

NEITHER ART NOR SCIENCE – TOWARDS A DISCIPLINE OF WARFARE

By Major Jim Storr

The TRENCH GASCOIGNE PRIZE is awarded for essays on contemporary problems of defence and international security.

Is the conduct of war an art or a science? The question reflects either a profound analysis of the soldier's craft or a nineteenth-century view of philosophy.¹ Why should the conduct of war be art or science? If neither, what is it?

Warfare, the conduct of war, has shaped the destiny of continents. Yet, as we shall see, it is relatively poorly described and poorly understood. If we can understand it better, we can learn to practise it better. What follows is an attempt to lay the foundations of an intellectual discipline of warfare. It relates mostly to *land* warfare; and within that, warfare, as opposed to the conduct of operations other than war.

It is to some extent a philosophical enquiry. We start by asking simple questions. Bronowsky wrote of Einstein that he had the habit of asking immensely simple questions; and when the answers were simple, 'then you hear God thinking'? We ask first 'what is written of it'. Plenty is written about *war*: any amount of narrative and analytic history, tracts on war as a social phenomenon, and so on. But far less is written about *warfare*, the conduct of war. Some of that is conceptual writings by authors such as Lind, van Crevelde, Luttwak, Liddel Hart and Fuller. The rest is military doctrine.

CONCEPTS AND DOCTRINE

Amongst conceptual writings, the landmark development in Western military thought in the 1990s was probably Lind's OODA Loop.³ The OODA Loop suggests that the process of Observation, Orientation, Decision and Action is a circular, iterative process. Military advantage accrues from being able to go around the loop faster than one's opponent.

However, the OODA process is not circular. It apparently takes 24 hours to execute a divisional operation.⁴ Planning takes a minimum of 12 hours. Thus, a divisional OODA loop would have to be at least 36 hours long. Yet the Gulf War and other

recent operations show divisions reacting far faster. Military forces do not in practice wait to observe until they have acted. Observation, Orientation and Action are continuous processes⁵, and decisions are made occasionally in consequence of them. There is no OODA Loop. The idea of 'getting inside the enemy's decision cycle' is deeply flawed.⁶ There is considerable advantage in reacting faster than one's opponent, but the OODA Loop does not adequately describe the process.

Lind's concept was based on fighter combat in Korea.⁷ The epitome of fighter combat is the performance of a few aces. Biographies of aces such as General Robin Olds, who was an ace in Korea and also in both the Second World War and Vietnam⁸, display no evidence of iterative behaviour. Their effectiveness centres on rapid, decisive decision and action; based on superlative, largely intuitive, situational awareness. Lind's concept does not adequately describe the observed facts for the activity under study (fighter combat) – let alone any extrapolation from them.

Turning to doctrine, British military doctrine is underpinned by the Core Functions of Find, Fix and Strike; and the Functions in Combat: Command, Manoeuvre, Firepower, Information and Intelligence, Protection and Combat Service Support. These are stated authoritatively.⁹ We are invited to accept them as an article of faith without justification. There is no established connection between the two sets of functions, identified in the key document in unconnected chapters. And there is no concrete linkage between the various



Major Jim Storr, a member of the King's Regiment, is currently a Military Advisor at the DERA Centre for Defence Studies.

Functions and the Principles of War.¹⁰

Command is defined as ‘... the direction, coordination and control of military forces’.¹¹ Control is ‘the process by which a commander ... organises, directs and coordinates the activities of the forces allocated to him...’.¹² This is clearly nonsense:

$$\begin{array}{l}
 \text{If} \quad \text{Command} = \text{Direction} + \text{Coordination} + \text{Control} \\
 \\
 \text{and} \quad \text{Control} = \text{Organisation} + \text{Direction} + \text{Coordination} \\
 \hline
 \text{then} \quad \text{Command} = \text{Direction} + \text{Coordination} + 2 \times \text{Control, or} \\
 \quad \quad \quad + \text{Control} = 2 \times \text{Direction} + 2 \times \text{Coordination} + \text{Organisation}
 \end{array}$$

Or similar. This will simply not do. Much doctrine appears incoherent and shows evidence of having been written by committees.¹³

It is surprising, but nonetheless apparent, that both doctrinal and conceptual works on warfare are not particularly coherent.¹⁴ Doctrine stresses shock and surprise, but we look in vain for a good definition of either, let alone a description of how to inflict them. There is a prevalence of paradox, and even books written about that prevalence.¹⁵ We should be wary. A paradox is a pair of statements which appear to be true but contradict each other.¹⁶ The resolution of a paradox requires our view of the situation, our paradigm, to change in some way.¹⁷ A prevalence of paradox should tell us that our understanding of war, and warfare, requires fundamental adjustment.

Such a collection of incoherent statements, poorly described phenomena and paradox is typical of the early stages of the development of an intellectual discipline.¹⁸ These may appear unfair criticisms. However, warfare is an ancient, established and perhaps even honourable craft. We should reasonably expect it to be as well described as, say, the major professions.

Let us make comparisons with two established disciplines: medicine and civil engineering. Neither is ‘art’ nor ‘science’, and is perhaps belittling to describe them as either. In medicine, there is a unifying understanding which eventually reduces to the relations of biochemistry. There is a fruitful pursuit of research in accordance with current understanding. There is much that is well described, little paradox, and little inconsistency.

Much of civil engineering is reducible to Statics (an application of the Newtonian Laws of Motion) and the stress-strain relations of materials. Thus, although new materials continue to present novel opportunities to designers, and computers

allow them to predict loads and analyse shapes in ever more sophisticated ways, the civil engineer is not faced with poorly described phenomena and paradox.

Man built Gothic cathedrals centuries before Newton was born, but that was as much as he could achieve. In order to progress, he needed a better understanding of his world, which Newtonian Physics gave him. Similarly, much of our knowledge of warfare appears valid, but anecdotal. We need a better understanding if we are to make material progress in the pursuit of warfare. Let us ask two more simple questions. Firstly, what kind of thing is war – how is it best described? Secondly, how should we do it – how is it best conducted?

THE NATURE OF WAR

It is difficult to develop a description of war that is both sufficient and necessary.¹⁹ However, we can observe that it is adversarial, dynamic, dangerous, complex, uncertain and, critically, human. Each term appears necessary – take it out, and the remaining set does not adequately describe war. The list is not quite sufficient, because it contains no notion that war is waged between states; accepting that the definition of the ‘state’ is not clear cut. But as a start, war is adversarial, dynamic, dangerous, complex, uncertain and essentially human. If war is such, what can we say about warfare?

War is adversarial; there are at least two sides. Each side may consist of a number of parties, for example allied states. They have taken to arms in pursuit of some set of aims – which may be more, or less, clearly enunciated. Those aims may or may not be pursued. They may change through the conflict. Nevertheless, the relevant measure of success is winning: satisfying a set of goals. The outcome is critical; not the method, nor the style with which it is conducted. The outcome is all important. This places a high value on pragmatism in warfare: judgement by results, not by theory or effort. Method is far less important than outcome.

War is dynamic; things change, and change quickly. We wish them to do so. Our approach must incorporate and anticipate change and movement. Since war is adversarial and dynamic, we cannot expect to conduct it at our leisure. We must expect the enemy to try to change things to his advantage. We must forestall him. Pre-emption and tempo are critical.

War is complex. It is a teeming interaction of hundreds or thousands of elements, be they individ-

ual tanks, aircraft or soldiers. Each behaves in moderately well-described patterns. However, war as a whole, and particularly combat (the state at which adversarial interactions become marked), verges on chaos.²⁰ Outcomes are not easily predicted in advance, and war takes on a character of its own – a set of emergent characteristics. This is an almost perfect description of complexity in accordance with now-classical complexity theory.

However, complexity theory suggests that the future is not in fact predicable.²¹ Therefore, the best we may expect from studying war is insight and understanding. We should not expect a precision which the nature of the subject does not permit. Indeed, since war is waged between human institutions and no two are identical, there are no clear-cut, categoric, black-and-white, yes-and-no statements about war. War is only described by generalisations, which by definition admit of exception. They also permit the pedant to undermine what in practice quite insightful theory.²²

War is uncertain. There is a strong element of chance. Hence, warfare is dominated by the management of risk. Some risk strategies are not appropriate. A commander cannot take no risk, and for example act only when he is certain. Since war is dynamic, such a time may never come. Since it is adversarial, his opponent may do something before him, at risk, which gains an advantage (not least through pre-emption). That is a risk the commander cannot take. Thus, in a circular fashion, he cannot afford to be risk averse. Risk is inherent in the problem.

War is dangerous. It is potentially lethal to its participants. The stress and fear which this imposes affects all related behaviour. The commander must seek to protect his forces from danger, not merely through altruism or political directive; but because without an instrument, he cannot act. Thus, most human behaviour in war will be sup-optimal, due to stress and fear (and the more so, the nearer to danger). Furthermore, protection of one's forces is fundamental to warfare.

War is rooted in individual and collective human behaviour. Just as civil engineering reduces to material science and statics, and medicine to biochemistry, warfare should be grounded in human behaviour. Given the present state of knowledge, human behaviour is not yet reducible to biochemistry, although some of the pharmacological mechanisms of the brain and their effect on behaviour are understood. Some of the human sciences are, at least, well described – for example, sociology, psy-

chology and anthropology. However, we should not expect too much. We cannot predict the outcomes of battles and engagements with precision in advance. However, we can require a test of doctrine. Its tenets should be explicable in terms of the way real people act. No confidence should be given to high-level abstract pronouncements (such as 'command at the highest level, control at the lowest') if they cannot be explained in terms of human behaviour. Without such underpinning, doctrine is nothing more than statements of current policy.

War is rooted in individual and collective human behaviour, but does not appear to be determined. Determinism requires events to occur according to fundamental laws, and thus in principle be predictable (even if the underlying laws have not yet been discovered). However, war is not like that. 'Every science has principles and rules' wrote the Marechal de Saxe; 'only war has none'.²³ Clausewitz agreed. Furthermore, apparent adherence to fundamental laws is a major criticism of Jomini.²⁴

DETERMINISM, RATIONALISM AND THEIR LIMITATIONS

Determinism requires causality and continuity. If A occurs and then B occurs, we infer that A causes B.²⁵ If A causes B everywhere and at all times, we infer it to be a principle of nature.²⁶ For all we know, war may be determined. Human behaviour might eventually be predictable from biochemical processes. Computer modelling might show how soldiers will react in war, starting from the action of adrenalin coursing through their brains. Such a model could then predict the outcome of the war from the precise initial states of the participants. However, the precise initial states are possibly unknowable²⁷ and it is unlikely that even the most powerful computer will be able to achieve such precision in the foreseeable future.²⁸ To that extent, *war may be determined, but it is not useful to consider it so.*

After centuries of thought, Man has failed to observe any strict relation between cause and effect on the battlefield. In deterministic terms, continuity is weak and causality is almost non-existent. This is our greatest challenge. It is probably the main reason why warfare is so poorly established as a discipline. Since the fourth century or even earlier, Western Man has largely progressed by exploiting determined phenomena.²⁹ Yet it appears that in war he cannot.

Fundamentally, human knowledge can only proceed in two ways: by gathering new facts, or better organising those which are already available.³⁰ Gathering new facts is almost impossible for soldiers in peacetime. Little in peacetime resembles war sufficiently for us to be confident in its lessons. In the absence of new facts, armies seek to draw more and more knowledge from a declining base of knowledge. The base declines because, outside major wars, we collectively forget much of war's complex detail. Most doctrinal writing in peacetime consists of a logical process of reasoning. It is therefore predominantly rational in approach.³¹ However, if we cannot draw concrete deductions from known relations between entities, rationalism fails us. Thus, this approach, and with it much doctrinal writing, is flawed. Doctrinal writing which is not rational deduction appears largely conjectural; which is often exciting, but of limited value.

The shortcomings of rationalism were recognised in the Sixteenth and Seventeenth Centuries by the Empiricists.³² Empiricism is not mere trial and error: it is a logical process based on the structuring of observed facts.³³ Thus, an empirical thinker must reject the OODA Loop, since it does not adequately describe the known facts. The empiricist asks 'what happens?' Assuming some continuity, he can expect it to happen broadly similarly elsewhere. In war he cannot expect causality, but a little continuity taken with pragmatism (concentration on results) suggests a way ahead. We should search history for things that have worked in the past. We can make sensible (if restricted) deductions, and check them by reference to observed facts: a process that puts great emphasis on historical study. We should act in war in ways which history tells us ought to have some beneficial outcome – we cannot expect more than that. We should observe the results, and then act accordingly. We can find useful insight in theory, but only when it demonstrably accords with the known facts.

We must decide and act rapidly, to pre-empt the enemy – war is dynamic and adversarial. We must accept risk; we cannot know with certainty what will work. We must not expect categorical, black-and white results; some things will tend to work, as a generalisation. Sometimes they will not, for reasons which we will not understand. Nevertheless, empiricism must be linked to rapidity of thought and action.

Extreme determinism can be expressed as fatalism. If events are predetermined, there is little consequence in human volition. However, deter-

minism is not strong in war. We should therefore take the opposite view: man can change the future by his actions. As a commander, he should. This is the basis of a philosophy of free will. We must also require our subordinates to express free will. We, and they, must learn to live with the consequences of their (independent) decisions.

ANALOGIES FROM OTHER DISCIPLINES

We have looked at the nature of war and asked what it implies for warfare. We have used two other disciplines, medicine and civil engineering, to suggest a basis in fundamental behaviour. What else can they suggest?

Medicine is more than the application of biochemistry. There is another, higher aspect: moral constraint. Few doctors actually take the Hippocratic Oath today. However, its existence highlights the social context of medicine, and suggests the importance of ethics in war.

There are fundamentally only two major constraints on the conduct of war: the art of the possible, and the art of the conscionable. The former largely concerns physical phenomena, such as ballistics or logistics. The latter includes limits on aims, limits on means, *Jus in Bellum* and *Jus ad Bello*, and deserves deep study. We cannot describe warfare as rooted in human behaviour without expecting those waging it to display some moral constraint. However, we should not expect that restraint to be entirely rational, nor explicitly stated. Equally, we must expect the 'art of the conscionable' to vary enormously between cultures.

Similarly, civil engineering is more than the manipulation of mechanical phenomena. It differs enormously from the pursuit of science. Engineering practice revolves around the elicitation and satisfaction of aims or requirements. This relates directly to warfare.

War is in some manner the application of collective violence in pursuit of the objectives of the State. Translating state objectives into the mission of a particular unit is the process of setting operational objectives for campaigns, and from there tactical missions for battles and engagements. The other side of this process is the provision of resources with which to do the job, and deciding how to employ those resources. There is thus a cascading series of aims and the concomitant provision of means.³⁴

Clausewitz described this process as a 'dialectic of aims and means'.³⁵ We apply the means in

order to achieve the aims. However, the aims that can be achieved are conditioned by the nature of the means available. Furthermore, applying the means to combat affects their nature (not least through attrition). This conditions their use for further operations. Anticipation of that effect further conditions the aims to be undertaken, at least to the prudent commander. ‘The dialectic of aims and means’ is peculiarly succinct. As we shall see, it is also a powerful intellectual tool.

DEDUCTIONS

What have we achieved? We can begin to understand poorly described phenomena better. We can see shock and surprise as useful metaphors for the collective response of a force, a human organisation, when subjected to stimuli of some type. What are those stimuli and what are the responses? This is a useful question, which should prompt further research. Similarly, we can begin to see the Core Functions as part of a description of combat which considers war to be adversarial and dynamic.

The enemy will conceal himself, to resist the effects of our weapons and conceal his plans, so he must be *found*. He will resist destruction, and attempt to damage or defeat us, so must be *fixed*. Finally he must be *struck* to inflict the damage that both reduces his ability to damage us, and grants us freedom to achieve our aims. The Core Functions do not describe the whole piece; they are a useful shorthand or high-level description. The Functions in Combat begin to break out the Core Functions in terms of tasks for certain troop types. This process is developed further into the Components of Capability. Critically, these issues can be derived from our description of war – particularly, that it is adversarial and dynamic.

We can also begin to identify a useful approach to warfare: a blend of pragmatism (what works? do it!) and empiricism (find out!) with dynamism (think and act quickly!) and just sufficient rationalism to move us from one set of real experiences to the next. We must add the expression of free will: the belief that commanders can, and must, affect the future through their actions.

We can also begin to understand what our guiding principles should be. We can break the Dialectic of Aims and Means out further, as follows:

Since war primarily concerns the elicitation and satisfaction of aims derived from the objectives of the State, the first principle must be the selection

and maintenance of the aim. If not, the operation or campaign in question is irrelevant to the purpose of the war.

We can consider the *nature* and the *application* of the means separately. Our primary concern with regard to the nature of the means should be to generate and sustain a fit instrument. We must maintain the morale of the troops, administer to their physical needs (in terms both of logistic sustenance and that they be effectively administered) and protect (secure) them against the enemy’s actions.

The application of the means in an adversarial, dynamic and dangerous environment requires us to concentrate the effect of our force; be correspondingly economical with forces away from that concentration; achieve synergy through cooperation, and surprise where possible; be flexible in application; and strike aggressively.

We can therefore define the Principles of War, from the Dialectic of Aims and Means, as the Selection and Maintenance of the Aim, the Maintenance of Morale; Administration; Security; Concentration of Force, Economy of Effort; Cooperation, Surprise; Flexibility and Offensive Action. These are not absolute. They are an interpretation of the requirements of war in an Anglo-Saxon paradigm. Unsurprisingly, the American Principles are similar.³⁶ One would expect a different Russian cultural interpretation, yet the Soviet ‘Principles of Operational Art’ are also reducible to the dialectic of Aims and Means.³⁷

We can also begin to deduce the qualities required of commanders in war. They must be pragmatic above all. They must be enquiring and willing to explore, hence demonstrate an empirical approach. They must be capable of taking risks, and be mentally and emotionally robust enough to weather both the unpredicted and the unfortunate – phlegmatic, perhaps. Since war is complex, they must have insight and understand high-level patterns and trends; and not be dominated by concrete facts.³⁸ The commander who can only live by hard facts is doomed to find too few, too late.

What can we say about the selection and preparation of commanders? We must train them to take action; to be proactive; to make things happen. We must train them to think and act rapidly, to expect the unexpected, and to react positively when things change. In war, change they will. Change is inherent in the problem. Fundamentally, however, we must educate them in pragmatism and empiricism, even to the detriment of some of their current

skills.

Finally, we can suggest areas for development and research. Empiricism demands that in peace we experiment far more than at present – it is our only means of assembling new experiences. Historically, armies which have experimented extensively in peace have generated significant advantage in war.³⁹ War is a complex activity, yet complexity theory has not yet been explored by soldiers. War is adversarial, yet we do not examine games theory or sports science. War is a human activity, yet we spend less than 1 per cent of the research vote on human-centred research. More fundamentally, we can draw further analogies from other disciplines, and we can work with practitioners of other disciplines to advance our own knowledge.

CONCLUSIONS

We began by asking whether the conduct of war is an art or a science. It is neither. Warfare is an established, respected, yet grossly under-explored discipline in its own right. It is constrained to some extent by physical laws, but is fundamentally not determined. At least, it is not useful to assume it is. It should be founded primarily on pragmatism, empiricism, dynamism and a robust belief in the exercise of free will. Warfare is also bound by moral constraint. It is strongly characterised by Clausewitz' dialectic of aims and means. From that dialectic we can derive much about how to describe war, how to conduct it, who we should choose to conduct it, and how to train their successors. Warfare is a relatively immature discipline. Yet we can, perhaps, see a direction in which to proceed. □

NOTES:

1. Carl von Clausewitz, *On War*. Ed. by Anatol Rappoport (London: Penguin, 1968), 20.
2. Jacob Bronowski, *The Ascent of Man* (London: Futura Publications, 1981), 162.
3. W S Lind, *Manoeuvre Warfare Handbook* (London: Westview Press, 1985), 4-5.
4. Staff Officer's Handbook, p. 3-1-1.
5. Action is continuous in the sense that, from the perspective of a formation HQ, some action is taking place, which the HQ can observe. The HQ itself observes, orientates, decides and issues orders. It is not the action of issuing orders that the HQ observes, but the actions of subordinates.
6. Not least because every circuit of the loop must involve some interaction of forces and hence attrition, which doctrine requires us to avoid where possible. We should not choose a strategy based on iteration.
7. Lind based his ideas on Boyd's observations about F-86

Sabre Jet pilots in the Korean war. The Sabre had a better cockpit canopy than the MiG-15, which gave the pilot better situational awareness. The Sabre had powered flight controls, which the MiG lacked, hence the Sabre could turn inside the MiG. Lind extrapolates from there to command and control in general. This is an exercise in induction (the generation of general statements from particular ones). Induction is unsafe. See Karl Popper, *The Logic of Scientific Discovery* (London: Hutchinson, 1959), 27. To generalise about formation-level C2 from aircraft design is tenuous, to say the least.

8. General Olds flew P-51 Mustangs in the Second World War, F-86 Sabre Jets in Korea and F-4 Phantoms in Vietnam. Although the only fighter pilot to qualify as an ace in 3 separate wars, he is by no means the most successful fighter pilot of all time. See Mike Spick, *The Ace Factor: Air Combat and the Role of Situational Awareness* (Shrewsbury: Air Life Publishing Ltd, 1988), 147ff. A particularly damning factor is the realisation that MiGs in Vietnam had many advantages in dogfighting over most US jet types.

9. Army Doctrine Publication (ADP) Operations, Chapter 2, paragraph 0227 and Chapter 5, paragraph 0502.

10. Ibid. Paragraph 0502 states: 'It is possible to make a practical summation of the concepts ...' but then fails to do so.

11. ADP Command, paragraph 0103.

12. Ibid, paragraph 0106.

13. Ross Pigeau and Carol McCann, 'Clarifying the Concepts of Control and Command', Proceedings of the 1999 C2 Research and Technology Symposium, Newport, RI, PP 475-90.

14. Lest this be considered an unfair criticism of British Doctrine, it should be noted that Carol McCann and Ross Pigeau commented on US, Canadian, NATO and ABCA Doctrine in 1995, 1996 and subsequently.

15. For example, see Edward Luttwak, *The Logic of War and Peace* (Cambridge, MA: Harvard University Press, 1987), 94, 120 and passim.

16. Common paradoxes are often presented as single statements, such as 'attack is the best form of defence'. Strictly, such a paradox comprises 2 elements, e.g., 'attack and defence are opposing forms of war' and 'the attack often has the effect of causing less harm to one's own forces than does being attacked' or similar. As in this example, one statement (the first) is often implicit.

17. Thomas Kuhn, *The Nature of Scientific Revolutions* (London: University of Chicago Press, 1996), 163.

18. Ibid., 15-16.

19. The physicist Karl Popper required a theory to describe a set of axioms that were internally consistent, mutually independent, necessary, and sufficient. 'Sufficient and necessary' is a scientific shorthand for a set of conditions which adequately define or describe an entity. See Popper, *The Logic of Scientific Discovery*, 71.

20. It has been remarked that the Israeli Army continuously operated between a state of dynamism and chaos. This perceptive remark was written before the development of chaos theory. See Edward Luttwak and Dan Horowitz, *The Israeli Army* (London: Allen Lane, 1975), 173.

— TRENCH GASCOIGNE PRIZE ESSAY —

21. Garnet P. Williams, *Chaos Theory Tamed*. (London: Taylor & Francis, 1997), 209.
22. Clausewitz had nothing but contempt for learned pedants. See Michael Howard, *Clausewitz* (Oxford: Oxford University Press, 1983), 23.
23. P Paret (ed.) *Makers of Modern Strategy* (Oxford: Oxford University Press, 1986), 12.
24. John Shy, 'Jomini' in P Paret (ed.) *Makers of Modern Strategy*, Chapter 6.
25. Note that we cannot observe causality, only infer it. Ascribed to Hume in J Bradley, *Mach's Philosophy of Science* (London: The Athlone Press, 1991), 44.
26. Continuity requires that 'that which is a property of nature at any one time and in any one place, constantly and everywhere recurs'. See Ernst Mach quoted in J Bradley, *Mach's Philosophy of Science*, 11-12.
27. A consequence of Heisenberg's Uncertainty Principle. In essence, we may know the location of fundamental (subatomic) particles, or their movement, but not both.
28. Williams, *Chaos Theory Tamed*, 211.
29. Bradley, *Mach's Philosophy of Science*, 139.
30. See P Frank quoted in Popper, *The Logic of Scientific Discovery*, 279.
31. Rationalism is the pursuit of knowledge through the exercise of reason alone.
32. Bacon, Locke, Hume and to some extent Newton. The fact that they were English is not coincidental. See Richard Popkin and Avrum Stoll, *Philosophy* (Oxford: Heinemann, 1969), 234-35.
33. Note that our description of war (as adversarial, dynamic,

dangerous, complex etc) is based on observation of the facts as we perceive them. The method used here is essentially empirical.

34. Taking 'means' as 'the means with which' as well as 'the means by which'. This seems a more elegant usage than 'ways and means', which results in awkward phrases such as 'The Way of Command.' What is a 'way' of command?
35. Clausewitz's term *Zweck* literally means 'purpose', here 'aim'. An alternative meaning is 'end', as in 'ends and means'. However, the meaning is highly contextual; 'aims' works better in the present sense. See Clausewitz, *On War*, 122-138 and Howard, *Clausewitz*, 35.
36. Department of the Army, US Army Field Manual 100-5 'Fighting Future Wars' (McLean, VA: Brassey's, 1994), 12.
37. Identifying and satisfying aims: Conformity of the Goal. The nature of the means: Preservation of Combat Effectiveness. The application of the means: Speed and Shock, Concentration of Effort, Surprise and Security, Combat Actives and Coordination of Forces. See David C Isby, *Weapons and Tactics of the Soviet Army* (London: Jane's, 1988), 13.
38. Pragmatism (being driven by what works in the real world) and being dominated by facts (which often reflects an authoritarian character) are not synonymous. Authoritarian behaviour is symptomatic of a human typology which is linked to an innate inability to conceptualise and exercise intuition.
39. Examples include the French Army after the Seven Years' War, the British Army after the Boer War, and the German Army after the First World War.

RUSI *Book Options Scheme*

April offer:

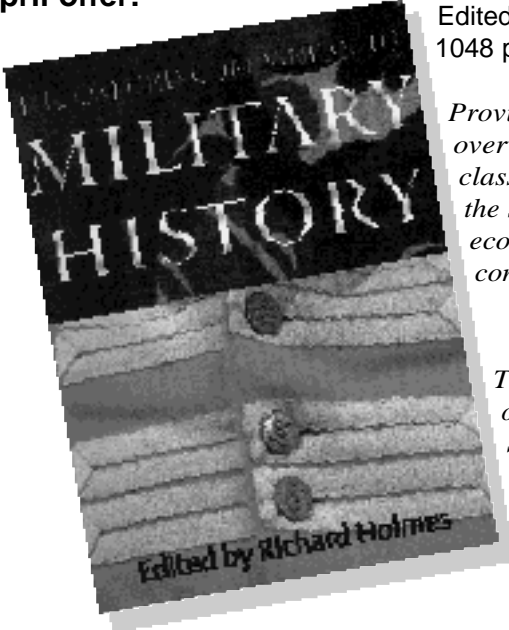
RRP£35.00

**Members
£ 27.00**

**Book Scheme
Members
£ 23.00**

**Postage &
Packaging £
6.50 per copy**

Available until the
end of September
2001
Please contact the
Membership Secretary



Oxford Companion to Military History
Edited by Richard Holmes
1048 pgs.

Providing a uniquely comprehensive overview of military history from classical times to present day, including the social, political, technological and economic background of major conflicts.

*The RUSI **Book Options Scheme** is open to all members. The Book Scheme offers generous discounts on specially selected books.*