it can surely hold up in the face of all but the most destructive acts of SIW (perhaps a major nuclear incident). The will of the enemy is likely to prove as difficult a target for SIW as it has for strategic bombing, and for essentially the same reasons.

Distinct Characteristics of SIW

An analysis of SIW based solely upon its considerable similarities with strategic bombing would risk selling this new form of warfare short. SIW displays some significant characteristics of its own, which may or may not affect its strategic performance. There would appear to be at least seven such features worthy of note. Firstly, as is noted in a great deal of the literature on this subject, SIW appears to blur traditional boundaries including those between public and private, crime and war, and peace and war. This notion is typified by the following statement by Lt. Col. David Srulowitz, Commander of AFCERT, who asserts "We are at war every day trying to detect and defend Air Force networked systems..." [199] There does indeed seem to be enough ambiguity in SIW activities to warrant such concerns as: who is responsible for defending the nation's NII and millions of computers, do particular hacking and cracking activities represent criminal intent or military and political activities, and who should respond to such actions and how? The answer to many of these questions probably depends upon the intent of the perpetrators and the scale of their activities. Of course, discerning these two features of an attack may not be possible with any degree of certainty.

The second noteworthy feature, and one that represents a considerable contrast to strategic bombing, is the anonymity and insidious nature of SIW activities. Conventional strategic

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[197] Pape, *Bombing to Win*, p316.
[198] Pape, 'The Limits of Precision', p103.
[199] Quoted in Adams, *The Next World War*, p203.

bombing is always an overt activity, whereas a nation may be under a SIW attack with no knowledge of this until the damage begins to be inflicted. The weapons of such an attack can be placed within enemy systems covertly, waiting for a pre-programmed time or event to trigger the assault. This capability could confer on SIW a level of intensity and simultaneity rarely achieved in conventional bombing. This second characteristic also leads to the third. For the victim of the attack, the above characteristic of SIW creates, in the words of Molander *et al*, formidable warning and attack assessment difficulties. [200] The PCCIP has recognised these dangers, and identified that a SIW campaign requires no detectable logistical preparation. This problem is compounded by the fourth property, the low entry costs required to engage in SIW. All that is really required is a PC with Internet access. Added to this is the wide availability of hacker tools. [201] We are left with a situation in which almost any individual, or group, can acquire SIW capabilities, then prepare and launch an attack in complete anonymity. The difficulties of responding to such an attack hardly need mentioning.

The fifth notable feature of SIW is that it may have presented attackers with a new target set. In this respect, some commentators have identified the electronic infrastructure, and in particular the financial infrastructure, as new and particularly vulnerable targets. Kopp claims that knocking-out these infrastructures would result in significantly more rapid economic dislocation, and produce greater systemic effects, than the more traditional target sets can offer. [202] Without any real examples it is impossible to prove or disprove this assertion. However, in response it is tempting to say that we have heard all this before, particularly in reference to the aforementioned industrial web theory. The sixth point to be made is that SIW appears to offer the disruption of a society without the attendant death and destruction. This could work both to the advantage and disadvantage of SIW as an instrument of strategy. Limiting the physical effects of an attack may help limit the level of retaliation should it come. Alternatively, as was mentioned in reference to strategic bombing with PGMs, this effect may simply diminish the impact on the morale of the target population. Also, as Douglas Waller reminds us, dislocating a society's infrastructure and

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[200] Molander *et al.*

[201] See Molander *et al*, and *PCCIP*.

[202] Kopp, pp323-324.

economy, no matter how non-lethal the weapons themselves, will still inflict casualties in a similar vein to economic blockades. [203] The seventh feature of SIW is that it possesses global reach, and does not require the establishment of overseas bases or platforms to operate from. In this sense, SIW does not require the assistance of the other armed services to function. The global reach of the B2 bomber suggests that this is not a unique characteristic. However, it would take a considerable fleet of conventionally-armed B2s to hit the same number of targets that just one SIW attack could hit.

These seven characteristics of SIW indicate that this form of warfare has distinct advantages over strategic bombing. This new form of attack, which is low-cost, has global reach, is insidious, anonymous, and has virtually unlimited munitions (you can always write a new virus), does appear to offer the potential for attacks which have an intensity and simultaneity without precedent. However, these advantages only amount to greater operational efficiency. As mentioned earlier, operational efficiency is not the same as strategic efficacy. The distinctive features of SIW do not amount to a magic formula which ensures that this form of warfare will be appropriate for every conflict, be free of friction, be conducted on the basis of good enough intelligence, not come up against effective enemy defences, nor that those responsible for strategy will create a harmonious relationship between means and ends, or that the enemy will capitulate in the face of a devastating SIW assault.

Conclusion

Every war is unique. Because of this, it is impossible categorically to declare that neither strategic bombing nor SIW will ever provide strategic success independently. However, the history of strategic bombing thus far, up to and including the 1999 conflict over Kosovo, reveals that strategic air power is only a complement to ground forces which provide 'control'. In this sense, Wylie is right to state that strategic bombing theory does not represent a general theory of war. He

[203] Waller, p32.

argues that a general theory must be applicable under any conditions and limitations. [204] Strategic bombing clearly does not fulfil this criterion. This does not mean that strategic bombing plays only a minor role. In fact, it can contribute to victory in a number of ways. Historically, bombing has forced the enemy to divert resources from other activities and fronts; has added pressure on the enemy's morale in conjunction with ground forces; restricted weapons production; in the case of Germany, it propelled the Nazis to shift some production away from CAS bombers and into night-fighters; [205] can serve to maintain morale at home; and go some way towards satisfying allies of your commitment to the fight. For example, during much of World War Two, the only offensive option open to Britain was Bomber Command. [206] Similarly, Daniel L. Byman and Matthew C. Waxman's argument that the air power debate has been distorted by focusing on its independent role, can also be applied to SIW. Both air power and SIW can function as coercive instruments in conjunction with other tools in the strategic toolbox. They should not be dismissed as failures simply on the basis that they have failed to achieve the dizzy heights set by their most ardent enthusiasts. [207] Based on the experience of strategic bombing, and bearing in mind the similarities between it and SIW, it is not unreasonable to suggest that SIW will in most cases fail to reach the heights of independent strategic success. In which case, the use of traditional ground forces will ensure that the nature of warfare as outlined in Chapter One will survive.

It is recognised that this chapter contains much speculation concerning the strategic efficacy of SIW. This is forced upon us by the lack of a comprehensive SIW campaign to date. However, the similarities that exist between SIW and strategic bombing enables us to conclude that many of the factors that have retarded the strategic performance of strategic bombing will in all likelihood have similar, if not directly equivalent, influences on SIW.

Of the factors that have limited the success of strategic bombing, and therefore will likely retard the efficacy of SIW, some are more significant than others. Tactical and operational problems cannot be discounted without comment. Getting the lower levels of strategy right, the

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[204] Wylie, p57.
[205] Overy, p129.
[206] Terraine, p259, and Hastings p348.
[207] Daniel L. Byman and Matthew C. Waxman, 'Kosovo and the Great Air Power Debate', *International Security*, Vol. 24, No. 4, Spring 2000, pp5-38.

practical things, is essential. However, as the history of strategic bombing has revealed, these problems can be overcome and have rarely limited the effects to a significant degree. The levels of destruction rained down by Bomber Command from 1943 onwards, starting from such an unpromising beginning, are testament to this. Institutional problems can have serious knock-on effects; these can lead to a lack of operational, and even strategic focus. Personalities can play a *significant* part in the conduct and direction of a campaign. Furthermore, loyalty to a *particular* doctrine can result in an effective instrument being forced to follow an inappropriate strategy for the war at hand. It can also lead to preparation for a different form of conflict than the one that actually occurs. Difficulties in intelligence should not be underestimated. Not only can these functions be poorly executed, they may represent insurmountable tasks in the first place. Without good intelligence to identify the key targets and how they interact, a strategic campaign is severely handicapped from the start. The impact of the diversion of resources to other roles should not be overestimated. As with the operational difficulties, these rarely, if ever, significantly retard a strategic campaign vis-à-vis attainment of its primary objective. Alternative draws on resources should be expected. Political restraints on a campaign will almost always be present. These particular constraints on a campaign can significantly reduce strategic efficacy, but the historical record does not suggest that they have been the primary reasons why strategic bombing has failed to deliver victory independently. Enemy countermeasures can have a significant impact. As the example of the German night-fighters reveal, the existence of an intelligent foe can at times put the whole campaign in jeopardy. A more significant reason, although still not the primary one, is poor strategy. Even an excellent technical, tactical, and operational military instrument, can be rendered strategically impotent if used in the cause of bad strategy. However, the most significant factors in the failure of strategic bombing are those related to the robustness of the enemy, both in terms of *resilience* of his capability, and his will to continue the fight. The future practitioners of SIW should take note of the fact that the success or failure of a campaign lies with the target society.

There has been a great deal written on the vulnerability of information age societies to SIW. But vulnerability alone does not lead to strategic success. This is not to say that SIW could not inflict significant levels of disruption, the evidence thus far suggests that it could. The unique characteristics of SIW may improve its operational efficacy relative to conventional

bombing campaigns. That being the case, those who are vulnerable should take the appropriate defensive steps. Offensive capabilities should also be developed to operate in the fifth dimension. However, the overriding conclusion of this chapter is that SIW does not work outside of the dialectical nature of strategy, in which case, the enemy's actions and his robustness will usually deny a strategic campaign the strategic success it desires, leaving final victory often to be achieved by ground forces. However, the fact that SIW is developing as a form of warfare may compel us to modify our understanding of the nature of warfare. Whether or not this is the case will be discussed later.

Chapter 5
INFORMATION POWER: STRATEGY, GEOPOLITICS, AND THE FIFTH DIMENSION

> "Now, as in revolutions past, technology is profoundly affecting the sovereignty of governments, the world economy, and military strategy." [1]

Introduction

Thus far, this work has postulated that the fundamental nature of war will not change with the coming of the information age. Yet, it has also been suggested that important changes will occur. Particularly worthy of note are: the development of SIW as a new instrument of strategy; the general rise in importance of information in the battlespace; and the greater levels of flexibility offered by information power to those practicing strategy. Not surprisingly, some analysts foresee profound geopolitical consequences resulting from the information revolution. The above quotation is illustrative of a growing literature which attributes revolutionary implications to the development and spread of Information Technology (IT). Typically these works predict the empowerment of small and/or non-state actors; the decline of the nation-state; a decreasing relevance for the physical world and its relationships; and the rising importance of information in the strategic world at the expense of traditional physically-based military capabilities.[2]

Technological developments that facilitate a more effective exploitation of a particular dimension of strategy can have important consequences. For example, the utilisation of the air and space environments this century (the third and fourth dimensions respectively) has further complicated the strategic world, and has presented new vulnerabilities and opportunities. In response, many actors have had to develop an understanding of these environments and how to operate within them. Some technologies, such as nuclear-armed Intercontinental Ballistic Missiles

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[1] Walter B. Wriston, 'Bits, Bytes, and Diplomacy', *Foreign Affairs*, Vol. 76, No. 5, Sep/Oct 1997, p.172.

[2] The following works variously include some of these ideas. Libicki, 'The Emerging Primacy of Information', Vlahos, and Mathews.

(ICBMs), may also have consequences for geopolitics and the continued relevance of geographical factors in international politics and strategy. Put simply, it matters that you can be hit by an ICBM in spite of geographical features that have traditionally acted as a form of defence, such as the Atlantic and Pacific oceans in the case of the United States. However, the geopolitical ramifications of nuclear weapons have not been as dramatic as some authors speculated. For example, in 1957, Hertz speculated that nuclear weapons would signal the demise of the nation state since it had seemingly become unable to fulfil the function of protecting its citizens. [3]

In reference to the relationship between technology and geopolitics, it is important to remember that geopolitical theory has often rested on the premise that technology can help shape the geopolitical world. After all, Sir Halford Mackinder regarded the development of railways as the key to unlocking the potential of the Heartland, and thereby signaling the rise of continental powers at the expense of the maritime countries. [4] It is therefore not implausible that the continued development of IT could have significant consequences for strategy and geopolitics. However, we must not overplay the significance of the information revolution. To do so could lead to a form of technological determinism. Mackinder avoided this particular pitfall by suggesting in his later work that the Heartland power could be offset by the Midland Ocean coalition. [5] This ability to offset technologically driven geopolitical change is a significant thought, to which this paper will return.

Other theorists have been less restrained than Mackinder and have tended to overemphasise the significance of a new technology or dimension of strategy. As indicated in the previous chapter, this occurred in the early years of airpower during the interwar period. Most notable in this respect is the work of Douhet. This Italian pilot and theorist trumpeted airpower as an independent means to victory. [6] Despite a number of comprehensive strategic bombing

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[3] Quoted in Paul F. Herman, Jr., 'The Revolution in "Military" Affairs', *Strategic Review*, Vol. XXIV, No. 2, Spring 1996, p26.

[4] Halford J. Mackinder, *Democratic Ideals and Reality*, (New York, W. W. Norton and Company, 1962). Ciro Zoppo also notes that geography, technology, and power politics are intrinsically related. See Ciro E. Zoppo, 'Classical Geopolitics and Beyond', in Zoppo and Charles Zorgbibe (eds), *On Geopolitics: Classical and Nuclear*, (NATO ASI Series, Dordrect, Martinus Nijhoff Publishers, 1985).

[5] The Midland Ocean was to comprise a strategic reserve in North America, an aerodrome in Britain, and a beachhead in France. The similarity of this concept to NATO is noteworthy.

[6] Douhet, *passim.*

campaigns, most notably in World War Two, Vietnam, and the 1991 Gulf War, the claims of Douhet have yet to be fully realised. However, this failure does not mean that the third dimension is unimportant. Airpower has for some time been regarded as the equal of the other forms of strategic power, and in certain quarters, and/or certain circumstances, is considered to be the leading edge of military power. [7] In this respect a new technology or particular dimension of strategy may not become independently dominant, but may still attain a significant level of importance. In reference to IT, the fifth dimension is likely to become even more significant in the practice of strategy. But it would be a mistake to overlook the continued importance of physical geography and the military forces that operate in the traditional physical environment.

In light of these thoughts, the objective of this chapter is to provide a framework that promotes a better understanding of the role information activities can play in the means-ends world of strategy. To this end, this chapter will demonstrate that a fifth dimension (the infosphere) of strategy does exist. From this, the chapter will explore the nature of this new dimension and analyse how this affects the practice of strategy within it. Analysing the advantages and limitations of 'information power' is crucial in any attempt to understand the long-term implications of the fifth dimension. It will be shown that these limitations suggest that physical expressions of strategic power, and the geography in which they operate, will remain salient. With these foundations in place we can begin to understand the significance the information revolution has for geopolitics.

Because the information age is still relatively young, the thoughts expressed in this work are inherently speculative, and are best regarded as preliminary thoughts, albeit ones that are based upon an understanding of the strategic past.

Infosphere: The Fifth Dimension of Strategy

As noted above, a considerable step in appreciating the significance of the information

[7] See Gray, *Modern Strategy,* p232.

environment and its attendant power is to understand the nature of the fifth dimension. The other forms of strategic power: sea, land, air, and space, all have their own physical environments that have unique characteristics. [8] The nature of each environment determines to a degree how the corresponding power can be utilised. Information power operates within an environment that is best defined as the 'infosphere'. Due to its ethereal nature the infosphere does not take easily to any concrete definition. In fact the infosphere is best thought of as an amorphous entity where information exists and flows. Although clearly not a physical medium in the same vein as the other dimensions of strategy, an information dimension can be identified. Weapons, in the form of malicious software, can flow through the infosphere, and in this sense the fifth dimension acts as a medium for strategic power. In a similar vein, a form of conflict can take place within the infosphere; electronic warfare being perhaps one obvious example of this type of conflict. The World War Two activities of the Royal Air Force's No.80 (Signals) Wing, the so-called 'Beam Benders', present an interesting case study of conflict in the fifth dimension. [9] Like the sea, one of the functions of the infosphere is to act as a highway, through which information and weapons can flow. The sea is also a place where large deposits of natural resources are to be found. Having secure access to the sea helps ensure the ability to exploit these resources. Likewise, deposits of information reside within the infosphere. In an age in which information is increasingly regarded as vital to the effective functioning of society, [10] ensuring access to this resource will be critical. These characteristics seem to imply that the infosphere does indeed constitute a medium of strategy, and has enormous economic, social, political, and military relevance. Ultimately, the defining characteristic that identifies the infosphere as a dimension of strategy, is that various forms of strategic power can be projected through and within this distinct environment. Therefore, like the other environments, operating in the fifth dimension requires distinct skills and doctrine.

The above description of the infosphere requires some important qualifications. Parts of the infosphere exist in the physical world in a strict sense. This is certainly the case with

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[8] For example, for an assessment of the space environment see Everett C. Dolman, 'Geostrategy in the Space Age: An Astropolitical Analysis', in Colin S. Gray and Geoffrey Sloan (eds), *Geopolitics: Geography and Strategy*, (London, Frank Cass, 1999), pp83-106.

[9] Laurie Brettingham, *Royal Air Force Beam Benders No.80 (Signals) Wing 1940-1945*, (Leicester, Midland Publishing Limited, 1997).

[10] Alvin and Heidi Toffler, *War and Anti-War*.

regard to the EMS, which acts as the substantial underpinning to the infosphere. It also applies substantially to the many physical assets that form part of the infosphere, such as satellites, cables, computers, and humans. In this way, there exists a significant overlap between the fifth dimension and the physical world. Libicki describes cyberspace (an important part of the infosphere) as being characterised by 'placelessness'. [11] This point is generally true, although not entirely, and may become less true as time progresses. Increasingly parts of cyberspace, and indeed information itself, are being territorialised, in that businesses, individuals, and states are claiming them. There is a sense that this is 'our' information, or these are 'our' computers, and we will choose whether to let you in or not. Of course with the right skills, access can be gained to some restricted systems and information. However, it should not be concluded that boundaries in cyberspace are an illusion simply because computer systems and information can be accessed by unauthorised users. The fact that people can gain illegal access across a state's borders does not invalidate the geopolitical reality of nation states. These thoughts have important implications for those who claim that a new geopolitical reality is on the horizon because the infosphere is without boundaries. As Robert O. Keohane and Joseph S. Nye, Jr. note, "... information does not flow in a vacuum but in political space already occupied." [12]

Whether or not the infosphere is strictly speaking a physical reality, is perhaps no more than a problem of definition with little real importance. In the practical world of strategy what really matters is perceiving the infosphere as a place that exists, understanding the nature of it, and regarding it as something which can be manipulated and used for strategic advantage.

As noted, the nature of the infosphere has important implications for those operating within it. One of the most prominent characteristics of the fifth dimension, is that relative to the other dimensions of strategy it can be expanded or contracted far more easily, and to a much greater degree, by man's actions. [13] The fifth dimension is malleable, to some extent it can be

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[11] Libicki, 'The Emerging Primacy of Information', p.274.

[12] Robert O. Keohane and Joseph S. Nye, Jr., 'Power and Interdependence in the Information Age', *Foreign Affairs*, Vol. 77, No. 5, Sep/Oct 1998, p.84.

[13] History reveals a number of cases in which the other dimensions have been expanded or contracted. To take land as an example, cases can be found which show limited examples of both expansion and contraction of this dimension. During the aforementioned siege of the island city Tyre in 333-332 BC, Alexander the Great constructed a 200-foot wide mole between the coast and the city. This enabled Alexander's land forces to attack the city directly. See Ferrill, *The Origins*

molded and shaped. For example, the launch of a new satellite or the connection of a computer to the Internet, are but two ways of expanding the fifth dimension. A new satellite produces new information, or a new conduit through which information can flow, and thereby the infosphere is expanded. The converse methods to achieve contraction should be obvious. Thus we have a situation in which some assets of information power, such as satellites and computers, are also simultaneously elements of the infosphere. The infosphere can also be manipulated through the art of deception. These truisms have implications for those wishing to contest command or control of the fifth dimension.

As is the case in the other dimensions of strategy, the relationship between those wishing to protect their information activities and those attempting to undermine them will invariably be characterised by dynamism. Protecting and securing information flow and integrity will require constant vigilance. [14] This is an important point to note. There are few absolutes in the infosphere. As elsewhere in the strategic world, you are dealing with intelligent foes who will attempt to counter your information power activities. Again, this reality affects the degree of revolutionary change that the fifth dimension may produce. If information power is offset or abated, its strategic efficacy is likewise diminished.

Terms other than the 'infosphere' may be put forward to describe the fifth dimension. Another candidate that may be championed is 'cyberspace'. However, cyberspace connotes a modern construction. To cite Libicki's definition, cyberspace is "the sum of the globe's communications links and computational nodes." [15] Cyberspace is only part of the infosphere. Like information warfare itself, the infosphere is an ancient component of strategy. As noted in the Introduction to this work, Napoleon's use of a cavalry screen to hide the movement of forces is a classic example of information warfare since he was denying the enemy certain

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of War, pp.204-205. In 1672, the Dutch responded to the French invasion by opening the dikes to flood the land, and thereby hold back the invaders. See Weigley, p.59. These two examples show an expansion and contraction of the land environment respectively. In a less direct sense, the submarine environment could be expanded - in a strategically useful manner - through the development of vessels which can withstand higher hull pressures. This of course is not an expansion of the environment itself, it is rather an expansion of man's exploitation of it. Nevertheless, it is an expansion.

[14] As Georgetown University computer science professor Dorothy Denning notes, "The problem is that the technology leaps ahead of the security, and that's going to be with us forever." Quoted in Carlin, p

[15] Libicki, 'The Emerging Primacy of Information'.

information. [16] By definition, Napoleon was also manipulating the infosphere. Consequently, Napoleon can also be said to have been exercising information power. In this example Napoleon was not using assets that are more readily associated with information power. In this sense the assets of information power need not be high-tech, nor dedicated solely to information tasks. A simple hilltop represents an asset of information power. The significance of physical high ground as an asset of information power has many historical examples. The battle for the Falkland Islands presents one relatively modern case. The capture of Mount Kent by British forces established a useful observation post over Port Stanley, and prevented the Argentineans using the mount to rain down observed artillery fire on 3 Commando Brigade. [17]

When considering the fifth dimension, a reasonable question to ask is why existence of the infosphere, and the concept of information power, have not been noted until recently. The most compelling response to this is that the information age has raised our awareness of information, and the development of cyberspace and SIW have given the fifth dimension a more distinct strategic function. Consequently we are adopting a mind-set that sees information as a tangible resource. Long established beliefs can be reassessed. For much of history it was taken for granted that time was absolute. It now transpires that time in fact is relative. [18] As the information age develops, and with it the growing significance of information, the infosphere may be attaining a greater prominence in many sectors of our economic, social, cultural, and military life. It is the developing salience of information that has raised the profile of the infosphere.

Of course, as noted in the introduction to this work, mankind has always been aware of the existence and value of information. Information has always been an important resource. To conclude, the greater exploitation of the infosphere is analogous to the exploitation of the air dimension this century. The third dimension has always played a role in warfare, mainly through the transmission of vocal or percussion commands, or as the medium through which projectiles travel. [19] However, it took the invention of heavier-than-air machines to lead to a far greater

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[16] Chandler, p.165.

[17] Max Hastings and Simon Jenkins, *The Battle for the Falklands*, (London, Pan Books, 1997). pp.300-301. See also Vegitius, p70.

[18] See Stephen Hawking, *A Brief History of Time: From the Big Bang to Black Holes*, (London, Bantam Books, 1995).

[19] E. J. Kingston-McCloughry notes that "[a]ll projectiles, admittedly, except the torpedo, travel to

exploitation of this dimension of strategy. Similarly, it may have taken the broader exploitation of the electromagnetic spectrum, and in particular the emergence of cyberspace, to realise fully the potential of information power.

Control of the Infosphere

A dominant operational concept in the air and sea environments is gaining command of the particular dimension of strategy. Douhet defines command of the air as: "[To] have the ability to fly against an enemy so as to injure him, while he has been deprived of the power to do likewise." [20] Most of the air power theorists stress that command of the air is a vital prerequisite to other operations. Douhet theorised that complete command could be obtained through the destruction of enemy air assets, preferably whilst they were still on the ground. [21] Gaining 'total' command of the global infosphere, *a la* Douhet, is an impossible and even undesirable prospect. To reach such a state, all potential enemies would have to be denied the use of all their information assets. Whereas an enemy has a relatively limited quantity of physical assets upon which his air power is based, the assets required to operate a form of information power are numerous. Also, because some of these assets come under the ownership of the civilian sector, and many are shared, excluding an adversary from the global infosphere is extremely difficult. The connections underlying the Internet are a prime example of how some information power assets are shared.

In line with Corbett's theory of the sea, at the global level the infosphere will commonly remain in an uncommanded state. [22] In fact it may prove disadvantageous completely to deny an enemy the use of his information assets. Certain information power activities require the existence of a functioning enemy information infrastructure. The more insidious acts of information power, such as cultural warfare, semantic attacks (which degrade the integrity of

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their targets through the medium of air;". E. J. Kingston-McCloughry, *War in Three Dimensions: The Impact of Air-Power upon the Classical Principles of War*, (London, Jonathan Cape, 1949), p22.

[20] Douhet, p.83.

[21] Ibid., p.34.

[22] Corbett, p.77

enemy information), intelligence gathering, and deception, all require a functioning enemy information infrastructure. The same applies to various acts of SIW. In this sense, to facilitate an effective information power campaign for oneself, and deny the same to the adversary, an actor may want selectively to destroy some of the enemy's assets, or none at all. Such considerations are circumstantial and depend upon the campaign's objective. Even on the battlefield, certain actions - such as deception - will require the existence of enemy information assets. In this way, an information campaign is less about attaining command through the destruction of enemy assets, and is more about *control* of the infosphere. *Control of the infosphere can be defined as the ability to use the infosphere for the furtherance of strategic objectives, and the ability to prevent the enemy from doing the same (in an effective manner).* The qualification in brackets refers to the difficulties of completely preventing the enemy from utilising his information assets. In this respect the best that can be hoped for is to limit the strategic efficacy of his information power. 'Control of the infosphere' denotes a situation in which an actor is able to control information and its flow, and bend the infosphere to serve his strategic objectives. In this vein, one may not wish to destroy an enemy's information assets, but rather control what information can flow through, from, or into them, manipulate that information, or simply gain access to it.

With the difficulties of securing global command of the infosphere in mind, it is useful to look to the work of Sir Julian Corbett and John Warden III. Both of these theorists refine the concept of command. They both recognise that command does not have to be either 'total' or 'permanent'. [23] As already noted, to achieve command of the global infosphere will prove impossible, even on a temporary basis. However, command of the infosphere may be more possible at the local battlefield level, although 'control' is still a more appropriate term even in this context. [24] This level of control may be slightly qualified in the future by cell-phones, computers with direct satellite links, and civilian information sources (SPOT satellite images can be acquired

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[23] See Corbett, p.89, and Colonel John A. Warden III, *The Air Campaign: Planning for Combat*, Future Warfare Series, Vol 3., (Washington, DC, Pergamon-Brasseys, 1989), p.130. A good analysis regarding the refinement of the command of the sea concept can be found in Eric Grove, *The Future of Sea Power*, (Annapolis, Naval Institute Press, 1990), especially pp.12-13.

[24] A useful distinction between the Global Information Environment (GIE) and the Military Information Environment (MIE) is outlined in *FM 100-6*. See also Starry and Arneson.

from the Internet). [25] Although, of course, being able to report back enemy positions via a cell-phone is a far less potent use of information power than a real-time sensor-to-shooter relationship. As Nye and Owens postulate "... some kinds of information - the accurate, timely, and comprehensive sort - are more valuable than others." Having an information edge can matter. [26] In this sense, an actor operating with the more potent form of information power should be able to get inside the enemy's decision-making cycle, and thereby hold an advantage.

The 1991 Gulf War illustrates the value of having 'control' of the fifth dimension. The coalition forces possessed information dominance, and were able to wage acts of political and psychological warfare, as well as acts of deception against the Iraqis. The Coalition forces selectively destroyed Iraqi communications architecture, leaving some nodes intact. As the Republican Guard forces began to move, and their land line communications became less useful, the Iraqis resorted to transmitting through radio communications. This latter form of communication is far easier to intercept. Leaving some enemy information assets intact paid dividends for the Coalition. [27] The level of military victory attained by coalition forces emphasises that an asymmetry of information power confers significant advantages, particularly if it results in control of the infosphere. [28] However, as noted throughout this thesis, war is a complex, multidimensional activity that requires competence in a number of spheres. Consequently, mastery of the information environment will not alone guarantee victory.

The most important point to come from the above discussion is that the term 'command' is perhaps inappropriate to describe strategic relationships within the infosphere. The complexities of ensuring one's own use of the infosphere and denying the same to an adversary, allied to the requirement of a functioning enemy information infrastructure to facilitate certain information operations, suggests that *control* of the infosphere may be a more appropriate concept. Like command, control of the infosphere is never likely to be either total or permanent. But as

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[25] George I. Seffers, 'Army War Game Reveals Power of Commercial Data', *Defense News*, September 22-28, 1997, p.44. See also Starry and Arneson.

[26] Joseph S. Nye Jr., and William A. Owens, 'America's Information Edge', *Foreign Affairs*, Vol. 75, No. 2, March/April 1996, p.24.

[27] See Atkinson, p439.

[28] This last point is not designed to suggest that information was the decisive factor in the conflict. Although it was an important element of the victory, other factors played their part. War is a very complex activity, and to succeed in war requires competence in many areas.

already noted by Nye and Owens, having an information edge can confer significant advantages.

The Accessibility of Information Power

Information power is that form of strategic power that operates in or through the infosphere. The primary characteristics of information power are its accessibility and flexibility. The combination of these two characteristics endows information power with plenty of potential in the strategic world. Information power can be used in many operations including: Intelligence gathering; terrorism; strategic warfare; raids; small wars; political and cultural warfare; economic warfare; Operations Other Than War (OOTW); logistic support; interdiction; and in the direct support of conventional military operations.

Sub-state actors are not omitted from engaging in information power activities. Terrorists are no exception. Barry Collin postulates that in the near future the terrorists of today will seem primitive by their use of bombs and bullets. Collin suggests that to highlight their cause terrorists are more likely to target information infrastructures with the weapons and techniques of the information warrior. [29] Cyberterrorism offers global reach at low entry costs. [30] And as Arquilla and Ronfeldt note, it can achieve all of this without raising the ire associated with the death and destruction of more traditional acts of terror. [31] The network nature of a post-industrial society would seem to indicate that an information warfare attack could inflict high levels of disruption. Walter Laqueur is unequivocal about the inherent potential of cyberterror: "If the new terrorism directs its energies toward information warfare, its destructive power will be exponentially greater than any it wielded in the past...". [32]

It has been postulated in some of the literature that there are cultural and technical

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[29] infowar.com, *New Security Threats Rest in 'Cyber Terrorism'*, http://www.infowar.com/CIVIL_DE/civil_c.html-ssi

[30] These points are made in an interesting assessment of the value of IT to terrorists, in Soo Hoo *et al.*

[31] Arquilla and Ronfeldt, *The Advent of Netwar.*

[32] Walter Laqueur, 'Postmodern Terrorism', *Foreign Affairs*, Vol. 75, No. 5, September/October 1996, p35.

obstacles that might prevent terrorist groups from adopting wholesale the methods of cyberterror. These include the cultural glorification of violence and heroic acts, and the enormous intelligence task involved in understanding the complexities of information age infrastructures. [33] In this sense, more traditional acts of violence may remain an important instrument in the terrorist's tool kit. However, any cultural or technical impediments to the adoption of cyberterror that may exist today, will undoubtedly diminish as the information age matures further. And as Kevin Soo Hoo *et al* assert, the arrival of cyberterror lowers the threshold for engaging in acts of terror. This latter point, combined with the growth of political groupings over the Internet, would seem to indicate that acts of cyberterror will increase. [34] Overall, it is reasonable to assert that terrorism will undoubtedly acquire an information face. Yet, its more physically destructive outpourings will not cease to be a danger. This area of strategy is illustrative of the fact that the more traditional geophysical forms of conflict will not disappear, rather they will merely exist alongside those in the fifth dimension.

The accessibility of information power is predominately the result of the very low entry costs required to engage in certain activities within the infosphere. These low costs enable small actors to operate reasonably effectively in the fifth dimension. This is not an entirely unique characteristic. Smaller actors can also operate significantly in the other dimensions of strategy. Terrorists or insurgents can of course operate with varying degrees of success in the physical world. Furthermore, relatively smaller powers can also employ sea power. As Gray notes, a *guerre de course* can make a mockery of maritime surface command. [35] Privateers operating against the shipping and interests of Philip II of Spain, at times with the financial backing of Elizabeth I, had a psychological impact on the Spanish sovereign quite out of proportion to the damage they inflicted. It is argued that the activities of men such as Sir Francis Drake contributed significantly to Philip's decision to seek the overthrow of Elizabeth, which in turn led to the ill-fated 'Enterprise of England' in 1588. [36] It is worth noting that in the contemporary world groups

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[33] Rathmell. Brian Jenkins expresses similar reservations about the use of cyberterror, see Soo Hoo *et al.*,pp145-146.

[34] Soo Hoo *et al.*,p144.

[35] Gray, *The Leverage of Sea Power*, p.12.

[36] Don Diego Pimentel, a senior Armada commander declared to his English interrogators: "The Reason why the king undertook this war [against England] was that he could not tolerate the fact

such as the Tamil Tigers have been able to utilise sea power. [37] However, it is generally fair to say that a smaller actor exercising information power effectively can exert leverage more potently than is often the case in the other dimensions. If accurate, the aforementioned 1996 GAO report and the June 1997 exercise 'Eligible Receiver' are testament to this claim.

There are non-state groups who are defined and exist as strategic actors almost entirely due to cyberspace. Often these groupings can only function effectively within the realms of the infosphere. Certain collections of hackers fall into this category. Groups such as these operate predominantly in the Global Information Environment (GIE). However, the interaction between the GIE and the Military Information Environment (MIE) is such, that they could potentially influence matters on the battlefield to some degree. [38] An important point to note is that *a little information power can go a long way.* This maxim emanates from the level of global interconnections in cyberspace, and the dependence of some actors upon these connections and the information flow they facilitate. This means that a small actor using information power has both global reach and the opportunity to engage in various kinds of information power activities, including political warfare, interdiction, and economic warfare, to name just three. The information age produces a reach and power almost unparalleled for sub-state actors. [39] Yet, information power does not guarantee strategic success.

Importantly, these smaller actors do not possess many of the assets specific to an information campaign in the MIE. In this sense, we can distinguish between those who operate and are competent in the GIE, and those powers who are also competent in the MIE. And yet, the use of information power in the MIE is not restricted to developed powers such as the United States. General Aideed's forces in Somalia are noted to have displayed a high degree of

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that Drake, with two or three rotten ships, should come to infest the harbours of Spain whenever it pleased him, and to capture its best towns in order to plunder them." Quoted in Parker, *The Grand Strategy of Philip II,* p176. This argument is also made in Colin Martin and Geoffrey Parker, *The Spanish Armada,* Revised Edition, (Manchester, Mandolin, 1999), p80, Roger Whiting, *The Enterprise of England: The Spanish Armada,* (Stroud, Alan Sutton Publishing Ltd., 1995), and John Sugden, *Sir Francis Drake,* (London, Pimlico, 1996), p201.

[37] This exploitation of sea power by the Tamil separatists led Sri Lankan President Chandrika Kumaratunga to announce an upgrade of the Sri Lankan navy. See 'Sri Lanka says navy will be upgraded to combat Tigers', *Jane's Defence Weekly,* 12 November 1997, p.5.

[38] For a description of the MIE and GIE see *FM100-6.*

[39] See Fuller, *Armaments and History,* p144, for comments on global reach and speed of radio.

competence in using information assets (including cell-phones), which kept them appraised of the movement of the United States' forces. The American experience in Somalia reveals that although having a plethora of advanced information assets is generally a good thing, they do not automatically endow you with an overwhelming information advantage. More importantly, Somalia also reveals that successful strategic performance relies on far more than just information power. This campaign also highlights the fact that information assets cannot always provide the required information. Expensive technological systems cannot easily identify a guerilla from amongst the general population. [40]

The Advantages and Limitations of Information Power

Like the other forms of strategic power, operating in the fifth dimension has both advantages and limitations. When assessing the significance of information power for geopolitics and the fate of the physical dimensions, it is important to note the advantages and limitations of this form of power. The overall significance of information power is directly related to its strategic efficacy.

Information power presents a number of advantages for the user. Firstly, some of the assets required to engage in acts of information power are relatively cheap to acquire. Internet ready computers are a case in point. Computers are not only inexpensive; they are also multi-role items in information power. They can be used for a range of operations including information denial; interdiction; economic warfare; semantic attacks; political and cultural warfare; intelligence gathering; SIW; and cyberterror. As noted, information power can be projected globally far more easily than other forms of power. Information power is also particularly good for covert activities.

Information power acts as a force multiplier across the spectrum of military activities. It has evolved into an essential companion to modern combat forces. Securing some level of control of the infosphere will help enable fast and effective command and control of forces; accurate and timely logistics; good reconnaissance of the battlefield; and in a more direct

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[40] O'Hanlon, *Technological Change*, pp118-119.

relationship, information power can vastly enhance the effectiveness of firepower, with real-time target information and precision strikes. By degrading an enemy's information power to a point where information dominance is achieved, offensive information operations can give friendly forces a significant edge. Control also paves the way for acts of political and psychological warfare, and acts of deception.

For an actor facing a conventionally superior force, information power may provide the means to engage in asymmetric strategies. These may include information denial; political warfare campaigns; or cyberterror. Even for a very significant military actor, information power offers a host of less-lethal and less-direct options that could prove less contentious in certain contingencies. In this context information power could take the form of information aid to an ally, as an alternative to sending military forces. This could prove useful in certain interventions, and also suits the requirements for post-heroic warfare when such an approach is both justified and effective. In those circumstances in which military force is required, information power could provide greater accuracy and therefore less collateral damage. [41] In essence, possessing information power endows an actor with greater flexibility and an increased range of instruments through which to pursue strategic objectives.

However, information power offers no panacea. Its limitations must be kept in mind. For instance, some of the assets of modern information power are vulnerable. Recent wargames have highlighted the possible future vulnerability of United States' space systems. [42] Some commentators have also noted the potential future vulnerability of large platform sensors such as the Airborne Warning and Control System (AWACS) and the Joint Surveillance and Targeting Attack Radar System (JSTARS). [43] And of course EMP, a candidate bogeyman of the information age, poses a general threat to many of the modern assets of information power.

To return to the issue of uncertainty in the battlespace, Major General W.J.P. Robins

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[41] For a discussion of counter-insurgency in the information age, see Baddeley. Libicki also discusses the potential of providing allies with information as a means of intervention. See Libicki, 'The Emerging Primacy of Information', especially pp266-268. However, he does recognize that at times information alone will not be enough, and that a virtual presence may reduce US leverage. See *Illuminating Tomorrow's War*.

[42] Barbara Starr, 'Wargames highlight US vulnerability in space', *Jane's Defence Weekly*, 8 October 1997, p.17.

[43] Libicki, 'The Emerging Primacy of Information', p.268.

notes that no information is ever complete and up to date, and therefore it is important to be aware of its limitations. [44] There are times when of course information will be up to date and complete, but General Robins' point is well taken, and is in line with the conclusion reached in Chapter 2 that uncertainty will never be totally removed from the battlespace. It is also worth reiterating the point that deception by the enemy will often degrade the utility of information. Again, being aware of these limitations of information is wise counsel.

An information power campaign is complicated by the civilian and shared nature of some of its assets. This produces a level of unpredictability that may make information power less controllable at times. This complication can be an advantage depending upon the user and his objectives. An information warrior operating in cyberspace may welcome the complexity of interconnections to hide his presence and activities. Another problem of being deeply interconnected is the potential for cascading effects of an information attack. For example, an ill-conceived worm attack against enemy information systems may return to one's own systems over the global network. In this way, Information power can be misused, and it can bite back.

The Continued Role of Physical Forces

There are more fundamental limitations to the strategic efficacy of information power. If the information revolution is to make physical geography and its relationships increasingly unimportant, then by implication it must make physically-based military forms of power irrelevant. Otherwise, if strategic objectives are still pursued through the use of traditional military forces, then physical geographical factors will still be relevant. Troops and equipment will need to be transported, in which case physical geography and distance will continue to matter. Also, the effects of terrain and the weather will still influence the conduct of operations.

There are two main ways in which the information revolution may render traditional forms of military power and geography obsolete. Firstly, information may become the dominant

[44] WJP. Robins, 'Information Age Operations', *RUSI Journal*, Vol. 142, No. 3, June 1997, p40.

factor in warfare, to the point at which information dominance may be the defining war-winning characteristic. To reiterate the premise of this thought: one belligerent in a conflict may have such obvious information dominance allied to Precision Guided Munitions, that victory becomes inevitable. As was concluded earlier, it is not inconceivable, in permissive conditions, for a conflict to end once information dominance has been achieved. Alternatively, as noted, Libicki postulates that information assets will create such visibility that offensive operations cease to be practicable. [45] In this way information power attains such dominance as to make physical expressions of power all but obsolete. A plethora of reasons were identified in Chapter 2 to suggest why such visions will not come to pass. Further to this, when considering the role of the infosphere it is important not to detach information power from the physical expressions of military force. Certain elements of information power emanate from the deployment of physical assets that at times require combat either to enable this deployment or to protect them. More often than not information power will act in concert with the other expressions of strategic power. Information power still needs air, land, or sea forces to destroy the targets it has identified, or to move supplies and troop deployments. One exception to this is the technique of 'chipping' which can disable an enemy system or vehicle without the intervention of the other forms of strategic power. [46] However, this technique has limited applicability and efficacy. In the Gulf War of 1991 it took the physical destruction and removal of ground forces to achieve the Coalition's objectives. Iraq's forces did not capitulate in the face of the Coalition's obvious information dominance. Also, the attainment of information dominance may require the destruction of enemy information assets. This will more often than not require the utilisation of physically-based forces.

The co-existence of the physical dimensions and the infosphere receives further validation in the responses to Michael Vlahos' article *The War After Byte City*. In this context, Ryan Henry and C. Edward Peartree correctly point out that even if Byte City becomes a reality, countries like the United States are still going to be required to fight in physical places like Mogadishu. [47] This only serves to emphasise the point that information power will exist alongside

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[45] Libicki, 'The Emerging Primacy of Information', and *Illuminating Tomorrow's War*.

[46] See Schwartau, especially Chapter Nine, 'Chipping: Silicon-Based Malicious Software'.

[47] Ryan Henry and C. Edward Peartree, 'Assessing 'Byte City': An Insightful or Misleading Vision?', *The Washington Quarterly*, Vol. 20, No. 2, Spring 1997, p.77.

its physical cousins, not replace them. Echoing this, Keohane and Nye note that at times 'soft power', for which information power is ideally suited, may at times require the application of 'hard power'. The example they use is that of military force being required to seize a radio station from which soft power can be generated. [48] These thoughts are not designed to underestimate the utility of information power, but merely to note that it is but one instrument of strategy alongside the others. Often the best results will come from a combination of these instruments.

The requirement to combine information power with the other instruments of strategy is nowhere better illustrated than in holding the high ground. The exploitation of the third and fourth dimensions this century leaves the high ground most potently composed of the air and space environments. Richard Szafranski and Libicki make a strong case that the infosphere must now be regarded as the high ground. [49] It may be more appropriate for the fifth dimension to be seen as the third part of the high ground equation. As a consequence, ensuring command of the high ground is an increasingly complicated task, which involves a synergistic relationship between these three dimensions. In this way, a 'high ground trinity' has developed in strategy.

Within the context of a military campaign these three dimensions of warfare (infosphere, air, and space) are so inextricably linked, that for a regular force command or control must be ensured in all of them simultaneously. The relationship amongst these three dimensions is almost symbiotic. For a regular force, to lose command or control of space would seriously compromise its information power, due to the inability to utilise space-based information assets. This does not relate to all actors in all circumstances. For example, a lack of space assets does not automatically equate with ineffective information power. An irregular enemy can often compensate for the absence of advanced information assets through the utilisation of local HUMINT. However, returning to the needs of a regular force, losing command of the air would create a similar situation to that faced with the loss of space control, due to the inability safely to deploy air-based information assets, such as JSTARS, AWACS, and Unmanned Aerial Vehicles (UAVs). Likewise, to lose information control to the enemy would undermine both space and air

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[48] Keohane and Nye, p.90.

[49] This is a point stressed in Richard Szafranski & Martin C. Libicki, '... Or Go Down in Flame? Toward an Airpower Manifesto for the Twenty-first Century', *Airpower Journal*, Vol. 10, No. 3, Fall 1996, pp.65-77.

power. An adversary with some degree of information control could interfere with satellites and their communications, or simply challenge the integrity of information across the board. Losing information control to the enemy also increases the vulnerability of space and air assets and compromises information operations. From these thoughts we see how the trinity develops, requiring protection for all three of its dimensions. This protection demands simultaneous operations in all three dimensions to ensure some form of command or control in each of them. Therefore information power relies on more traditional forms of military power just as much as they rely on it. This thought is further complicated by the fact that space, air, and information power all rely upon ground installations to function, which in turn require protection. In this sense, the interconnected relationships amongst the different dimensions are further enhanced.

The second means by which information power may render physically-based forces and environments obsolete, is through strategically successful attacks against the National Information Infrastructure (NII) of an opponent, and in such a context distance and geography would begin to take more of a back seat in strategy and wars could well be waged solely through the infosphere. However, as discussed in the previous chapter, it is unlikely that SIW will provide an independent theory of victory. Within the SIW literature there is often reference to a potential electronic Pearl Harbour. In response, it is worth remembering that the United States recovered from the real physical Japanese attack in 1941, and went on to win the Pacific war.

From the above discussion it has been suggested that information power is unlikely to provide an independently successful tool of strategy. In which case the more traditional physically-based instruments of strategy will still play an important role. However, it has also been shown that by utilising the infosphere a wide variety of actors, both big and small, can project power globally without reference to established geographic realities. So what does this all mean for geopolitics?

Geopolitics and the Fifth Dimension

As noted in the introduction to this chapter, a number of writers foresee revolutionary implications

for geopolitics. Walter B. Wriston unequivocally states that "Information technology has demolished time and distance." [50] Likewise, Jessica T. Mathews argues that the information revolution is bringing a novel redistribution of power, which reduces the importance of proximity and endows non-state actors with unprecedented levels of power. [51] Some of these observations seem to have a certain validity. For example, information power is extremely accessible, and to reiterate, *a little information power can go a long way.* In relation to acts of SIW, interdiction, economic warfare, and political warfare, small actors and even individuals have seldom had such readily available capabilities. Overall it seems credible to suggest that these characteristics of information power will have geopolitical implications. The important questions are how significant these implications will be, and how will they be manifested? What follows is a speculative assessment of how the information age may or may not affect geopolitics.

Geopolitically the information age may create somewhat of a paradox. On the one hand it may encourage states to become involved more readily in issues and crises regardless of their relative geographic position. Alternatively it may lead to a more isolationist stance. In 1968 Albert Wohlstetter noted that technological advances in transportation and telecommunications result in an extension of the neighbourhood, which brings increased chances for both co-operation and conflict. A state's interests become more global as cultural, capital, and economic exchanges increase. [52] Aside from the fact that a state may have greater interest in events that are not geographically contiguous to it, information power may also present an actor with a greater capacity to become involved in external matters. Sending military forces into a crisis zone is often an expensive and risky undertaking, and can prove politically controversial. Information power presents opportunities to influence events without direct presence and in a more discreet manner.

In contrast, being vulnerable to certain information power activities may make states more wary of becoming involved. The vulnerability of a state's NII to information attack, or the prospect of wide-spread political warfare campaigns against the involvement of the state in an

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[50] Wriston, p.172.

[51] See Mathews. Goodwin also notes that a common theme in some of the RMA literature is the notion that Information Warfare represents the rise of a new political-economic order, in which non-state actors do better than the Westphalian states. See Goodwin, p216.

[52] Albert Wohlstetter, 'Illusions of Distance', *Foreign Affairs*, Vol. 46, No. 2, January 1968, pp242-255.

external matter, could propel foreign policy towards an isolationist stance. Such considerations are heavily influenced by the context in which they take place. The issue involved may be of such import that a state is willing to accept the adverse effects of an information power campaign. Also, a state may have developed effective countermeasures or counter-information campaigns in order to limit the damage.

Ultimately, when considering the broad implications of technological developments on geopolitics, it is crucial to remember Luttwak's theory that countermeasures will be developed which limit the long-term influence of any successful strategy or instrument. Desmond Ball regards the development of these countermeasures as inevitable, in which case the conclusions of any technological development have only passing relevance. [53] Libicki has suggested that each new medium brings with it a new geographical logic that dominates and transforms the old media. He cites the exploitation of the air environment as an example of this. Libicki suggests that the significance of this lies in the fact that the British Isles could be attacked regardless of the fleet, which had traditionally acted as the ultimate protector against homeland attacks. [54] In response to this statement, it is important to remember the previous discussion regarding the failure of airpower to affect an independent strategic victory. Also, the fleet still played a critical role in that it helped prevent the Germans from mounting an invasion of Britain during World War Two, in which case the logic of the old medium (the sea) still mattered. Finally, the British development of a countermeasure, in the form of an integrated air defence system, helped limit the ability of the air environment to change the geopolitical logic of Europe fundamentally.

Historically, even technologies that might at first appear to change the prevailing geopolitical logic quite dramatically, have not ultimately rendered physical geography, and consequently the established geopolitical environment, irrelevant. Even under the potentially geopolitically ambivalent nuclear shadow, traditional geographic concerns still played a part. Again, this reveals that although certain technological developments can affect the geopolitical world they do not necessarily make all aspects of the previous environment obsolete. For example, Desmond Ball reminds us that geography still pervades nuclear matters. One particular

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[53] Desmond Ball, 'Modern Technology and Geopolitics', in Zoppo and Zorgbibe (eds), p175.
[54] Libicki, 'The Emerging Primacy of Information, p261.

case was the lack of suitable bases for the Soviet's ballistic missile nuclear submarine (SSBN) force. The absence of these bases meant that Soviet SSBNs had to pass through choke points en route to the open seas, which made them easier to track for NATO.[55] Therefore, physical geography can influence even nuclear matters. Geography pervades the nuclear field in another related manner. Where an enemy missile is launched from has significant implications for the command and control of nuclear forces. Shorter flight times for delivery systems can make quite a difference. As Ashton B. Carter has noted, Soviet SLBMs reduced the time scale for nuclear operations to fifteen minutes or less. This increased the likelihood of United States nuclear forces, especially its bombers, being caught on the ground in a Soviet first strike. [56] In these examples, although ICBMs and SLBMs made geographical distance less of an obstacle to the projection of force, they did not make distance nor geography irrelevant. Far from it, these factors were critical in nuclear operations.

During the Cold War, geopolitical concerns that could trace their origins to a time before nuclear-armed ICBMs still held sway. The American involvement in Vietnam was an expression of a containment policy that owed much to Mackinder's theories on the Heartland. In this sense, some conflicts are fought for reasons unrelated to the dominant technology of the period. Although the shadow of nuclear weapons influenced how the United States conducted the war, the conflict was not fought over issues relating to nuclear weapons, *a la* Cuba in 1962. The point being made is that Vietnam was fought because of a logic that owed nothing to nuclear concerns. Also, the forces used were conventional and physically-based, and therefore physical geopolitics still mattered, as did geographic issues such as terrain and weather. Further to this, as previously mentioned, the pre-war assumption that nuclear weapons would dominate future conflicts distorted USAF operations during the early stages of the war

It is also important to bear in mind the broader strategic limitations of any particular dimension of strategy. The maritime environment is certainly critically important to many actors, and plays a central role in the world's transportation and trading activities. But Gray and Corbett

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[55] Ball, p187.

[56] See Ashton B. Carter, 'Assessing Command System Vulnerability', and 'Sources of Error and Uncertainty', in Carter, John D. Steinbruner, and Charles A. Zraket (eds), *Managing Nuclear Operations*, (Washington DC, The Brooking Institution, 1987), pp555-610, 611-639.

are undoubtedly right when they note that sea power is only relevant to how it affects the main area of human dwelling, the land. [57] Gray extends this logic to the information age, and in response to Libicki's claim that cyberspace is placeless, Gray claims that humans are not placeless because they exist in a geographic reality. [58] The same can be said for the natural resources humans rely upon. To produce strategic leverage, information power must significantly influence the physical world. As has been argued throughout this work: to achieve such influence will more often than not require the aid of physically-based forms of power, and specifically the man on the scene with a gun.

Finally, it is important not to become deterministic with regards to geopolitics and technology. Wohlstetter wisely points out that being able to project power does not automatically mean that you will or have to. [59] When thinking about geopolitics we should not forget the 'politics' side of the equation. There has to be some policy rationale for utilising information power against, or in support of, someone. Simply being able to project power in real-time and on a global scale, does not mean that you will do so in every case

Conclusions

Although not wholly recognisable as a physical environment, the infosphere does constitute a fifth dimension of strategy. Ultimately, a form of strategic power can be projected within and through it. Information power is an extremely flexible instrument. Also, the information age empowers non-state actors in ways we have not seen before. As a consequence of its flexibility, ubiquity, and accessibility, it is hard to imagine a strategic actor performing well in the twenty-first century

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[57] Gray, *Leverage of Sea Power*, p.4.
[58] See Colin S. Gray, 'A Rejoinder by Colin S. Gray', *Orbis*, Vol. 40, No. 2, Spring 1996, p276.
[59] Wohlstetter, 'Illusions of Distance', p.246.

without understanding and taking account of information power. The broader geopolitical implications of the fifth dimension are directly dependent on how effective information power can be in the means-ends world of strategy. At times, and in certain cases, information power may prove to be independently sufficient to achieve policy objectives. This may be the case in the transfer of reconnaissance information to an ally. But in many instances information power will have to act in concert with the other physical instruments of power. This results primarily from the fact that humans exist and operate in the physical world. As a result, physical geography continues to matter both in military and geopolitical terms. Because geography matters, distance and proximity will also continue to play an important role. In addition, it is worth remembering that the infosphere and information are being territorialised. Rather than being an environment that is ambivalent to the traditional geopolitical reality, the infosphere will partially reflect it.

Also, as Keohane and Nye remind us, rather than just empowering sub-state actors, the information revolution can enhance the potency of a state's conventional military power. In fact, Keohane and Nye go further, and correctly note that the geographically-based nation states will continue to structure politics in the information age. They may be less accurate however when they suggest that nation states will rely more on information and less on material resources. [60] It is a mistake to raise the significance of information above the other instruments of power. States in general will base their power in all the dimensions of strategy as befits their particular situation and the circumstances of the time.

Strategy is a complex beast. The twenty-first century strategic and geopolitical environments will not be solely determined by any one dimension or form of power. If any dimension can make such a claim it is the physical land environment on which humans live. In the end, the expressions of power in the other dimensions must be able to exert leverage into this most basic of environments. Yet, the geopolitical landscape will change, because a form of strategic power (information power) can be projected globally without recourse to physical geography. However, the limitations of information power, allied to the basic dominance of physical geography, suggests that the new geopolitical reality will reflect physical geography at least as

[60] See Keohane and Nye, p88 and p94.

much as it will reflect the infosphere.

Chapter 6
Concluding Thoughts: A Clausewitzian Future

"Sun Tzu's notions of victory with minimal violence may displace Clausewitz's emphasis on the deadly clash of armies amid fog and friction." [1]

Introduction

The above statement by Arquilla and Ronfeldt, two of the most prominent writers on information age warfare, represents the explicit declaration of an often implicit, even unintentional, notion prevalent in much of the RMA literature. In this respect, the statement identifies the central assumptions which this thesis has set out to challenge. Namely, that the nature of warfare has changed in that it will become a less violent, less uncertain, and more controllable activity. It follows, that the dominant Clausewitzian paradigm has become anachronistic, and therefore should be replaced by theoretical works more fitting to the information age. Arquilla and Ronfeldt propose the work of Sun Tzu as an alternative to Clausewitz, yet it is also worthwhile exploring works written in the information age to test their utility as general theories of war. To the Clausewitzian faithful this exercise may appear to be verging on the sacrilegious. However, as noted in Chapter 1, the influence of certain works of strategic theory is such, and the subject they are concerned with of such import, that retaining a work of theory merely on the grounds of loyalty is unhelpful, and may even be counterproductive to the pursuit of better strategic performance. It is worthwhile returning to Bernard Brodie's question in relation to the opportunity costs involved in the reading *On War*: "Is the reading of this book at this time worth more to me than the reading of any other works that I could read with the same time." [2] Moreover,

[1] Arquilla and Ronfeldt, 'A New Epoch', p18.
[2] Brodie, 'The Continuing Relevance of *On War*', p55.

Gray, who describes *On War* as "my constant companion", [3] correctly asserts that strategic theory is a living tradition, hence Clausewitz's work requires amendment. [4]

To this end, this chapter will assess whether the various changes to the character of warfare, as outlined in chapters 2-5, will be sufficient to merit a change to the Clausewitzian nature of war. Although it will be established that both Clausewitz's 'climate of war' and his 'trinity' remain fundamentally intact, some significant changes have occurred in the information age, with more to come. This blend of continuity and change forms the basis for the evaluation of whether the various works of theory retain their validity for the future. It is the conclusion of this work that despite further changes to the grammar of war wrought by the information age, Clausewitz's *On War* is still worthy of Brodie's assessment as "... not simply the greatest but the only truly great book on war." [5] Yet, and in line with Brodie's own balanced examination of Clausewitz, the Prussian's work needs some reassessment and supplementation in the modern world. [6] The two other great classic works of strategic theory enjoy mixed fortunes in the information age. It will be argued that despite many claims akin to that expressed in this chapter's opening quotation by Arquilla and Ronfeldt, aside from his emphasis on the role of knowledge in warfare, Sun Tzu's reputation should not be greatly enhanced by recent changes. In contrast, a reinvigoration of Jomini's work may be justified, although his dogmatic emphasis on certain principles, and his fixation primarily on the operational level, ultimately leave him lagging behind Clausewitz as a general theorist of war.

Finally, there is the issue of works of theory written in the information age. As noted throughout this thesis, the current RMA has produced a plethora of literature ruminating over the changes instigated by the current epoch. Amidst this glut of literature three bodies of work stand out for recognition as prospective general theories of war. These are the Tofflers' *War and Anti-War*; the collective works of Libicki; and Arquilla and Ronfeldt's writings, most of which can be found in the one volume *In Athena's Camp*. That these three authors have been

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[3] Gray, *Modern Strategy*, pxi.

[4] ibid, p76.

[5] Brodie, 'The Continuing Relevance of *On War*', p58.

[6] For his part, Brodie argued that Herman Kahn's work on nuclear strategy was a useful supplement to Clausewitz, although only in a limited manner. ibid, p57.

chosen above all others does not necessarily indicate that they have produced the most competent modern writing on the subject. Also, it needs stipulating that other works aside from these three have made significant contributions to the current RMA debate. In this context, Admiral Owens, Andrew Marshall, and James Blaker are prominent figures. The three chosen bodies of work have been singled out on the basis that they transcend a narrow focus on the battlespace and extrapolate on the wider implications of the information revolution. Their work has a broad, encompassing perspective. These authors can also claim to have been significantly influential in various important quarters. Indeed, David Silverberg comments on how "the Tofflers are everywhere – at least everywhere in the defensive universe." [7] The aforementioned works are also representative of many other writings to be found in the RMA debate, in the sense that their central themes are evident in much of the RMA literature. Consequently, to examine these authors is also to examine much of the wider writings in the RMA literature. Therefore, these three works will be evaluated to assess whether they represent general theories of war, and are worth the opportunity costs involved in reading them.

The chapter will conclude by identifying certain basic factors which determine the enduring nature of warfare, regardless of historical, political, or technological context. As noted, this nature of warfare is exemplified in Clausewitz's 'climate' and 'trinity'. Although it will be shown that certain elements of the climate of war are not always directly in play during any particular conflict, they are always waiting on the sidelines ready to be reintroduced. This latter comment is of particular relevance to violence as an element in the nature of war. Violence is not always evident in conflict (for example in electronic warfare or 'pure' SIW), yet the dialectic nature of strategy makes its reintroduction an ever-present possibility. This explains why Clausewitz's emphasis on the battle is at times inappropriate, but ultimately correct. [8] It is the abiding factors of policy demands, geography, the dialectic nature of strategy (paradox), the adaptability of war (its polymorphous character), and the fact that war is an activity waged by humans, which ensure the resonance of Clausewitz's nature of warfare in the information age. In

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[7] David Silverberg, 'Tofflermania', *Armed Forces Journal International*, June 1995, p60.

[8] On this point Gray perceptively comments that "modern scholars have struggled in vain to sidestep the logic in Clausewitz's insistence upon the permanent salience of the possibility of combat." Gray, *Modern Strategy*, p97.

this sense, any analysis of the nature of war, and therefore the suitability of a particular work of theory, cannot be performed without recourse to these five elemental facets of strategy.

When examining the relevance of various works of strategic theory two prominent questions suggest themselves. Why is theory important? What characteristics should a general theory of strategy posses? As a general proposition, Wylie's assertion that no general theory can guarantee success should be treated as the first and most fundamental thought on the value of theory. [9] It is important to recognise the limits of theory within the practical world of strategic studies. And yet, this does not translate into meaningless existence for theoretical writings. As Wylie himself stipulates, one of the most elemental roles of a general theory of war is that it enables each of the armed services to see beyond their own environmentally restricted perceptions. [10] In a similar vein, a general theory may also help guard against the tendency to view strategic issues from a purely contemporary perspective, and therefore avoid the error of mistaking a fad for the enduring truth. Of course, theory can, and does, influence behaviour. [11] One of the most obvious and direct examples of this phenomena is the relationship between the theory and practice of strategic bombing, particularly in the interwar years when the central theoretical tenets of both precision and area/morale bombing were formulated in the works of Douhet, Trenchard, and Mitchell. As Murray notes, the influence of theory can reach into many areas including doctrine and force composition: "The Theories of Douhet and other early airpower advocates ... have exercised a great influence on the development of air forces since that time." [12] Similarly, the thinkers concerned with nuclear strategy during the Cold War were said to have "wielded enormous influence, not only over the way an entire generation's thoughts about military issues were shaped but also over the formulation of defence policy in the nuclear-weapon states." [13] Returning to the information age, the Tofflers' *War and Anti-War*, which, as will be argued later, is the weakest of the three bodies of work considered here, has "influenced many in the military."

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[9] Wylie, p2.
[10] ibid, p29.
[11] Gray, *Modern Strategy*, pp4 & 35.
[12] Williamson Murray, *The Luftwaffe 1933-45: Strategy for Defeat*, (Washington, DC, Brassey's, 1996), pxxiv.
[13] John Baylis and John Garnett, 'Introduction', in John Baylis and John Garnett (eds), *Makers of Nuclear Strategy*, (New York, St. Martin's Press, 1991), pp1-2.

[14] It appears that strategic theory can have both positive and negative influences on strategic behaviour. For example, strategic bombing theory has distracted attention and resources away from the other roles of airpower. For the practitioner the key challenge in this respect is to differentiate the good from the bad in a general sense, and to extract the useful elements from each work of theory. Good theory can be a useful ally to the practitioner, whereas unsound theory can mislead.

There are at least five main characteristics which a general theory must posses so that it acts more as an aid than as a hindrance. Firstly, it should be universal, and inclusive of all the different forms warfare can take. [15] This is of particular importance when considering much of the RMA literature which often tends to focus on the regular battlespace. Just as important as this first feature, any theory must coincide with reality. [16] To this end, Murray and Grimsley's declaration that strategy is the art of the possible can be taken as a warning to those who would construct complex or naively optimistic plans or theories. [17] In this context Clausewitz provides an important warning to the RMA enthusiasts: "[Theory's] purpose is to demonstrate what war is in practice, not what its ideal nature ought to be." [18] Thirdly, any theory must be of use to the practitioners of strategy. On this issue, Brodie is once again very persuasive: "Above all, strategic theory is a theory for action." [19] Echoing Brodie's wise counsel, Gray argues that strategic theory "has merit in the measure of its value to those who must meet the practical challenges of strategy." [20] The fourth element for a general theory is that, in Gray's words, it should not be affected by technology, geography, or tactical details. [21] The fifth and final characteristic is again taken from the outstanding work of Wylie, and concerns his superior concept of 'control'. Wylie argues that any general theory should have woven into it the notion

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[14] Lt. Col. Chris J. Krisinger, 'War and Anti-War: *Caveat Emptor*' (Review Essay), *Strategic Review*, Spring 1996, p67.
[15] Wylie, *passim.*
[16] ibid, pp62-63.
[17] Murray and Grimsley, p22.
[18] Clausewitz, p718.
[19] Cited in Gray, *Modern Strategy*, p3.
[20] ibid, p82. Clausewitz also contends that harmony must exist between theory and practice. Clausewitz, p164.
[21] Gray, *Modern Strategy*, p110.

that the objective of strategy is 'control'. [22] This final characteristic is perhaps the most controversial of the five outlined above. The controversy emanates from the fact that by advocating a guiding principle the theory is edging towards a prescriptive tone. However, because the aim of any strategy is control, and the concept of control is so embracing, this final feature of theory does not become restrictive in the same manner in which Jomini's principles often do. It is also important to return to the essence of the third characteristic, and to note that by highlighting the constructive nature of theory's role in the attainment of control, Wylie is merely placing the needs of the practitioner at the heart of his ideas. Strategic theory cannot afford to be an abstract pursuit as theory in some other fields is want to be.

In the final analysis it is appropriate that the wisest words written on the role of strategic theory are to be found in *On War*. Clausewitz succinctly identifies both the value and limits of theory. "[Theory] is meant to educate the mind of the future commander, or, more accurately, to guide him in his self-education, not to accompany him to the battlefield." [23] Later on in the work he elaborates on these thoughts: "Theory cannot equip the mind with formulas for solving problems, nor can it mark the narrow path on which the sole solution is supposed to lie by planting a hedge of principles on either side. But it can give the mind insight into the great mass of phenomena and of their relationships, then leave it free to rise into the higher realms of action." [24] Theory should be an aid to judgment, [25] whilst at the same time accepting the chaotic and varied nature of war, and thereby forego rigid principles for victory, leaving the human element as the final arbiter of success or failure.

The Unchanging Climate of War

Clausewitz's 'climate of war' can be perceived as a framework to understand the nature of warfare. In this respect, preparation for war, and indeed its conduct once hostilities have begun,

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[22] Wylie, p77.
[23] Clausewitz, p163.
[24] ibid, p698.
[25] ibid, p183.

should be undertaken with the expectation that the four elements of the climate have to be faced and dealt with. Consequently, military culture should reflect this reality. It is therefore important to identify whether or not the climate of war has been altered by the information age. Physical violence is one of the primary characteristics which distinguishes war from other activities in grand strategy. It is telling that Hedley Bull identifies violence as one of the three attributes that define war as: "organised violence carried on by political units against each other." [26] Although Clausewitz recognised that strategic success did not always require battle, and therefore violence did not invariably take place, he recognised that battle was constantly possible and always present in the calculations of the belligerents. It is therefore significant that this seemingly elemental aspect of the nature of warfare has been challenged within the RMA literature. The challenge takes various forms with differing degrees of severity. At the more reasonable end of the spectrum is a greater emphasis on disruption, as opposed to destruction, as a means to victory. Such claims do not necessarily dictate an absolute end to violence, although they do seek to diminish its occurrence and severity substantially. The more extreme comments in this argument can be found in Libicki's notion of information dominance and information-provided transparency rendering physical expressions of force redundant. Of equal significance is the potential professed for SIW. On this issue, SIW represents an interesting compromise, although one that ultimately can lead to an end to physical violence in warfare. SIW is still an act of force to compel an enemy to our will, and therefore still lies within the realms of warfare, and yet it does not necessarily represent an act of physical force. Aside from the aforementioned military cultural implications of less violent visions of future warfare, within the relevant literature there also exists a tendency to reduce the complex activity of war to a point at which information becomes the decisive element. This proclivity is exemplified by Leonhard's *The Principles of War for the Information Age*, and similarly can be found at the heart of the works of Libicki and Arquilla and Ronfeldt. [27] Taking these views too seriously could result in an undue emphasis on information assets and operations in procurement and doctrine.

There are four dominant reasons why violence cannot be removed from the act of

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[26] Bull, p184.

[27] In the case of the latter, 'Cyberwar is Coming' is particularly guilty of this sin.

war. Firstly, strategy may require the physical destruction of enemy forces and assets. As noted earlier, this was an expressed objective in both the post-D-Day campaign against the Wehrmacht, and Iraq's Republican Guard in 1991. In a more extreme example, sections within the Roman Republic viewed the destruction of the Carthaginian civilisation as the final goal of the protracted Punic Wars. This is not to suggest that such objectives will always be appropriate. On this point Wylie is generally correct when he notes that control should usually be achieved somewhere between extermination and not solving the problem. [28] The key to strategic judgment is identifying where that point lies and if it has been reached. Secondly, in some instances violent destruction of enemy forces will prove much simpler and therefore easier to execute than a finely-tuned disruption campaign. The former approach has the advantage of having a greater sense of finality about it. In many instances a disrupted foe can regain cohesion much more rapidly than a destroyed foe can reform itself. Thirdly, control will often require the physical presence of ground forces, in which case the enemy will probably need to be physically removed from the territory in question. Although at times an enemy on the wrong side of information dominance will cede control, there will surely be many occasions in which the enemy will have to be physically, and violently removed. A recent example of such a situation is the 1991 Gulf War, in which it took the violently executed Coalition offensive to compel Iraqi forces to withdraw from Kuwait. Finally, because war is an interaction between at least two intelligent actors, an enemy can always reintroduce violence into a non-violent conflict. Reflecting his emphasis on the preeminence of battle, Clausewitz persuasively argues that "the enemy can *frustrate everything through a successful battle* ... Thus it is evident that destruction of the enemy forces is always the superior, more effective means, with which others cannot compete" [emphasis in the original]. [29] In the modern world violence can be reintroduced in the extreme form of WMD. We should also keep in mind Dunlap's notion that an enemy may feel that strategic advantage can be obtained by pursuing especially violent forms of conflict. [30] It seems appropriate at this juncture to reiterate once again Clausewitz's warning concerning the dangers inherent in blunting one's own ability to prosecute

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[28] Wylie, p70.
[29] Clausewitz, p111.
[30] Dunlap, *passim.*

violent forms of warfare for fear that an enemy so endowed would hold an advantage. [31]

In the final analysis, it is important to note that warfare has always contained elements which are non-violent. From Clausewitz's own period the Battle of Ulm is a prominent example, and electronic warfare (EW) suggests itself as a noticeable non-violent feature of the modern era. However, both of these illustrations still fit into the Clausewitzian notion concerning the overarching presence of violent battle. Indeed, EW and psychological operations can be perceived primarily as activities which serve the violent application of force. This can also apply to SIW and/or acts of IW in the battlespace under certain circumstances. For instance, IW attacks against logistic systems or the informational/industrial infrastructure of a foe, can be regarded as supporting operations to the main campaign which is conducted by physical military forces. In this sense, SIW and IW more broadly resemble the supporting roles often played by airpower. However, it is when SIW performs a similar role to strategic bombing in the pursuit of an independent theory of victory, that cracks appear in the view that war is always potentially an act of physical violence. Under these circumstances SIW represents an act of force, but not necessarily an act of physical force. As noted, SIW can lead to violence, destruction, and loss of life, yet if carefully targeted it can act as a coercive tool without these effects. As noted in the previous chapter, this is one of the alleged advantages of cyberterror. The arrival of SIW would therefore seem to question the absolute validity of one aspect of the nature of warfare as outlined in Chapter 1. In fact, SIW goes even further, through its ability to wage war without recourse to any real physical exertion or direct involvement at a physical level of humans. Although, as a caveat it is important to note that humans are still intimately involved as both the instigators of the attack, and the intended target (the mind of the opponent). However, the discussion of the strategic potential of SIW in Chapter 4 indicates that this challenge to the nature of warfare is less apparent than first seems to be the case. The inability to convert SIW into a strategic theory of victory indicates that although SIW does represent a new form of warfare, in most circumstances it will merely act as a supporting element to traditional surface forces. Although, terrorists who only employ cyberterror do pose as an important caveat to the latter point.

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[31] Clausewitz, p309.

The dominant factors in the above deliberations are the requirements of strategy and its dialectic nature. It is strategy that largely dictates whether and how much violence is required. War is usually violent, but strategy requires more than just the application of violence and destructive force. Indeed, a large part of the art of strategy involves making a judgment on when to apply violent and destructive force, how much, in what form, and against which targets. At times, such as in the context of a nuclear deterrence strategy, the mere threat of the use of force may suffice. Nonetheless, even in these circumstances the possibility of battle is the key. This latter point works at two levels. Firstly, it is the potential destructive power of nuclear forces (or conventional forces in conventional deterrence) which acts as the prime mover for a deterrence strategy. Secondly, being prepared to fight a nuclear 'battle' (having a warfighting doctrine), as opposed to existential deterrence, in theory enhances the credibility of a deterrence posture. [32] Another case in which military force was often indirectly threatened rather than used directly was the nearby presence of Roman legions in the early empire. Although always ready to be deployed and used, the legions often achieved their objectives by the fact of their presence. [33] In certain contingencies, such as COIN, counterterrorism, or colonial policing, a more minimal use of force may be judicious. [34] It is within these contingencies that non-violent forms of information power may have particular relevance. Whereas, in the face of a regular and substantial enemy such as the Third Reich, the strategy of unconditional surrender translated into the direct application of large levels of destructive and violent force. Overall, the great practitioners of strategy have usually been adept at balancing the use and non-use of destructive force, and its relationship to the other instruments of grand strategy. This is true of T. E. Lawrence and Alexander the Great, to name just two. To take the latter as an example, Alexander's campaign against Darius III of Persia was constructed of a balance between successful battles and cruel punishments (Tyre) on the one hand, and leniency and constructive relationships with his conquered enemies on the other. [35] In Alexander's strategy can be seen a superior synthesis of Clausewitz and Sun Tzu's paradigms.

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[32] For a discussion of these issues see Colin S. Gray, 'War-Fighting for Deterrence', *The Journal of Strategic Studies*, vol. 7, 1984.

[33] Luttwak, *The Grand Strategy of the Roman Empire*, p125.

[34] Omissi, *passim.*

[35] For details of Alexander's campaigns, see Fuller, *The Generalship of Alexander the Great*, Hammond, and Lane Fox.

Although, ultimately those elements of his campaign with which Sun Tzu would have been most content were only possible as a result of his battlefield victories over the Persian army.

The optimism in the RMA literature's claim to be able to significantly reduce or eliminate violence from war, is equaled by its visions concerning the reduction of uncertainty in conflict. Again, the significance of this issue relates to both the preparation and conduct of war. The inherent dangers in all too readily accepting the conclusions of those who profess the coming dominance of concepts such as DBK and SOS, are persuasively expressed in Wylie's assertion that "planning for certitude is the greatest of all military mistakes." [36] Of particular concern is the notion that an RMA force requires fewer, if any, reserves. This conclusion is reached by two different, but related, routes. The first perceives reserves as purely a mechanism to deal with uncertainties. Consequently, if information systems can eliminate the fog of war then reserves become redundant. Secondly, this same level of certainty enables warfare to be successfully concluded by a single decisive action, in which case reserves will never have an opportunity to play a part. As a response to these thoughts we can turn to the work of T. E. Lawrence, who penned these lines in his discussion of the intangible elements of war and in response to earlier theories relating to the demise of the reserve: "There was a line of variability (man) running through all its estimates. Its components were sensitive and illogical, and generals guarded themselves by the device of reserves ... Goltz has said that when you know the enemy's strength, and he is fully deployed, then you know enough to dispense with a reserve. But this is never. There is always the possibility of accident, of some flaws in materials, present in the general's mind: and the reserve is unconsciously held to meet it ... Nine-tenths of tactics are certain, and taught in books: but the irrational tenth is like the kingfisher flashing across the pool and that is the test of generals." [37]

In the above statement Lawrence summerises well some of the many reasons which will ensure that war remains an uncertain activity. However, the increased levels of certainty envisaged in the RMA literature cannot be dismissed out of hand. All things being equal, information systems and better information operations should ensure that certain elements of

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[36] Wylie, p72.

[37] Lawrence, 'Guerrilla Warfare', p884.

warfare will become less uncertain for certain periods of time. This is particularly true in relation to the disposition of forces in the battlespace. To this end, *JV 2010* is right to expect "increased transparency". [38] The significance of this should not be underestimated. Historically, many battles have been heavily influenced by uncertainties in the whereabouts and status of forces. The Battle of Waterloo provides just one example from Clausewitz's own time, and is typified by the concerns and uncertainty about 'where is Blucher?' This potential for increased transparency, added to the aforementioned increased reliance on information in certain weapon systems, and the greater assurity of destruction in the battlespace because of an increasingly efficient sensor to shooter relationship, implies that Libicki is correct to stress the significance of the conflict over information. Likewise, Leonhard is right to call for information operations to be regarded as an equal in combined arms operations and joint warfare.

Whilst accepting the potential for increased transparency, it is important to correct the error in the RMA literature which too readily links success in the infosphere to a theory of victory. Aside from the fact that strategy requires competence across a whole range of dimensions, [39] it is also important to note that certainty will in all likelihood never be achieved. This is due to at least seven main reasons. Firstly, because war is an interaction with an intelligent enemy, certainty is reduced by the non-linear results of the interaction itself, and also by the deliberate actions of the enemy. This latter category includes acts of deception and attacks to degrade information systems. Secondly, as Lawrence notes in the above quotation, war is infused by intangible elements, many of them relating to humans and therefore of an unquantifiable nature. War and is not just constructed of physical units to be identified. The third element of uncertainty is 'intent'. Seeing the disposition of enemy forces is not the same as understanding what he will do with them, although dispositions can give an idea of intent. In his piece *What is Information Warfare*, Libicki notes that stronger encryption, ironically a product of the information age, will make it significantly more difficult to uncover enemy intentions from his transmissions as was done with Ultra in World War Two. [40] Fourthly, information-overload will

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[38] *Joint Vision 2010,* p39.
[39] Gray, *Modern Strategy, passim.*
[40] Libicki, *What is Information Warfare?*

complicate the task of identifying certainty. In this respect, there is an important distinction between having information and knowing the true state of affairs. We can extrapolate from the case of Pearl Harbour that the increase in information in the Twenty-first Century will not only see an increased production of useful information, but will also witness a growth in noise. The fifth factor which maintains uncertainty relates to the geography of any particular battlespace. This is particularly relevant in the increasingly prevalent urban battlespace. Uncertainty in this instance is not just a product of the physical structure of an urban area, but can also be produced by an enemy mingling with the civilian population. The SOS will not solve the age-old problem of distinguishing a guerrilla from a civilian. This suggests another related problem for acquiring greater certainty, and is concerned with the many forms war can take. As noted, some of these forms do not include regular identifiable forces. The sixth problem is that of human error. Ultimately, information has to be handled and used by humans. And as the cases of both General MacArthur and Bomber Harris reveal, information is processed by individuals who may have strong preconceived ideas. Also, returning to the discussion of military genius, certain commanders may not have the cognitive abilities to make effective use of the information they receive. Judgment in war is still very much an art, not a science. Finally, the level of certainty attainable will be affected by the somewhat ambiguous, but ultimately useful, term 'chance'. Warfare in the information age will not run like clockwork. In which case, a plan based on perfect and complete information can still fail because of some unforeseeable incident. In conclusion, these seven main factors which reduce certainty mean that warfare still lies in the realms of the unpredictable. Therefore, war is still an environment in which, as Clausewitz notes, the judgment of the commander is paramount. [41]

In many respects the current RMA reflects the strategic culture of the United States with its tendency to seek technological fixes to strategic problems, and the increasing removal of humans from the sharp end of war. The former of these traits could result in poor strategic performance, whereas there is some, albeit limited, rationale for the latter. There is a certain operational logic in the increased utilization of UCAVs, stand-off munitions, and artificial

[41] Clausewitz, p97.

intelligence. These developments offer the potential for higher operational tempo. As with many of the proposals and visions of the RMA, the problem with these concepts arises if they are not considered within a strategic perspective. Often, desires for less direct human involvement in conflict emanate from two sources. The first relates to an alleged sensitivity to casualties, whereas the second is based on an overlyoptomistic appraisal of the strategic efficacy of bombardment. It is interesting that various strands of the RMA literature exhibit two contradictory errors of analysis. Certain works place too little emphasis on the strategic value of battle and firepower, often because of an undue confidence in the efficacy of information operations. Alternatively, too much faith is placed in the strategic efficacy of standoff bombardment. However, although these two approaches represent contradictorily errors they both have an identical inadequacy: an astrategic outlook.

To understand why humans must remain directly involved in the prosecution of war, we need look no further then the requirements of strategy, war's varied forms, and strategy's dialectic nature. Wylie's concept of control once again serves as the most useful frame of reference in relation to strategic needs. Wylie helpfully concludes that control is about people. [42] From this perspective we can begin to recognise the value of infantry and ground forces more generally. To reiterate, it is only these forms of military power which can provide prolonged, durable presence and exert control over the key issue, whether that be a population or some other resource. This is of particular importance in 'small wars', in which the direct protection of the population is often paramount, and when the political dimension is more pronounced. [43] The flexibility of the man on the scene with a gun is also of merit when we consider the geography of certain battlespaces. In this respect, urban, heavily forested, and mountainous regions immediately spring to mind. In conclusion, certain strategic requirements relating to the form of a particular conflict (small wars), allied to specific geographical environments, make it almost imperative that ground forces, and infantry especially, be the leading edge in a campaign.

Once it is accepted that ground forces must be available to meet the needs of strategy, it is a logical step to defend the continued existence of manned platforms in the face of

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[42] Wylie, p89.

[43] Gray, *Modern Strategy*, p284.

Libicki's assault by 'the small and the many'. [44] Although flexible, infantry forces invariably are both vulnerable and relatively slow moving. The traditional answer to these two problems, namely: manned platforms which provide protected firepower and mobility, appears to be as relevant in the information age as it was previously. Organic firepower would also serve as a guarantee should the networks upon which distant firesupport relies be attacked or go down for other reasons. It is worth making the point again that the advocates of concepts such as the Mesh and SOS do not pay enough serious attention to the paradoxical logic of strategy. If information networks prove to be a significant force multiplier, then these same networks may become the prime target of enemy efforts. This is not to undermine the valuable and increasing role that stand-off firepower will play, but merely to note that organic firepower is a sensible and complimentary element. This combination of distant and organic firepower was at the heart of improvements in operational and tactical art during the First World War. In that particular case indirect artillery certainly had a leading role, and yet infantry platoons also required and benefited from innovations such as the Lewis gun. [45] Further, as Applegate correctly notes, organic firepower also provides punch should the other armed services which contribute firesupport not be available. [46] Returning to the needs of strategy, the lessons of Bosnia are also worthy of attention. Although heavy armour does not appear to have an obvious role in such a peacekeeping operation as in the Balkans, British Challenger tanks performed a useful psychological, deterrent, function, and aided efforts to limit the escalatory tendency of the conflict. This latter example merely serves to highlight the varied and flexible nature of manned platforms.

The continued requirement to put ground forces into harm's way does not mean that some of the innovations of the information age will not have a role. For certain missions, and in certain circumstances, unmanned platforms and/or stand-off missiles will represent the leading edge. Yet, it is difficult to perceive how these same technologies can perform the many varied roles strategy and the variability of war, including variable geography, call for. Consequently, because humans will continue to wage war directly, the individual human commander, perhaps

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[44] Libicki, 'The Small and the Many'.
[45] P. Griffith, *passim*.
[46] Applegate, p81.

aided by AI, also has a safe future. In this respect, the commander fulfils two primary functions. Firstly, he deals with the humanity of the men under his command, and secondly he plays a vital role by making strategically important judgments. A fundamental point that much of the RMA literature, with its emphasis on technology and/or information operations, misses or undervalues is Gray's assertion that strategy is about, and is done by, people. [47] Since war will continue to be characterised by violence, human involvement, uncertainty, strategic needs, and interaction with an intelligent enemy, then friction and chance will invariably continue to operate as well. [48] It can therefore be concluded that the information age has not delegitimised the Clausewitzian climate and nature of war. Nevertheless, the information age has, and will introduce some significant changes into the character of war which at least require some adjustments, and therefore perhaps Clausewitz needs some reassessment and supplementation.

Coming Changes

Although the foundations which constitute the nature of warfare remain fundamentally intact, the information age does appear to have brought about some important changes which impact on the practice of strategy. With the maturation of the infosphere as a dimension of strategy in mind, it is appropriate to regard the current epoch as of equal importance to the changes wrought by both the air and nuclear revolutions in the twentieth-century. Whether these moments of change represent RMAs is somewhat of a mute point. It is of no real importance whether any particular change can be classified as an RMA in some academic script, instead, what matters is how these changes can be exploited in the reality of strategic practice. What follows is an analysis of the main changes and their implications.

The first notable feature of warfare in the information age is that information may have become more directly relevant to the outcome of military operations. The key words in this

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[47] Gray, *Modern Strategy*, p26.

[48] These characteristics of war provide the majority of the ingredients of Clausewitz's 'unified concept of a general friction'. See Watts, p32.

last sentence are 'more' and 'directly'. Information has always played an important role in warfare, as Slim's comment and Hannibal's success at Lake Transimene testify. [49] Yet, there is some validity in Libicki's assertion that war may increasingly take on the form of hide-and-seek. This results from the increased omnipotence and efficacy of sensors, the increasingly rapid dissemination of information to shooters, and the growing levels of precision and assurity of kill. Libicki's thesis loses its persuasiveness when it extrapolates from these findings to conclude that war will cease to be a force-on-force experience. In this respect Libicki has committed a number of errors. The first is to underestimate the paradoxical logic of strategy. Superior information and weapon systems will not be permitted to rule the battlespace indefinitely and unmolested. Responses to these systems can take either a symmetrical or asymmetrical form. Indeed, the Pacific War reveals how simple fortification measures by the Japanese offset United States distant firepower. Japanese bunkers were notoriously difficult to knock out. [50] Libicki's notions also abide by the false belief that information has become the dominant dimension in warfare, whereby, due to the recognised potency of the sensor-to-shooter relationship, the battle over information becomes the decisive and possibly only element of the war. In contrast, although still recognising the advantages to be gained from information superiority, it is plausible that a force can still function without substantial information support. Admittedly, the force may operate less effectively, and may be more vulnerable, but to expect it to capitulate immediately on losing the information battle is too reductionist. In fact, to highlight the continued importance of physical assets in war, it is likely that a force deprived of physical supplies will operate less effectively than if it had been deprived of its information assets. An infantryman or tank can still function without being connected to an information net, but both will not operate effectively for long without food, water, and fuel, respectively. Nevertheless, to reiterate, information has become a more prominent, and perhaps a more significant dimension in warfare. This fact should be recognised by the acceptance of Leonhard's notion that information operations be regarded as an equal part of

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[49] See 'Introduction', p1, for Slim's comment. Gray also correctly identifies information as a permanent dimension of war. *Modern Strategy*, p252. See also Lawrence, 'Guerrilla Warfare', p885.

[50] See Ronald H. Spector, *Eagle Against the Sun: The American War with Japan,* (New York, The Free Press, 1985), p262.

combined warfare. Further to this, success in information operations may increasingly require the realisation of Libicki's call for an info corps to operate in this fifth dimension of strategy. [51]

The encompassing term 'digitisation' constitutes the second significant change. In particular, attention should be focused on the C^2 implications. Again, it is worthwhile noting that digitisation does not achieve anything definitely new, C^2 still function when using semaphore, drums, or wireless radio. Yet, the relative advantages of digitisation should be exploited. In particular, command structures are affected. To this extent, the advocates of the organisational implications of the information age are worthy of note. [52] Chapter 3 noted the distinct advantages of the hybrid command structure which utilises the best features of both hierarchies and networks. In theory, such a structure would benefit from the flexibility, adaptability, information flow, and robustness of a network, while at the same time retaining the concept of the commander's 'intent' as the overarching guide to action. Discussions of C^2 in the information age invariably throw up the prospect of command by AI. Chapter 3 suggested that although possessing some distinct advantages, AI should only ever be regarded as an aide to the irreplaceable human commander. All told, digitisation and its organisational implications warrant exploitation, but we should not fall into the trap of elevating these elements of strategy to the point at which they are claimed to be the dominant and decisive dimensions. A digitised force, operating with information age organisational structures and ethos, should provide a number of relative advantages over its industrial age counterpart, but it will not ensure strategic victory.

The third new element of the current epoch in warfare has a more genuine originality than the previous two. SIW, with its non-violent, non-physical, real-time, global reach, does represent a new means of waging war. However, as discussed earlier, it shares some significant similarities with strategic bombing. It is the conclusions drawn from this comparison which suggests that SIW will rarely, if ever, represent an independent theory of victory. Consequently, SIW will not fundamentally alter the nature of war. However, this limitation in its strategic efficacy does not significantly detract from its importance. Precisely because this form of warfare is so readily accessible, and so potentially damaging to an information age society, any

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[51] Libicki, *The Mesh and the Net.*

[52] This is central component of Arquilla and Ronfeldt's work.

defence community must take it seriously. Taking it seriously entails the development of both offensive and defensive capabilities.

SIW represents just one element in the grand strategic instrument of 'information power'. As an overall concept this fourth change is not new to the information age. Yet like many of the other changes, it may be enjoying increased potential. This heightened promise is related to the growing significance of information generally and the growth and development of cyberspace in particular, which has endowed information power with a greater range of outlets, operations, and more direct impact.

The final change worthy of note is the result of a culmination of the previous four, and therefore represents the most significant development of the information age. The rise in the significance of the infosphere, the fifth dimension of strategy, cannot be ignored. Like the other dimensions, strategy in the infosphere has its own grammar, and requires operations which are specific to its unique nature. The dominant operational and strategic concept in this fifth dimension is 'control of the infosphere'. Control, as opposed to command, not only reflects the complex reality of the infosphere, but also facilitates greater flexibility to operations in this unique environment. However, the essential point to make about the infosphere is that it represents only one, and not the decisive or dominant, dimension of strategy. In this respect, Corbett's realistic assessment of the potential for sea power is equally applicable to information power. Information power only has relevance in how it exerts leverage onto the land where people live. For this reason, the infosphere will add an extra dimension to geopolitics, it will not render traditional geopolitical concerns irrelevant.

Clausewitzian Future (with a Jominian Renaissance)

It was Clausewitz himself who acknowledged that each age had its own particular character of war, but that there also existed certain universal elements which should always be considered. [53]

[53] Clausewitz, pp717-718.

This thesis has demonstrated that indeed warfare in the information age exhibits its own characteristics, and even presents some significant changes. Yet, the essential nature of warfare, as exemplified in Clausewitz's climate and trinity, remains mostly unchanged. Therefore, at minimum, *On War* remains a great, and relevant, work of strategic theory. The question then is, does it remain the 'only truly great book on war', and does it need supplementing with the reinvigorated works of Sun Tzu and Jomini? Alternatively, are the changes wrought by the information age of such seismic proportions that the nature of war can now only be understood with reference to new works of strategic theory as well?

Arquilla and Ronfeldt believe that Sun Tzu now represents a more accurate reflection of war than does the work of Clausewitz. Their interpretation is in agreement with B. H. Liddell Hart's assessment in the 'Foreword' to Samuel Griffith's 1963 translation of the Chinese general's work. Whilst accepting the status of Clausewitz, Liddell Hart considers his work dated in comparison to Sun Tzu's. [54] It is fitting therefore to begin this assessment with the work of this Chinese doyen of the information age. Sun Tzu has much to offer those wishing to understand warfare in the information age. Yet, in many important respects his work represents more of an ideal than a reality, and at times is too reductionist. The most prominent positive feature of *The Art of War*, and the one which receives most attention in the current epoch, is the central role attributed to knowledge in the conduct of strategy. Sun Tzu is right to promote the value of gathering knowledge on the enemy, oneself, and the terrain. And yet, like many of his information age counterparts he makes too direct a link between knowledge and success. Acting as a balance to all such reductionist theories which distill the art of strategy down to one or two dimensions, is Gray's assertion that success requires a level of competence in most of the dimensions. [55] In this respect, Sun Tzu proffers sound advice, but do not take his assertions too literally. Although not often noted by the RMA enthusiasts, Sun Tzu's statement concerning deception in warfare is of particular relevance in the current age. There is a certain irony here for those writers who put faith in the potency of information, because quite naturally the goal of deception is to reduce the efficacy of information and knowledge. Therefore, the same theorist

[54] B. H. Liddell Hart, 'Foreword', in Sun Tzu, pv.
[55] Gray, *Modern Strategy*, p358.

who promotes the value of information gathering, also values one of the primary methods to render that same information less effective. This is to Sun Tzu's credit. By creating a juxtaposition between knowledge and deception, he captures the dynamic nature of the conflict over information. Indeed, *The Art of War* is primarily concerned with the manipulation of information, and in this respect exemplifies the concept of control of the infosphere. On the broad issue of information Clausewitz is far too negative. However, Gray is undoubtedly right that Clausewitz's concept of the fog of war is a healthy corrective to those writings which promise total situational awareness or DBK. [56] In agreement this thesis has somewhat laboured the point that various factors will ensure the continued primacy of uncertainty. Similarly, Clausewitz is correct to stress the role of the commander in dealing with this inevitable uncertainty. However, the Prussian unduly downplays the role information gathering can have in dealing with uncertainty. Clausewitz's attitude to the role of information is exemplified by the mere one and a half pages he devotes explicitly to the subject, and the negative influence he believes information has by creating doubts in the commander's mind. On the issue of information it seems that the most balanced approach lies within a synthesis of Clausewitz and Sun Tzu's work. Interestingly, this synthesis is evident in Jomini's *Art of War*. Jomini accepts the inherent uncertainties in warfare, and acknowledges the fact that information may be inaccurate and that perfect information is not achievable. Like his Prussian contemporary, he sees part of the answer to this problem lies in the qualities of the general. However, within his work Jomini also espouses the value of collecting information, discusses relevant issues such as information security and encryption, and by his ideas concerning decisive points suggests that useful, perhaps decisive, knowledge is attainable. On this subject, Jomini presents perhaps the most balanced perspective of the three great theorists.

Sun Tzu's unfortunate tendency for reductionism is nowhere better exemplified than in his axiom "For to win one hundred victories in one hundred battles is not the acme of skill. To subdue the enemy without fighting is the acme of skill." [57] The broad scope of strategy does not allow for such a one dimensional appraisal. As mentioned repeatedly throughout this thesis,

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[56] ibid, p96.
[57] Sun Tzu, p77.

destruction of the enemy and/or his forces can be a requisite for the attainment of one's strategic objectives. In the case of the 1991 Gulf War, had the Coalition somehow been able to force the withdrawal of Iraqi forces without the need for battle, it is unlikely that an unscathed Iraqi army would have ceased to pose a threat to the emirate, and therefore the attainment of the Coalition's objectives would have been even less complete than they were. Upon close examination of Sun Tzu's work it becomes clear why his theories are popular amongst some of the RMA advocates. In certain respects he espouses ideas which have a very contemporary ring to them. To summerise: he proclaims the desirability of short wars, economy of force, the decisive role of information, and the minimisation of enemy casualties. A quick assessment of these notions might suggest that: a protracted conflict can promote an actor's goals in certain cases (North Vietnam); that preserving one's forces is generally a useful principle; information is an importing feature of warfare, but rarely decisive; and the level of violence/destruction inflicted on the enemy should be dictated by strategic requirements. This is not to say that *The Art of War* does not encompass some subtle and balanced appraisals. For example, see the above discussion concerning Sun Tzu's appreciation of the need to 'control' the infosphere. Also, his discussion of ordinary and extraordinary forces suggests that he understands the complex character that war can assume. [58] However, these thoughts do suggest that Sun Tzu's analysis, although containing useful, and sometimes insightful, perceptions, is generally too restrictive to encompass the breadth of strategic requirements and circumstances.

Jomini goes some way towards rectifying these deficiencies, and in this respect his work reflects a more nuanced approach than he is often given credit for. Being a good Napoleonic thinker, Jomini regards the destruction of the hostile army as the most effective means to produce decisive results "since states and provinces fall of themselves when there is no organised force to protect them." [59] However, he also concedes that results can be gained by outmanoeuvering the enemy to fall upon his flanks, and thereby demoralise him. Although, interestingly Jomini regards such victories as less decisive than those obtained through destruction of the enemy's force. [60]

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[58] ibid, pp91-92.
[59] Jomini, p89.
[60] ibid, p201.

Finally, and perhaps reflecting a recognition of the political and human elements in strategy, and also Napoleon's experiences in the Iberian Peninsula, Jomini describes the application of physical military force to quash a 'war of opinion' as "inappropriate measures for arresting an evil which lies wholly in the human passions." [61] On this issue, as is the case with the role of information in war, Jomini benefits from a reevaluation of his work inspired by the information age.

Despite the quality of Jomini's ideas, Clausewitz's thoughts on the function of violence in war is undoubtedly the superior analysis. The essence of his thoughts are to be found in Book 1 Chapter 2, and Book 8. In these sections of *On War* Clausewitz reveals that he does not subscribe to a blind fixation on physical destruction of the enemy. His range of thoughts on this issue include the acceptance that many roads lead to success, and whether violence is required depends on the particular circumstance. [62] He also correctly identifies the destruction of the enemy's force as merely a means to an end rather than being an end in itself. [63] Importantly, Clausewitz is cognizant that under certain conditions defeat of the enemy forces is not possible, for example if one side has a marked relative weakness. [64] Furthermore, Clausewitz's own definition of destruction of the enemy does not rest solely upon acts of physical violence: "The fighting forces must be *destroyed*: that is, they must be *put in such a condition that they can no longer carry on the fight.* Whenever we use the phrase 'destruction of the enemy's forces' this alone is what we mean." [emphasis in the original] [65] This is an important statement by the Prussian theorist, because it demonstrates that his work is in harmony with those instances in which the enemy can be defeated with little or no acts of physical violence. In this respect, Clausewitz retains his validity on those rare occasions when disruption or manoeuvre are decisive. Although, as noted in Chapter 1, this does not detract substantially from his perspective that war is usually an act of bloodshed: "*violent resolution of the crisis*, the wish to annihilate the enemy's forces, is the first-born son of war." [emphasis in the original] [66]

These thoughts reveal that Clausewitz perceived war as a varied activity in which

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[61] ibid, p26.
[62] Clausewitz, p107.
[63] ibid, p110.
[64] ibid, p103.
[65] ibid, p102.
[66] ibid, p113.

violence had a more muted role at times. Yet, it is when he links these thoughts to the role of combat and fighting that his superior analysis becomes most evident. Whist recognising that war does not always include physical fighting, and that strategy does not always require it, two factors ensure that physical combat and violence have central and dominant roles in warfare. It is this reality which must underpin any preparation for future war. Firstly, "Combat is the only effective force in war; its aim is to destroy the enemy's forces as a means to a further end. That holds good even if no actual fighting occurs, because the outcome rests on the assumption that if it came to fighting, the enemy would be destroyed. It follows that the destruction of the enemy's force underlies all military actions." [67] As previously accepted, destruction of the enemy can in theory be achieved by disruption. However, the rarity of such a decisive non-violent, non-attritional act is such that war preparation must have at its heart the expectation that violent combat will occur. Secondly, Clausewitz reminds us that because war is conducted amongst competing belligerents, the natural tendency for war to escalate to its extremes. This translates into the possibility that the enemy can reintroduce combat and violence. By reintroducing violence against an enemy unprepared for such an eventuality, the belligerent who raises the anti may gain an advantage. Although over-selling the point somewhat, Clausewitz is still ultimately correct to stress the superiority of combat in war when he states "the enemy *can frustrate everything through a successful battle.*" [emphasis in the original] [68] The superiority of Clausewitz's analysis emanates from the fact that it encompasses the role of an intelligent enemy, that war is ultimately a battle of the wills conducted primarily through physical expressions of force, and his emphasis placed on the dominant role of strategy. It is this latter point which the RMA literature so often overlooks. Although recognising that each age and culture will have its own peculiar preconceptions of war, and therefore its own limiting conditions, [69] Clausewitz rightly notes that policy, amongst other things, will (one can say 'should') determine the character of a war. [70] This would suggest that post-heroic warfare has some recognised validity in a Clausewitzian world. However, as Clausewitz himself recognises, although certain conditions are unique to each age, there are

[67] ibid, pp110-111.
[68] ibid, p111.
[69] ibid, p717.
[70] ibid, p732.

universal truths which every theorist, regardless of context, must include. [71] These ubiquitous elements must be given priority over current political or social inclinations. Otherwise, an enemy operating within the universal elements would invariably gain an advantage over those who neglect these truths.

Of the three classic works of theory, Clausewitz and Sun Tzu embody the human element of warfare most convincingly. Although all three works place great emphasis on the role of the human traits of the commander, Jomini's thesis suffers from his overly deterministic discussion of operational and geometric principles, which seem to leave insufficient room for discussions of the human and therefore political aspects of strategy. Gray correctly includes the human element as one of his main dimensions of strategy. Although it represents an obvious dimension, the human role in strategy requires attention because war is conducted ultimately by humans. Again, this work has shown how the RMA literature has a tendency to regard warfare as being composed solely of quantifiable units which can be translated by the system-of-systems into information to be displayed on a computer monitor. This approach commits two significant errors. Firstly, since politics is concerned with the interaction of humans, it ignores the fundamental role played by politics and the affairs of humans in strategy. Just as erroneous, the RMA literature underestimates the moral forces at play in war. As *Warfighting* recognises, these intangible elements play at least an equal part in deciding the outcome of any particular conflict.

Sun Tzu's work contains a number of dominant themes. The role of knowledge in war has already been identified. However, another thread running through *The Art of War* is the recognition that war is conducted against an opposing human mind. This may be a result of Sun Tzu's Confucian tradition which regards war correctly as partly a cerebral activity. Although he is sometimes rightly criticised for giving insufficient attention to the paradoxical logic of strategy, and thereby does not fully explain the significance of an opposing human belligerent, Sun Tzu is acutely aware of the fact that war is far more than just force dispositions. In this respect he discusses a number of factors, including: the advantages to be gained from playing on the temperament of the enemy commander, the relationship between commander and population, and

[71] ibid, p718.

he even notes that human frailties can be exploited when he discusses cultural warfare waged by the introduction of licentious dancers. [72] History is in accordance with Sun Tzu's emphasis on the significance of human traits in war. Whether it be Hitler's ideological vigor, Napoleon's egocentric visions of grandeure, or Hannibal's thirst for revenge, individual human characteristics can have both positive and negative effects on strategic performance.

Similarly, for Clausewitz the organic whole of war is constructed of a mix of physical and psychological/human factors. This is evident in the trinity, which contains the human elements of passion, politics, and the play of chance. Akin to Sun Tzu, Clausewitz places great emphasis on the traits of the commander. Aside from recognising the human traits required for *coup d'eoil,* the essence of military genius, much of the dominant concept of friction emanates from human involvement in the art of war. It is within the unified concept of friction that the effects of the nature of warfare can be felt. As is often cited, friction distinguishes war in theory from war in reality. Importantly, the broader concept of friction includes not only chance events such as mechanical failure or the weather, but also includes the mismatch between means and ends, and a number of human-related difficulties such as danger, physical exertion, physical and political limits on the use of force, and unpredictability resulting from interaction with the enemy. [73] Admittedly, the delivery of firepower by PGMs, or the application of power through SIW, should exhibit different and less obvious forms of friction than the conveyance of power by foot soldiers who have to contend more directly with the enemy's forces and terrain. However, the two former methods of war both have their own forms of friction, and their inability to produce decisive strategic results will ensure that the more friction prone expressions of power will continue. The role of friction is critical because it largely determines whether or not war is a controllable activity. Sun Tzu tends towards regarding war as a controllable phenomena, so long as one can acquire good knowledge and have effective command and control of one's forces. Clausewitz perceives war as being more manageable, than controllable, because the military genius can achieve policy ends by the use of military means. However, this positive control of war does not represent a reductionist, one-dimensional perspective which rests its assumptions on

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[72] Sun Tzu, p114.

[73] Watts, *Clausewitzian Friction*, p32.

the advantage to be gained from good C^4I. Instead, Clausewitz's concept of control comes from the military genius' ability to cope with friction through his cognitive abilities and strength of determination. On this point, a synthesis of these two theorists' work is perhaps most appropriate. Better knowledge and C^2 should in theory reduce the chaos of war, and yet the intangibles, many the result of human involvement, are best dealt with by human actors. To this synthesis, one should also add the value of factors such as training and quantity, which also help reduce the influence of friction. [74]

The New Theorists

Evidently, the information age has brought mixed, but generally favourable, fortunes for the three great classical works of strategic theory. In the final analysis, Clausewitz still retains his preeminence because the core of his work has proven to be universally applicable, and his approach reveals a subtle balance which reflects the complex nature of war and strategy. Interestingly, although his views on the role and value of information clearly do not do sufficient justice to this important dimension of strategy, his general appreciation on the prominence of uncertainty remains valid. Information is the one significant area in which *On War* needs supplementation. On this issue, both Sun Tzu and Jomini are useful. The Swiss theorist offers a more balanced appraisal of information by valuing its contribution, but at the same time not propelling it to a dominant and decisive place in the outcome of strategy. Whereas, Sun Tzu provides a useful antidote to Clausewitz's pessimism, but ultimately assumes that too much certainty is achievable. The real value of the Chinese theorist's work comes from his implicit understanding of how information can be manipulated, and therefore *The Art of War* is useful reading for those contemplating 'control of the infosphere'.

Due to the growing and more direct significance of the infosphere it seems at least possible that some of the theory written during, and reflecting, the information age will prove

[74] Gray, *War, Peace and Victory,* pp107-108.

useful in a supplementary role to the three great works. Therefore, we shall examine the works of Libicki, Arquilla and Ronfeldt, and the Tofflers, to decide whether they contain enough practical value to offset the opportunity costs of reading them. To achieve this, each body of work will be considered in three stages. Firstly, the main points and themes will be outlined. These will then be analysed to decipher which of their ideas prove useful, and what problems and/or weaknesses can be identified.

As previously mentioned, the Tofflers have produced some of the most influential work of the information age. It is therefore of concern for those interested in sound strategic practice that their theory represents the weakest of the three works reviewed here. Generally, the Tofflers display an ignorance of strategic thought. Frank C. Mahncke bemoans their anecdotal style which presents little evidence or substantive analysis. [75] This lack of strategic understanding is manifestly evident in their claim that the future is 'post-Clausewitzian'. [76] At the heart of the Tofflers' thinking on future warfare is 'knowledge'. Their mindset is exemplified by the comment that we are witnessing a transformation from brute-force to 'brain-force' in warfare. [77] The similarity to Sun Tzu's perception of war as a cerebral activity is both striking and revealing. In particular, it leads to the first and most obvious response to the Tofflers statement. Are they suggesting that warfare prior to the information age did not have a substantial cognitive element? Warfare has always been an activity in which mental acruity has played a central role. It is also erroneous to distinguish between the physical and mental dimensions of warfare. Even though information enables a more effective use of munitions at the technical and tactical levels, it does not represent the 'leading edge' in all contexts. Herein lies one of the fundamental failings and dangers of the RMA literature, and the Tofflers work in particular: reductionism. By concentrating on just one of the many dimensions of strategy, these works implicitly, sometimes explicitly, suggest that success can be gained through superior performance in just one particular dimension. Gray's notion of strategy as a complex, unified activity is the perfect counter to the

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[75] Frank C. Mahncke, 'Information Warriors', (Book Review), *Naval War College Review*, Vol. XLVII, No. 3, Summer 1994, p133.

[76] Alvin and Heidi Toffler, 'Foreword: The New Intangibles', in Arquilla and Ronfeldt (eds), *In Athena's Camp*, pxx.

[77] Toffler and Toffler, *War and Anti-War*, pp10-11.

RMA advocates' tendency towards reductionism in their efforts to elevate the role of just one dimension, often information or technology. Like many of the RMA enthusiasts the Tofflers base their ideas on a perceived revolutionary increase in the importance of the knowledge dimension to strategy. However, unlike those elements of the RMA literature which focus primarily upon the battlespace, the Tofflers draw wider conclusions concerning the role of information in grand strategy. In his review of *War and Anti-War*, Krisinger suggests that the Tofflers' theory, like that of post-heroic warfare, is underpinned unduly by ethical considerations. [78] In this respect, they exhibit similar thoughts to those expressed by Libicki, namely, that increased transparency and greater potency of information power offers the opportunity to prevent violent conflict before it begins. [79] Drawing attention to the various functions information power can fulfil is an important and creditable undertaking. However, once again an overly optimistic appraisal of its potential is the result of insufficient attention being paid to strategic considerations.

These three errors, lack of strategic and historical perspective, and optimistic reductionism, underpin much of the limitations in the Tofflers' theory. For example, their focus on the knowledge terrain, again echoing Sun Tzu's thoughts, represents judicious advice and practice. [80] Yet, they again fail to recognise that knowledge is just one dimension of strategy. Likewise, it is hard to criticise the Tofflers on their comment that the outcomes of war often depend heavily on intangible factors rather than more quantifiable elements such as numerical superiority. [81] Nevertheless, history reveals that a significant resource imbalance can prove influential to the outcome of any particular conflict. Once Germany and Japan had failed to achieve decisive quick victories over the Allied powers, it is difficult to see how the resource rich Allies could not ultimately prevail given reasonable competence in the other dimensions. [82] The Tofflers escape the regular war-fixation of much of the RMA literature. In this sense, they are correct to discuss the diversity of wars, and the difficulties of creating omni-capable forces. [83] The limitation in their theory on this issue comes from the reduction of both the complex activities of

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[78] Krisinger, p128.
[79] See Toffler and Toffler, *War and Anti-War*, pp230-1.
[80] ibid, p158.
[81] ibid, p71, and pxiv.
[82] For an account of the resource inequalities between the two sides, see Ellis, *Brute Force*.
[83] Toffler and Toffler, *War and Anti-War*, p81 and p84.

wealth creation and warfare to the three wave hypothesis of civilisation. War is certainly a diverse and adaptable activity, but this is more than just the product of which wave of civilisation the belligerents belong to. The character of each war is dependent on many factors, including policy goals, geography, individual preferences, and interaction between the opponents. Overall, it has to be concluded that the opportunity costs of reading the Tofflers work are simply too high to justify the effort required. Also, anything of value they do discuss, such as the value of the knowledge terrain, is more competently addressed in Sun Tzu's *The Art of War.* Taking the Tofflers too seriously has the potential to negatively affect strategic performance. Such a one-dimensional approach to the complex and unified pursuit of strategy will likely leave those who follow such a path ill-equipped to deal with the varied demands of strategy, and the ever-present intelligent enemy.

Libicki is one of the most prolific writings on information age warfare. His work exhibits a host of useful observations, many of which should be considered as having serious practical application and merit. In particular, his discussions of information power and the information environment are helpful, but ultimately too radical and reductionist. Unfortunately, and much like the Tofflers, generally his work lacks strategic context, and therefore much of his work suffers from a lack of universal relevance. As befits a theorist of the RMA, information is firmly at the heart of Libicki's vision of the future of warfare. Two related concepts dominate his work. Firstly, he regards the 'mesh' to be of such significance that he declares that it represents a change in the nature of warfare, and equally poses a challenge to the role of human command in war. [84] Alongside the mesh stands Libicki's thoughts on information power. Together, these two changes elevate information, and the information environment, to positions of prominence in the conduct of strategy. As noted earlier, in the battlespace this translates into 'hide-and-seek' warfare, in which information dominance becomes the deciding factor. Whereas, on the bigger stage the global reach of information renders physical geography less important, and enables effective military intervention without the deployment of forces. Taken together, these visions offer the promise of waging war with significantly less bloodshed. [85] For someone who places

[84] Libicki, 'The Small and the Many', p210.

[85] *ibid*, p197, and Libicki, 'Dominant Battlespace Knowledge and its Consequences', p40.

information at the core of future warfare, Libicki is surprisingly negative on the potential offered by SIW. [86] This complacency, although somewhat of a welcomed relief in comparison to the prophets of doom, derives from a general overconfidence in the robustness of the information systems which underlie his theories.

On this latter point, Libicki goes someway towards recognising the paradoxical logic, in that he accepts that an enemy facing the mesh will undertake measures to offset its potency. To this end, he discusses acts of deception, the challenge posed by stealth, and the difficulties encountered by the mesh in certain small war environments. [87] However, ultimately Libicki foresees the answer to these problems lays in better detection technology, such as face recognition software to identify terrorists or guerrillas in densely populated urban environment. His answer is always technological, rather than strategic in nature. In this context, whilst acknowledging that 'Mud Warfare' (LIC in a dense environment) represents a possible asymmetric response to the RMA, he optimistically concludes that the 'Grid', through the proliferation of sensors and networked electronics, can negate the potency of Mud Warfare. [88] Once again, the absence of any strategic context to his discussion is notable. He even addresses the asymmetrical response of WMD/EMP, but ultimately concludes that the mesh will be able to neutralise this threat by targeting the means of delivery and/or production sites. Alternatively, by removing tempting targets from the battlespace and by encouraging a more discriminating use of force, the Grid reduces the impetus to use WMD. [89] These examples are revealing in that they highlight Libicki's overemphasis on the technical and tactical levels of strategy. Whereas, a successful method of waging war can conceivably be offset at any of the levels of strategy.

Libicki's work contains some very useful comments on the strategic role of information power. In particular, he is convincing when he discusses the strategic flexibility offered by this fifth expression of power, the importance of attaining some form of information superiority, the related difficulties in gaining command of the information environment, and the requirement for an information force with its own doctrine and culture. On occasions, he

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[86] Libicki, 'The Small and the Many', p274.
[87] Libicki, 'Dominant Battlespace Knowledge and its Consequences', p
[88] Libicki, *Illuminating Tomorrow's War.*
[89] Libicki, *The Mesh and the Net*, and *Illuminating Tomorrow's War.*

acknowledges the strategic limitations to information operations. In particular, he acknowledges that they cannot usually translate into a theory of victory if they operate in the service of poor strategy. [90] All told, these positive contributions by Libicki, especially his work on information power, makes his work worthy of attention. However, certain significant failings ensure that his work cannot be regarded as universal and therefore comparable to the great classical theories. In particular, there are too few occasions in which he exhibits an interest in the relationship between policy and the use of force. For example, Libicki describes how precision bombardment facilitated by the mesh can enable the United States to 'control' the battlespace. [91] Contrast this perception of control with that of Wylie's. The difference is clearly one of appreciation of strategic requirements. In this example Libicki has fallen into the trap of equating bombardment with a theory of war. He does this partly because one of his main starting, and guiding points seems to be an emphasis on post-heroic warfare. Libicki exhibits a similar insufficient appreciation of strategy in his limited discussions of small wars. As Gray states, in these forms of war politics is more pronounced. [92] For Libicki, the challenges of these conflicts does not lie in the careful matching of means to ends, but rather in better surveillance techniques. Although he at least accepts the value of HUMINT in these contexts. [93] In a similar vein to the Tofflers, Libicki's ideas have an air of reductionism about them. Information is far too central and dominant in his conception of strategy. Finally, he underestimates the significance of the paradoxical logic. Accordingly, Libicki's information systems are too robust in the face of enemy actions. Even if this was possible, he still does not convincingly explain how a dominant mesh will translate into a theory of strategic victory. In the final assessment, Libicki's work is akin to that of Douhet. Both of these theorists introduce some important concepts and issues which require careful consideration and even action. However, basing your strategy predominately upon the ideas of Libicki is as unlikely to result in strategic success than those who have sort a theory of victory by following Douhet's work.

The final work of the new theorists to be considered, that of Arquilla and Ronfeldt,

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[90] Libicki, *Information Dominance*.
[91] Libicki, 'The Small and the Many', p195.
[92] Gray, *Modern Strategy*, p284.
[93] Libicki, 'Dominant Battlespace Knowledge', p46.

displays a confusing mixture of radical claims concerning the revolutionary potential of the information age, and a more balanced, broader perspective on the future of warfare. Invariably, information is the instrument of change in Arquilla and Ronfeldt's theories. 'Cyberwar', which acts as the orgainsing concept for the future battlespace, is defined as "conducting, and preparing to conduct, military operations according to information-related principles." [94] More fundamentally, information-flow facilitates powerful organisational change, resulting in the empowerment and rise of the network form of organisation. To support their claims, the authors cite a number of historical cases in which success went to those operating along lines similar to cyberwar and netwar principles. The examples they rely upon include the Mongols in the thirteenth century, the Chechen rebels fighting post-Soviet Russia in the 1990s, to the communist forces waging war against the United States and its South Vietnam ally. In relation to Vietnam they claim "the networked organisational style of guerilla fighters ... suggests the tremendous robustness of these fighters in the face of even the sternest countermeasures. The Vietnam War provides *the best example* of a networked insurgency withstanding everything the American hierarchy threw at it." [emphasis added] This example of reductionism, which reduces the complex conflict in Vietnam down to differences in organisational structures, is an unfortunate choice, particularly as the insurgent force in South Vietnam, the Viet Cong, had been defeated by its 'hierarchical' opponents by 1968. The force that conquered South Vietnam in 1975 was the regular, and hierarchical NVA.

Nevertheless, their discussions concerning networks lead Arquilla and Ronfeldt into a welcome consideration of the broader spectrum of war. Unlike many of their contemporary RMA colleagues, they are prepared to give serious attention to irregular warfare in the information age. Indeed, they confidently claim that information-related principles are just as applicable at the lower end of the spectrum as at the higher 'regular' extremity. Although welcome, Arquilla and Ronfeldt unfortunately reveal too much enthusiasm for van Creveld's notion concerning the irregularisation of warfare. Indeed, 'netwar', described as "an emerging mode of conflict (and crime) at societal levels, involving measures short of war," [95] can be perceived as being a 'virtual

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[94] Arquilla and Ronfeldt, 'Cyberwar is Coming', p30.

[95] Arquilla and Ronfeldt, 'The Advent of Netwar', in idem, *In Athena's Camp*, p277.

transformation of war'.

For Arquilla and Ronfeldt, the consequences of these changes result in an increasing emphasis on network forms, in which information becomes a critical commodity. Therefore, this leads to the claim that "decisive duels for the control of information flows will take the place of drawn-out battles of attrition or annihilation; the requirement to destroy will recede as the ability to disrupt is enhanced." [96] A reasonable question to pose in response to these thoughts, is why do many of the RMA theorists believe that the new must necessarily replace the old? Is it not plausible that the new will take its place alongside the old. Because of the basic requirements of 'strategic control', and the paradoxical logic, the airpower revolution has not rendered the older expressions of military power irrelevant. Rather, it has taken an important place in joint warfare. In a similar vein, it is likely that the conflict over control of the infosphere will not prove decisive, but instead will be an important component of joint operations. Likewise, as truly decisive manoeuvre is rarely achieved, signaling the end of attrition and annihilation is highly questionable. To reiterate, Gray rightly asserts that attrition, manoeuvre, and control are not mutually exclusive, indeed, they are interrelated. [97] Nevertheless, Arquilla and Ronfeldt take a further optimistic step and declare that cyberwar offers the potential to make war less bloody for both sides in a conflict, and therefore more humane. [98] Moving even further from the Clausewitzian paradigm, they postulate that in the information age friction ceases to be the main concern, instead limiting entropy will be the key. [99] This comment clearly reveals a misappreciation of what friction entails. If we accept Barry Watts' explanation of the range of factors which make up the unified concept of friction, it is hard to understand how these difficulties, including the mismatch between means and ends and interaction with the enemy, can cease to be of concern. The information age does not require the replacement of friction as the overarching and yet simple explanation of why war in practice differs from war in theory.

From the above comments it is clear that this thesis, perhaps exhibiting a Mars view

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[96] Arquilla and Ronfeldt, 'A New Epoch', p2.
[97] Gray, Modern Strategy, p159 and p177.
[98] Arquilla and Ronfeldt, 'Cyberwar is Coming', pp44-45.
[99] Arquilla and Ronfeldt, 'Information, Power, and Grand Strategy: In Athena's Camp – Section 1', in idem, *In Athena's Camp,* p157.

of war, has identified a number of substantial problems with Arquilla and Ronfeldt's theories. Yet, these should not detract entirely from the positive contributions their work can make. For example, like Libicki, they correctly discuss information as another dimension of strategy which may act as the first choice for decision makers in certain circumstances. [100] They are also right to highlight the role of information by defining it as a strategic resource. [101] Also, their aforementioned discussion of how small wars may be affected by the information age at least opens the debate on this much neglected subject in the RMA literature. However, it is noteworthy that they fail to expand their broader discussion of future warfare to discuss how WMD fits into their visions. One of the most useful aspects of their work is that concerned with hybrid command structures. This is a balanced appraisal of the advantages to be gained from both network and hierarchical models, and reveals that they have some understanding of the needs of battle command. Importantly, Arquilla and Ronfeldt move away from much of the RMA literatures obsession with standoff high-tempo operations. In contrast, they acknowledge that cyberwar is just as applicable slow and close-in. Although welcome, their inability to move beyond the information-centric concept of cyberwar still poses a problem. At one stage they appear to come close to accepting an attritional element to future war, when they note that in a state of near-parity, cyberwarfighting proficiency will result in the need for 'big battalions'. [102] Their call for the need to construct an enemy information order of battle is also an important recognition of the increasing importance of information operations to success in joint warfare. [103] Finally, and most importantly, Arquilla and Ronfeldt, very much like Corbett's realistic visions of what the sea environment could do, declare that important though the conflict in cyberspace (infosphere) may be, the outcome of any conflict will be decided by what happens in the 'real' world. [104] This may be their most important contribution to the debate on warfare in the information age.

Of the three theorists of the information age considered here, the work of Arquilla and Ronfeldt is undoubtedly the most useful in the practical world of strategy. Their broader

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[100] Arquilla and Ronfeldt, 'Information, Power, and Grand Strategy: In Athena's Camp – Section 2', in idem, *In Athena's Camp,* pp419-420.
[101] Arquilla and Ronfeldt, 'Cyberwar is Coming', p25.
[102] ibid, p47.
[103] Arquilla and Ronfeldt, 'Information Power', p160.
[104] Arquilla and Ronfeldt, 'A New Epoch', p8.

outlook, encompassing a greater range of the spectrum of conflict and stretching into the realms of grand strategy, results in a more balanced appraisal. Likewise, their discussions of command structures is a judicious attempt to harness the benefits of both hierarchies and networks. In these respects it is difficult to disagree with Goodwin's assessment of *In Athena's Camp* as the most sober analysis of Information Warfare. [105] However, in the final analysis their work also exhibits reductionism, and would benefit from perceiving information as just one dimension amongst equals rather than as *the* dimension in the future. Due to this undue fixation on information, they consequently suffer from the fallacy of the decisive manoeuvre. In this sense they fail to appreciate the varied and complex nature of warfare. This is exemplified by their claim that cyberwar represents as big a change as blitzkrieg. [106] Again, their choice of example is both instructive and unfortunate. Despite the undoubted advantages the German operational innovation produced for them during the early years of World War Two, these were offset by Allied competence, and German incompetence, in many of the other dimensions of strategy. The fact that Germany was defeated despite its operational and tactical prowess reveals the complex unified nature of strategy.

Conclusion

In the practical realms of strategy any theory which endeavours to be universal must reflect the true nature of war. If a theory fails to achieve this then the theory itself, as well as those whose military culture is based upon it, will receive a rude awakening in the crucible that is the reality of war. It also seems that the more prescriptive a theory, the less universal it is. Prescription is a trait much of the RMA literature exhibits, primarily through its advocacy of attaining victory through information-related concepts such as information dominance. Sun Tzu also exhibits this tendency at times, especially in his maxims concerning the value of speed in warfare, and the desirability of achieving victory without battle. Wylie correctly notes that principles, which prescriptive theories

[105] Goodwin, p220.
[106] Arquilla and Ronfeldt, 'Cyberwar is Coming', p31.

often include, only reflect the specific time, place, and need of writing. [107]

Historical experience suggests that the nature of war is molded by five dominant factors. These are the policy objective, the paradoxical logic, geography, the polymorphous character of war, and the fact that war is an activity waged by humans. The first of these, the influence of policy, is what strategy is all about. The challenge of matching military means to policy ends dictates the type and level of force required, and whether, and how much, violence and destruction is needed. This latter point is also linked to the capabilities and will of the enemy. The policy objective also decides the relationship between military force and the other instruments of strategy, [108] and of course identifies the military objectives to be attained. The variety of military objectives reflects the many policy goals war can serve, and can include the destruction of enemy forces, the capture of territory, or the protection and allegiance of the population, to name just three. When considering the myriad goals for which war is waged, and the many objectives which serve these ends, Wylie's superior idea of control represents a useful guiding concept. Gray further refines this by noting that control can take either a physical or a psychological form. [109] Equally, the plethora of objectives for which war is waged partially accounts for the many forms it can take. This polymorphous feature of war is also the product of the characteristics of the enemy, and the geography in which the conflict is waged. The direct role played by humans in the conduct of war at the sharp end is ensured by Wylie's correct assertion that the man on the scene with a gun represents control. In itself this embodies Corbett's balanced appraisal that every expression of strategic/military power must exert leverage onto the land dimension. Therefore, this requirement for the physical presence of human soldiers ensures that physical exertion and danger remain ever-present features of warfare.

Luttwak's identification of the paradoxical logic, and Clausewitz's emphasis on the fact that war is not waged against a lifeless mass, are essential when considering the nature of war. Unfortunately, most of the RMA literature fails to take sufficient account of this core feature of strategy. The existence of an intelligent enemy has two significant effects. Firstly, he can

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[107] Wylie, p19.

[108] In this respect, Wylie notes how the strategic aim of control must also include non-military instruments such as diplomacy, economic tools, and philosophy. Wylie, p89.

[109] Gray, *Modern Strategy*, p210.

endeavour to offset your strong suit. In this sense, tactical or operational proficiency based on the exploitation of the RMA, or a theory of war centred around SIW, may not translate into strategic success. The advantages to be gained from the RMA can be offset at all the levels of strategy, and even if your enemy proves to be merely competent in his performance, one's own strategic incompetence may result in failure. The German experience in World War Two and the United States' performance in Vietnam suggest themselves as obvious examples. A second consequence of the paradoxical logic, which is of particular significance to the RMA literature, is that an enemy can introduce into a conflict a level of violence for which a post-heroic military is unprepared. Clausewitz's warning on this should be taken to heart by all those who espouse and encourage a less violent approach to warfare supposedly enabled by the RMA. Violence is an integral part of the nature of warfare, and an enemy can reintroduce it regardless of one's efforts. Therefore, military culture should reflect the violence inherent in war. In fact, an enemy may adopt the extreme levels of violence offered by WMD as an asymmetrical response to RMA competence. Alternatively, he may opt for the more sporadic, unpredictable violence associated with various forms of small war, such as terrorism, and thereby deny a regular RMA force its preferred operational environment.

Much of the RMA literature undervalues the fifth significant element which helps shape the nature of war, its human dimension. War is a human undertaking at both the physical and psychological levels. Consequently, any theory which focuses primarily upon the technological dimension will prove inadequate because it ignores the intangibles of warfare. By ignoring these you are invariably overlooking a significant aspect of strategy, and one which plays a major role in deciding the outcome of any particular conflict. One prominent example of the role humanity can play in strategy is that of Phillip II of Spain in the sixteenth century. Phillip's personality, and more precisely his overcentralised style of decision making, which itself was born of his overwhelming feeling of responsibility for the defence of the catholic faith during the Reformation, was a major factor in his failure to achieve his policy objectives. Indeed, Phillip is of particular relevance because he possessed an information advantage over many of his opponents, and himself placed much belief in the fact that this information would bring him success. However, his information advantage was offset by a number of factors. These included

his own cognitive rigidity which ignored information that contradicted his own established ideas; an overcentralised command style which prevented initiative by his subordinates and created an information overload for him; the imperial overstretch of the Spanish empire; the competence of his main adversaries, in particular Elizabeth I; and poor operational performance/planning which was exacerbated by poor luck, such as the weather during the 1588 Armada, which finally put paid to an ill-conceived and poorly planned operation. [110] Because strategy is a human activity, infused by politics, it remains an art, and therefore requires human acts of judgment to succeed.

Despite the many changes to the character of warfare that have occurred since the early nineteenth century, and in spite of the changes yet to come in the information age, Clausewitz's *On War* still reflects the true nature of war most accurately. This is primarily the result of his superior concepts of the trinity and climate of war. Within these ideas lies an understanding of the subtle yet complex nature of war, which encompasses the relationship of means to ends, and the universal key concept of friction, that which distinguishes war on paper from war in reality. Therefore, when thinking about, and preparing for, future warfare, our starting point should be the work of Clausewitz. However, Gray is right in his assertion that we need more than just *On War*. The greatest and only true great book on war, to paraphrase Brodie, should be supplemented. At the level of general theory, three works suggest themselves. These are Luttwak's *Strategy: The Logic of War and Peace*, primarily for its identification of the paradoxical logic of strategy, although his discussion of the harmony of the levels of strategy is also a worthwhile and beneficial read; Wylie's *Military Strategy: A General Theory of Power Control*, which is distinguished for its universally useful concept of control, and the related ideas concerning the man on the scene with a gun; Gray's *Modern Strategy*, which is chosen for its excellent identification of the many dimensions of strategy, its broad scope covering the whole spectrum of strategic matters, and its concept that strategy represents a unified, practical undertaking.

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[110] For accounts of the war between England and Spain see Parker, *The Grand Strategy of Philip II*, Martin and Parker, *The Spanish Armada*, Whiting, *The Enterprise of England: The Spanish Armada*, Sugden, *Sir Francis Drake*, Wallace T. MacCaffrey, *Elizabeth I: War and Politics 1588-1603*, (Princeton, Princeton University Press, 1992), Garrett Mattingly, *The Defeat of the Spanish Armada*, (London, Book Club Associates, 1972), and Anne Somerset, *Elizabeth I*, (London, Phoenix Giant, 1992).

However, despite Clausewitz's universal applicability, his work does suffer from an underestimation of the role information can play in reducing uncertainty and aiding strategic performance. It should be noted that this is not a criticism of his concept of uncertainty in warfare, which as was argued in Chapter 2 remains an ever-present feature of conflict. However, because information has become more directly relevant in the practice of strategy, and for the same reasons that we benefit from a familiarity with the work of Corbett and Kahn, who provide deeper insight into the subsets of strategic studies, we require works which explore information power and the nature of the infosphere as additions to Clausewitz. To this end, Sun Tzu, Libicki, and Arquilla and Ronfeldt all express interesting comments/ideas which illuminate thinking on information power. In this context, control of the infosphere provides a valuable theoretical construct to inform operations within this unique environment. At a more general level regarding the overall value and role of information, a synthesis of the theories of Sun Tzu and Clausewitz displays the most balanced appraisal. As noted earlier in this chapter, elements of such a synthesis can be found in the work of Jomini.

In conclusion it is important to emphasise that information is just one element of strategy. Gray notes that deficiencies in the technological dimension can be compensated for by other means. So it is with information. A force without information dominance can still operate, although it may be more vulnerable and less effective at the tactical and operational levels. In contrast, a force without supplies will soon cease to function at all. This comment is designed to show the relative importance of the information environment. In a similar manner, Bennett notes the limitations of intelligence. He notes that good intelligence is virtually useless without sufficient force to exploit it, although it does represent a significant force multiplier. [111] He also makes the vital point that during World War Two, the true value of Ultra could only be appreciated by recognising its limits. [112] So it is with information. Having some form of control of the infosphere, or at least denying it to your enemy, is beneficial in the same way in which it is useful to have air superiority. Yet, having control of the fifth dimension, or not, will neither guarantee success or failure at the strategic level. Strategic success requires competence in many

[111] Bennett, pxxiii.
[112] ibid, p61.

of the dimensions.

The current RMA will instigate many changes to the character of warfare, and many of these, such as digitisation, hybrid command structures, and SIW, should be exploited. However, we should not expect these changes to alter the nature of war. In this respect, it appears that much of the theory which has been produced during the information age does not reflect the true nature of warfare, rather it represents a philosophical fad which reflects political and social desires for post-heroic warfare, and which has an undue emphasis on information as the decisive dimension of strategy. Consequently, military culture and doctrine should be based upon the Clausewitzian paradigm which still represents the closet manifestation to the true nature of war. It is therefore fitting to end with a quotation from *On War* which provides a superior understanding of the need to balance the requirements of the day with the universal nature of war. How this fine balance is achieved lies at the heart of the art of strategy.

> *We can thus only say that the aims a belligerent adopts, and the resources he employs, must be governed by the particular characteristics of his own position; but they will also conform to the spirit of the age and to its general character. Finally, they must always be governed by the general conclusions to be drawn from the nature of war itself.* [113]

[113] Clausewitz, p718.

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