Operation
Allied Force

Since the end of the Cold War British governments have shown little hesitation in using military force to back up their diplomatic and international objectives. The British Government has dictated that the military should be a '*force for good*.'[1] Future operations are likely to be limited, low-intensity wars of choice and it is almost inevitable that UK forces will be part of a coalition, usually a US-led alliance.[2]

In recent combined operations, alliance cohesion has been identified as the coalition's strategic centre of gravity. At a national level, the key contribution to that cohesion is the will to fight, which is characterized by public support for the use of force. Gaining and maintaining public support is essential, especially during lengthy conflicts of choice, and it is generally accepted that there are 4 critical vulnerabilities: moral legitimacy, collateral damage, casualties and fratricide. This essay examines whether these vulnerabilities are real or merely politico-military perceptions. Armed with the results, it goes on to propose ways to mitigate their secondary effects: an extensive coordinated information campaign; the increased delegation of targeting decisions; formal legal training and advice for operators; and a doctrinal formula for the use of offensive air power[3] at the land-air interface. These improvements could make our operational capability more robust at little or no financial cost and at acceptable political risk.

In interventions, the strength of the national will to fight is dependent on the clarity of the national interest or on the operation's moral legitimacy. If the public has ownership of the issues it shows surprising strength of character but, often since the end of the Cold War, these 2 cornerstones have been articulated poorly to the people. The paper will propose engendering strong and enduring support through a coordinated, open and honest information operation (IO), aimed at both the media and the public, that commences long before military action starts.

A precision attack on the Orlate Bridge, Kosovo, by the RAF

Once the military is engaged on operations, human, environmental and structural collateral damage is assumed to threaten public support. 'It is expected by the public that the military use increasingly humane [and] discriminate attack methods'

It is widely accepted that the US public is casualty averse; it is perceived that British people are more robust. But there is now evidence that political bodies have overplayed public casualty aversion. The politico-military leadership's perception is that public opinion will not stand for casualties. Is this true? If not, what are the ramifications for the military?

Worse than casualties resulting from enemy action is the impact of fratricide.[4] The public perceives it as wasteful, unprofessional, avoidable and unforgivable, yet history shows it to be almost inevitable. Fratricide and casualty aversion now constrain British air

power doctrine and procedures and, as a result, air power has been used increasingly conservatively over the last 10 years. How might we improve our operational effectiveness at the land-air interface?

Once the military is engaged on operations, human, environmental and structural collateral damage is assumed to threaten public support. '*It is expected by the public that the military use increasingly humane* [and] *discriminate attack methods*'.[5] Recent opponents have publicized their civilian casualties to undermine allied public support and thereby attack its centre of gravity.[6] The public would understand *jus in bello*, proportionality, discrimination, legitimate targeting and precautions in attack if these concepts were explained. However, it has not been educated in the harsh realities of war. The paper goes on to describe the basic ingredients necessary for the second phase of the IO – maintaining national support.

Closer investigation finds that the public is relatively unconcerned about collateral damage, expects casualties but is dismayed by fratricide. It appears that it is the politico-military leadership that really fears media vitriol concerning these realities of war and, therefore, it hamstrings its operators. Decentralized execution has become a thing of the past; targeting is controlled from the strategic level; rules of engagement do not permit aircrews to operate under the principle of mission command; and aircraft operations are confined to the relative safety of medium-level airspace. Insufficient space means that examination of the nascent technological solutions to these challenges is beyond the scope of this paper; instead the essay concentrates on pragmatic doctrinal and procedural solutions.

The main body of evidence has been culled from Operation ALLIED FORCE. This coalition humanitarian intervention lasted 78 days, long enough for public support to be affected by political and military strategies, the media and the operational results. It highlighted major flaws in doctrine, capabilities, information operations, targeting, air interdiction (AI) and close air support (CAS).[7] Therefore, it provides a number of lessons from which to develop better ways to use air power.

MAINTAINING PUBLIC SUPPORT FOR WARS OF CHOICE

> '*No enduring threat* [to the UK] *is likely to emerge during the next 20 years.*'[8]

Future conflicts are increasingly likely to be of low-intensity and generated by ethno-nationalistic or humanitarian issues.[9] The UK is likely to be but one partner in a coalition. If a country has anything other than rudimentary defences the UK cannot get involved in the future without expecting casualties. For example, in a conflict against any integrated air defence system, stand-off jamming would be required; the UK does not have this capability. Since the Gulf War, the US has always provided the non-lethal suppression of enemy air defences (SEAD) capability and, because it will not place its forces under external command, the major portion of air power for a conflict too. Therefore, the US has both run the campaigns and defined the rules.

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A US Navy Hornet launches an AGM-88 HARM missile. SEAD (Suppression of Enemy Air Defences) enables the missile to reach and destroy an enemy transmitter before it can be shut down

During Operation ALLIED FORCE, NATO attacked a sovereign state; many claimed this was illegal. The bombardment violated the principles of non-aggression and non-intervention in formal international law and it was not legitimised by the UN Security Council (UNSC). NATO embarked on air strikes because it was deemed that military force was required to avert a potential humanitarian disaster. This required the application of natural law principles to legitimise the intervention[10] and has set a powerful precedent for the future.

Immediately prior to Operation ALLIED FORCE there was widespread public consternation that NATO would get embroiled in a costly and lengthy war that might not be won. Few, however, doubted that something needed to be done. Political strategies to halt the collapse of law and order in Kosovo had failed. Politicians and the public remembered Rwanda where only minimal military intervention was carried out and over 800,000 people died at a

Ethnic cleansing: Kosovo identity papers destroyed by the Serbs

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rate greater than the Holocaust; it seemed increasingly likely that such an unthinkable disaster would happen in Kosovo. In Chicago one month after commencing the Operation, Blair outlined the 5 criteria to be met before his Government would commit to a military intervention. These were that national interests were involved; all diplomatic options had been exhausted; there was certitude that military intervention was morally just; military options could be sensibly and prudently undertaken; and that there was an acceptance of a long-term commitment.[11]

There are problems in the first and last of Blair's criteria. Britain's national interests are global; if Britain wants a central place in the increasingly globalized world, they have to be. But the linkages between distant wars of choice and the national interest are often obscure to the man on the street. In fact, for Kosovo, the politicians demonised Milosevic in order to engender support. Even if the linkages can be identified, with a limited national budget, it is inevitable that expensive military operations fought over vague national interests will be lower in the public's priority list than domestic issues such as unemployment, health, social security and education. Explaining convoluted connections to the sceptical British public can be difficult. However, it is an essential leadership task to rally support for an intervention. The 'statement to the nation' favoured by US presidents may not sit well with the British psyche, but it does provide clear leadership. British politicians should consider appropriating (and probably anglicising) the technique. The current technique of relying on partial and subliminal messages interpreted by the media does not provide either leadership impact or a focused message.

TV pictures of refugees being expelled from the country on overcrowded trains conjured up images of the Holocaust. First-hand stories of the horrors were widely publicized

The strength of public support for wars of choice is directly related to the public's ownership of the issues. Embarking on somebody else's war without ensuring public ownership engenders only weak and fragile support, which directly impacts the UK's centre of gravity and constrains the military in 2 major ways: there may not be an acceptance of a long-term commitment (Blair's fifth criterion) and there may be a high degree of casualty aversion. In both cases the secondary effect is that the public's will to support an operation may falter. In contrast, if the public has ownership of the cause, it is likely to accept both long-term commitment and casualties. The Kosovo crisis is just such an example. Throughout spring and summer 1999, increasing proof of Serbian humanitarian atrocities slowly filtered out of Kosovo. TV pictures of refugees being expelled from the country on overcrowded trains conjured up images of the Holocaust. First-hand stories of the horrors were widely publicized. As the air campaign went on, even as the effects of the bombing were questioned, public support grew rather than diminished. The public swung into line behind the politicians and an opposed land entry was not only considered, it even met with approval. Such an operation would have meant numerous casualties yet the public did not baulk.

Government does not have to consult or even inform the public before intervening, but if the public does not believe in an operation's overall aim, its resilience and support will be low. In such situations, as the US involvement in Somalia graphically displayed, even small numbers of casualties, especially those treated inhumanely, can mean public support for an operation vanishes. Interestingly, political resilience decays even faster. President Clinton withdrew US forces from Somalia before a public furore because his perception was that public would not stand for a military mission that had crept to '*warlord hunting*'[12] and he feared a public backlash. It was wasting lives for an unsupportable mission that led to the withdrawal, not the casualties themselves.

Therefore, the first military line of operation should be an IO, one aimed not at the enemy but at our own public. In order to engender strong support and, thereby, to protect our centre of gravity before committing the military to such humanitarian operations, our political leadership should prove the operation's legitimacy. As Lieutenant General Cosgrove realized prior to deploying to East Timor in September 1999, he '*needed to talk to the mums and dads…to persuade them that their children*, [his forces], *would be all right*', and that the mission was necessary.[13] The media will ensure that '*mums and dads*' extend beyond progeny to the wider public at large. Such IOs cannot be defensive; they must lay out strongly, clearly and unambiguously the reasons for an intervention, justify it morally, be honest about the risks and persuade the public that those risks are worth taking. If the IO fails the Government should think hard about getting involved at all. A bold IO at the outset will not only stymie enemy opportunities to attack our centre of gravity, but it will also send a clear deterrent message to him.

An American gun ship withdraws from Mogadishu

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The realities of differing national perspectives within a coalition mean that devising a coherent IO will be no easy task. But this challenge will have to be surmounted sooner or later and, furthermore, the dialogue between coalition members will result in an increased openness between countries that will either shore up cohesion or expose the tensions that need to be protected against. Rehearsing arguments is always useful.

A Luftwaffe Tornado prepares to refuel from an RAF tanker during Operation ALLIED FORCE

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At the outset of Operation ALLIED FORCE President Clinton ruled out the use of ground forces in Kosovo; British political [14] and military [15] leaders did too. While this protected Alliance solidarity during entry into the war, it neutered the air campaign because air strikes were not backed up by the threat of land power. As part of an IO strategy, the comments were deeply flawed. It was casualty aversion in our military and political leaderships that led to this stance because the assumption that the public was casualty averse was not challenged.

WHERE DOES CASUALTY AVERSION REALLY LIE?

During Operation ALLIED FORCE aircrews were ordered not to take unwarranted risks with their lives. The commander's '*first requirement was to avoid losses, principally losses of aircraft*.'[16] This was a manifestation of the military and political perception that the public (throughout the Alliance) was casualty averse. But is the British public really casualty averse?

Western casualty aversion has been widely studied over the last 30 years. However, while there is a great deal of conjecture about the British public's position there is little evidence. The common view is that, primarily because of the Northern Ireland struggles, the British public has a more robust attitude to military casualties than the US. This perception is borne out by evidence from the Falklands War where the British public showed surprising resilience in the face of the deaths of 255 men, the wounding of 777 more and the loss of 6 ships and 9 Harriers.'[17] However, perceptions have changed since the Gulf War

because, in spite of dire predictions,[18] actual casualty figures only numbered a few hundred. '*Advances in technology have led to a widespread expectation that military operations can be conducted with few or no casualties, on either side'*[19] *and 'pressures will increase for Rules of Engagement* [ROE] *that minimize the risk of casualties*.' [20]

British troops on patrol in Northern Ireland

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The politico-military elite believes that casualties have to be avoided at all costs. During Operation ALLIED FORCE, '*the reason* [for minimizing aircraft losses] *was, this had to be an air campaign of infinite duration. We knew at the outset that you can't start an air campaign if you go into it losing 4, 5, 6 aircraft a day with the headlines screaming NATO loses twelfth aircraft, because then the clock's ticking*.'[21] This belief has led to a doctrinal shift in the way that the Western powers conduct air campaigns. As casualty rates decrease over time the expectation that the trend [22] can continue has meant that minimum (although not necessarily zero) casualties has become an end in itself. In turn air power is used ever more conservatively in conditions of ever increasing air dominance. This paper advocates an expansion of the doctrine. Of course we should continue to minimize the risk of casualties, both the public and the military would not accept otherwise, but we should recognize that there are situations in which we need to risk taking casualties in order to achieve the task. Furthermore, we should communicate that recognition to the public.

The trick is to balance the risk of taking casualties against both maximizing military effectiveness and ensuring target discrimination. It will be a delicate balance, but operational decisions should be made on the basis of a scientific derivation of the acceptable casualty level not unsubstantiated perceptions. This analysis has to be broken down nationally, because the distribution of the casualties amongst the coalition partners is crucial. For instance, President Chirac threatened to withdraw French troops from Bosnia in 1995 because it was predominantly France that was taking the casualties in what was perceived as an increasingly futile peace keeping mission.[23] Acceptable casualty levels depend on national resilience and ownership of the conflict's issues. The UK has not assessed the scale of its vulnerability scientifically. Rather than continue to develop doctrine based on intangible, debatable, military perceptions, a representative statistical survey needs to be conducted.

The aim of the survey should be to determine the extent of public support for different types of issue in which military operations would be used, and to correlate those results with the casualty level that would be both expected and acceptable. Comparison of the results to similar surveys conducted amongst the military leadership and the political leadership groups, (accepting the limitations of sample size) would establish baseline relationships. The results of such a study carried out on a sample of 4,900 people by the Triangle Institute for Strategic Studies in the US are illuminating.

It is apparent that the latter elites, who were lieutenants, captains and majors in the Vietnam War, are still scarred by the Vietnam Syndrome. The public, however, is much less so

Captain Steve Ritchie – the only USAF fighter pilot ace of the war in Southeast Asia

The evidence shows that the public is not nearly as casualty-averse as the military and political leadership. It is apparent that the latter elites, who were lieutenants, captains and majors in the Vietnam War, are still scarred by the Vietnam Syndrome. The public, however, is much less so. It shows that the military and political elites…'believe that the American public is casualty-averse and will not tolerate deaths except when vital interests are at stake. [It] reached this conclusion by posing three plausible intervention scenarios (defending Taiwan against a

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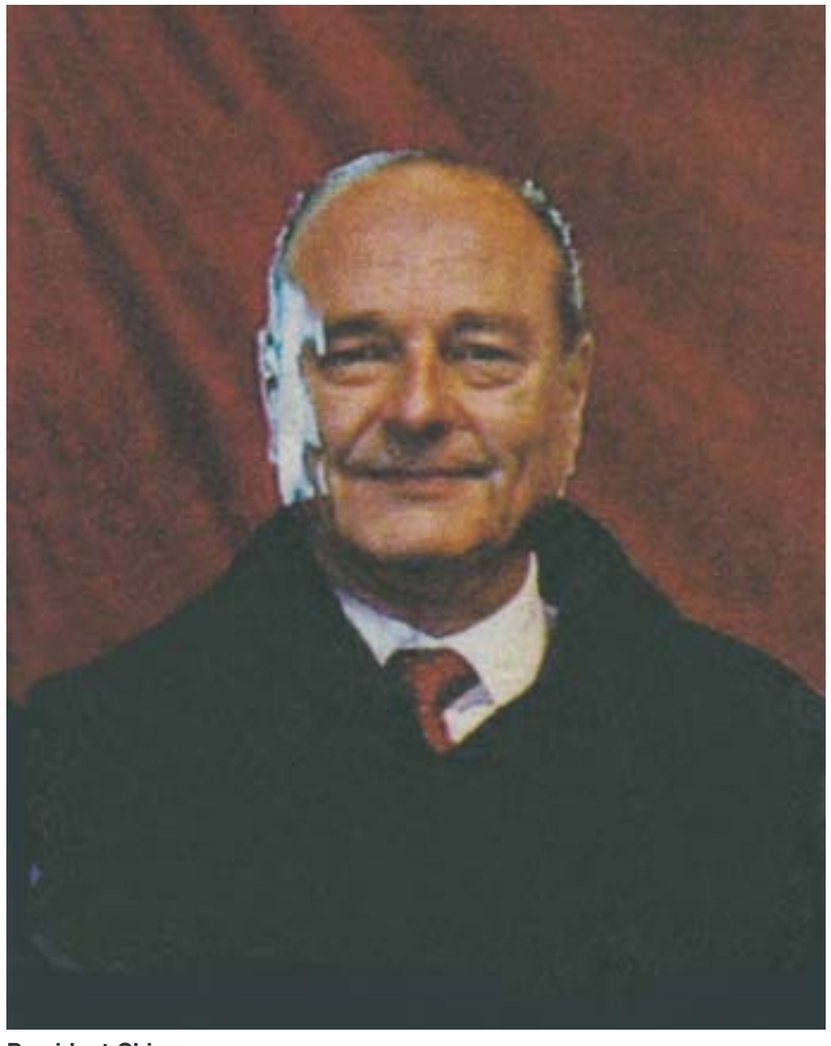

President Chirac

Chinese invasion, preventing Iraq from acquiring weapons of mass destruction, and stabilizing a democratic government in the Congo) to senior military officers, influential civilian leaders, and the general public and by asking them to consider how many American deaths would be acceptable to complete each mission *(Table 1)*.'

Number of Deaths Acceptable

Mission	Military Elite	Civilian Elite	Mass Public
Congo	284	484	6,861
Iraq	6,016	19,045	29,853
Taiwan	17,425	17,554	20,172

Table 1. Relative Casualty Aversion Across Political, Military and Public Groups [24]

'As the authors point out, one must interpret these averages in general terms and must realize that they do not necessarily reflect the actual casualties the public will accept once real soldiers start dying. But the *sheer numbers* and *dramatic differences* between the groups are significant. More importantly, they are consistent with the previous research [25]…The Taiwan case is a holdover from the Cold War and represents deep-rooted American sentiment [against] the… Chinese and the *long-standing commitment to defend Taiwan*. [These are considered] very important, if not vital, national interests. It is not surprising, therefore, to find consensus on the costs that all three groups are willing to accept to accomplish the mission. The Iraq and Congo cases are examples of post-cold-war interventions, which have sparked the contention that the American public is casualty-averse. The Iraq case is significant because it demonstrates the effectiveness of leadership and cueing [26] from public leaders.' [27]

If the British military and politicians had access to the results of a similar national study they would have a powerful tool with which to gauge more accurately their vulnerability to casualty aversion. During a conflict, both the military and the political leadership groups could test their own reactions to casualties in order to assess by comparison the public's will to support a fight.

At the operational level, the fact that we might have a higher resistance to casualties means that our forces could undertake higher risk tasks. The protection of KFOR in 1999 during Operation JOINT GUARDIAN by Harrier GR7s conducting low-level CAS is one such example.[28] Furthermore, the US doctrinal assumption that it will be able to gain and sustain both air superiority and sufficient forces for an indefinite war begs a question. What if the situation became so critical that lines of operation had to taken without total control of the battlespace and in spite of higher casualty risks? This could be where Britain comes to the fore, as it did in the Gulf War when only the Tornado GR1 could fulfil the runway denial role. Obviously there would have to be significant military benefits before military commanders should take greater risks with their subordinates' lives; this paper does not advocate needless squandering of lives or materiel. For instance, during Operation ALLIED FORCE, low-level, fast-jet operations were offered to General Clarke but were prohibited from the outset, even during the numerous bad weather periods

when the RAF's operational effectiveness was almost completely negated.[29] The increased military effect of low-level bombing, and the increased discrimination potential that going lower would have afforded aircrews, was deemed not to outweigh the casualty risk. But there may be times when it does.

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In reality though, is the politico-military leadership willing to risk losing public support in a war of choice? With casualty aversion, the Achilles heel is not really the public; it is the media. Journalists constantly harangued General Jertz during Operation ALLIED FORCE questioning NATO's capability to discriminate targets, to be proportionate in attack and to be effective from the relative safety of airspace above 15,000 feet. But NATO commanders believed that the fickle media would accuse them of squandering aircrew if they lost aircraft and they feared that scenario more than accusations of being ineffective.[30] Moreover, at the grand-strategic level, the politicians feared that losing media support would impact their power-base; the potential impact of a military miscalculation drove them to conservatism long before the public's culminating point.

The logical conclusion of this analysis takes us to the fact that it is the media themselves that should be another target of our ongoing IO strategy. If the media can be persuaded to take ownership of the issues, to support the military methods being used to achieve the ends and to be consistent in their reporting, then the halter can be lifted off the military. Targeting the national media smacks of propaganda, but the emphatic strategy should be, and has to be, to explain honestly the military constraints, capabilities, risks and challenges so that the military does not become subject to ill-informed sniping from television pundits and the national press. This, in turn, would guard against losing public support.

COLLATERAL DAMAGE – DOES THE PUBLIC CARE?

Once involved in a conflict, maintaining public support is a vital line of operation. Ownership is fundamental, strong political leadership is crucial, but competent military progress towards the end-state (winning) and *jus in bello* (the legitimacy of the methods used) are also very important.[31] The principal manifestation of being incompetent and/or illegitimate is collateral damage. The primary constraints on military effectiveness resulting from the need to remain competent and legitimate are expressed in the ROE and in targeting restrictions.

The laws of armed conflict concerning collateral damage are relatively unambiguous, although their application often requires a good deal of judgement. Collateral damage is an unavoidable consequence of war. The Geneva Convention and the

subsequent 1977 Additional Protocols clearly state that making mistakes is not illegal. Additionally, one is judged on the information available at the time, not on information that came to light after the event. However, the risks of erring must be outweighed by the expected military gains. British politicians, legal advisers, commanders, targeteers and operators alike are responsible, on pain of punishment by the International Court of Justice, for being discriminate, for protecting civilian objects, for taking precautions in attack and for using proportional force – the principles behind the laws. Moreover, anyone in the targeting chain can stop an attack if he realizes that it will break any of these principles; in fact everyone is responsible for doing so and can be held accountable if he knowingly continues.

During Operation ALLIED FORCE, political and military perceptions about the effects of collateral damage on national/alliance public opinion hamstrung RAF effectiveness in 3 ways. The Government restricted the types of targets that could be attacked, determined how they could be struck and, for much of the war, retained the final target-attack clearance. This bureaucracy slowed down the RAF's operational tempo.

With improvements in communications this 'long-screwdriver' effect has become increasingly prevalent. It is a result of political concerns and is a clear example of politicians reaching down [32] below their grand-strategic level. The military accepts the phenomenon as a fact of life: 'military operations are subjected to intensive scrutiny, especially with the immediacy of media broadcasting, and sensationalism, which often drives newspaper sales and TV ratings. This often invites political intervention, thereby limiting the delegation of military command authority and the acceptance of risk'.[33]

What this fact of life means is that either we do not adhere to our doctrine or our doctrine is fundamentally flawed. There is centralized control and centralized planning but very little decentralized execution. Mission command [34] is dying out and reach down is increasing.[35]

Yet Operation ALLIED FORCE showed British aircrews to be highly professional. During the 870 Harrier GR7 missions flown, pilots brought their weapons home over 350 times. The aircrew that drop the bombs have the ultimate responsibility as the final link in the chain. They are required by law not to attack if they believe the target is illegitimate and

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Sudanese demonstrators protest against the US bombing of a pharmaceutical plant in Khartoum in 1998

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they exercised that right many times during the Kosovo conflict.[36] As Sir Richard Johns put it: this 'represents a discipline within the ranks of our operational aircrew of which I am deeply proud'.[37] Recognizing that aircrews take the legal responsibilities invested in them under the laws of armed conflict extremely seriously and that they can be trusted to show restraint, the political and military leaderships should live by the doctrine. They should give the operators enough rope to be effective or alternatively to hang themselves. Concurrently, aircrew training on the laws of armed conflict should be formalized and legal advisers for operators should be provided.

Politicians should delegate the responsibility for targeting further down the command chain than they currently do. It is natural and appropriate that ROE will be approved, if not written, by national political bodies. However, ROE do not define targets; they give guidance and intent. They provide a framework within which target suitability can be assessed. Target authorization decisions themselves should be delegated to those running the campaign. At the highest level this should be the Military Committee, but more often it should be the Joint Targeting Coordination Board [38] or, for routine and unexceptional targets, the Joint Force Air Component Commander (JFACC).[39] For coalition operations national target authorization should be delegated to the national component commander (NCC) advising the JFACC. The NCC himself will be advised by legal experts and would retain the option of ratifying any contentious targets with superior formations up to the Attorney General and the political body. This would accord with UK doctrine and would speed up the operational tempo. The aircrews will provide an additional safety net at the tactical level during detailed target planning and according to the latest intelligence and the conditions on the day. Such a system was proven during the Gulf War but, since then, reach down has taken hold.

Collateral damage should be minimized for two reasons: it demonstrates military competence and it is a legal and moral requirement. This helps to maintain public support, although there is a key balance that must be maintained. Minimizing collateral damage can reduce or negate military effects. Operators might be forced to attack from ineffective directions or to use ineffective weapons. Of course, if the military can achieve the aim anyway there is little need to change the balance. But collateral damage concerns must be kept in perspective. Public opinion itself is less sensitive to collateral damage than the leadership perceives it to be; it is the media that make the hue and cry.[40] And the public does care about military effectiveness, witness the recriminations in the aftermath of Kosovo; evidence of military success is an important positive part of maintaining public support in a conflict.[41]

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Since the Gulf War, extremely impressive video footage of precision attacks has given the public the impression that air power is supremely surgical; it can be, but not always. There are very limited numbers of laser designators and laser-guided weapons are only

practical against static targets in permissive weather conditions. Precision weapons cannot be guaranteed to hit the target even in perfect conditions; statistically a third miss. If they miss, they can cause collateral damage. Over the past 10 years, the military has tacitly perpetuated the myth that air power *in toto* is as exact as its precision tip can be. Protecting that myth has exposed the vulnerability of collateral damage sensitivity. Accepting operational security, the IO has to portray air power's capabilities honestly and describe how it minimizes collateral damage.

Operation ALLIED FORCE exposed the public to these truths and, while it was disappointed in the RAF's lack of capability, legitimate collateral damage did not unduly concern it.[42] For instance, following the destruction of a Serb train on the Gredelica railway bridge General Clarke's detailed explanation (with video) of how the mistake occurred effectively silenced media criticism of the pilot.[43] Conversely, when the bombing of a stationary refugee convoy near Dakovica was not explained adequately for over a week, the implied military incompetence did enormous damage to the Alliance's credibility and the media called into question the efficacy of NATO tactics and procedures.

The most penetrating question was how is flying high enough to minimize the risks to aircrews reconciled with the need to fly low enough to identify targets? While the Chief of the Air Staff stated after the war that '*war is and will remain a nasty and brutal business in which the aim is to achieve political objectives with the least possible loss to one's own side … no prizes are awarded for manufacturing an evenly balanced fight let alone for sustaining unnecessary casualties. I should also point out that the airspace above 15,000 feet was* ***not*** *a safe haven.*'[44] The dilemma was balancing the minimum casualty risk with the legal remit to be proportional and discriminate. '*If an issue is worth fighting for, it should be worth dying for*.'[45] The overriding issue at the time was casualty aversion. In hindsight, if the public were not as casualty averse as was believed at the time, perhaps the JFACC should have permitted aircrews to go lower in order to locate and identify targets. Alternatively, there are those that argue that the war could have gone on indefinitely and that NATO would have outlasted Serbia in the slow one-sided war of attrition that was fought. Fortunately, Milosevic's capitulation prevented NATO having to discover if this was true.

A Serb train is destroyed

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Within the IO sphere, there must be a system in place whereby if a mistake occurs, it can be admitted and explained. The public will accept a reasonable mistake but it does not take kindly to being lied to or to cover-ups. IO cells need representative displays to prove their points which, in most cases, will require the digitization of cockpit video and very fast links from the front line to the rebuttal cells. An open, straight talking, reasonable and, above all, truthful explanation will minimize the impact of collateral damage. Systems should be put in place.

WHAT IS THE IMPACT OF FRATRICIDE?

Estimates of Iraqi losses during the Gulf war vary considerably but even using a conservative 3,000 the fratricide level would be approximately 1.5 per cent

Fratricide is not new; as long as men have fought each other, they have made mistakes and killed their own. However, since the Gulf War, the prevention of fratricide has risen high on military agendas.

Simply put, the fratricide level of a conflict can be calculated by dividing the number of fratricide casualties by the total number of friendly casualties. Historically, the level has been a steady two per cent [46] although a reluctance to admit fratricide and the fog of war may hide a true reflection of the level.[47] In the Gulf War, where 35 of the 146 US casualties were due to fratricide, this calculation produced a figure of 24 per cent. Unsurprisingly, there was widespread outrage in the US, a sentiment that was echoed in the UK after the destruction on 26 February 1991 of 2 Warrior Fighting Vehicles and 9 British soldiers by a marauding A-10 pilot who mistook them for the enemy.

It can be argued that this fratricide-level calculation method exaggerates the problem. It may be more pertinent to divide the number of fratricide casualties by the number of enemy deaths. This produces a number that links the number of friendly casualties generated by getting it wrong to the number of enemy casualties generated by a force getting it right. Estimates of Iraqi losses during the Gulf war vary considerably but even using a conservative 3,000 the fratricide level would be approximately 1.5 per cent. Undoubtedly this method affords significantly more protection to our centre of gravity than the first. However, playing statistics will lose commanders their human touch. The raw data needs to be made available and the tragedy of the human loss needs to be sensitively handled. Following fratricidal mistakes the military needs to be ready to defend itself against charges of lethal incompetence. Comparing the number of mistakes to the offensive effort provides a useful tool to deflect bad publicity, but fratricide will still seriously damage support.

The effects of such errors are widespread and extremely damaging. First, there is the direct consequence of loss of fighting materiel. Secondly, firepower wasted on friends cannot be brought to bear on the enemy. Thirdly, fratricide undermines trust between forces, services and even coalition partners. Fourthly, it devastates military morale. Fifthly, it can affect how fratricide-scarred personnel and units fight future battles [48] and make units fearful of making a mistake become indecisive. Whether this

happens at the individual level, for instance air defence battery operators, or at the operational level for instance in the generation of restrictive ROE, the message is clear: fratricide hamstrings combat effectiveness.

Fratricide occurs at the land-air interface. With air power, it can be caused by weapons malfunction and by inaccurate weapon aiming but, in the main, it occurs because of misidentification. Misidentification can occur through the carelessness, bullishness or expectancy of individuals, through poor communications or because fielded technology does not give the military a reliable capability to identify friend from foe.[49]

Technology that can recognize friends on the battlefield already exists [50] and has proven itself worthy of procurement. However, it relies on all units being 'on the net'. The sheer numbers of individual technological units required to digitise the battlespace creates a financial burden that has so far proven too heavy to bear. This is exacerbated by the fact that each nation needs to procure a system that is compatible with its coalition partners' systems. One nation needs to set the trend but, since each US Service has procured different technologies, not even the US is giving a lead. Until combat identification technology enters widespread service, (and probably forever more to provide for system failure), doctrinal and procedural fratricide limitation systems need to be put in place.

LAND AND AIR INTERFACE

How can we rationalize air power's doctrine of centralized control and centralized planning with land's doctrine of mission command in the tactical chaos of the battlefield?

Without combat identification technology, there is only one method of eradicating air/land fratricide: the complete disassociation of land and air environments. In the joint environment the challenge is to create an effective doctrinal and procedural structure that allows air and land to mesh safely. How can we rationalize air power's doctrine of centralized control and centralized planning with land's doctrine of mission command in the tactical chaos of the battlefield? Executing joint fires in the close and deep battlespace is fraught with dangers. The two doctrines are completely at odds especially with the demise of decentralized execution resulting from politico-military casualty, collateral damage and fratricide aversion. How should we employ our forces to operate effectively under these limitations?

RAF FAST JET CAPABILITIES AND CONSTRAINTS

In order to acquire [51] tactical targets, RAF aircraft need to operate below 10,000 feet. During the day especially, this makes them vulnerable to prolific, relatively low technology, infra-red (IR) surface-to-air missile, anti-aircraft artillery and personal weapon threats. At night, these predominantly optically-aimed threats are extremely difficult to bring to bear so the aircraft are more survivable.

Ready for combat! Harrier GR.Mk 7

The target acquisition sensors in British fast jets comprise the aircrews' naked eyes, night vision goggles (NVGs) and the Thermal Imaging Airborne Laser Designation (TIALD) targeting pod

The target acquisition sensors in British fast jets comprise the aircrews' naked eyes, night vision goggles (NVGs) and the Thermal Imaging Airborne Laser Designation (TIALD) targeting pod. The Tornado GR4's and Harrier GR7's Forward Looking Infra-red (FLIR) sensor and the Tornado's ground mapping and terrain following radars do not allow autonomous tactical-target identification. The FLIR is a navigation sensor not a targeting one; it is incapable of allowing the aircrews to reliably acquire (far less identify) tactical targets.[52] Tornado's radars can be used for ground mapping, terrain following and targeting infrastructure-type targets but cannot identify mobile targets.

During the day, from medium level, it is possible to use hand-held, image-stabilized binoculars [53] to recognize and attempt to identify targets acquired by the naked eye. At night, this is impossible. Then, even from low level, NVGs offer only 20:40 [54] visual acuity making it extremely difficult to acquire tanks and impossible to recognise them at greater than 500 metres range (which is closer than the range required to release a bomb).

TIALD, with its optical (day only) and electronic zoom facilities, permits target recognition if not identification (against tactical targets). However, using it is akin to looking through a drinking straw; it requires very accurate cueing in order to lay the sensor over the target in the first place, which is a rare luxury when attempting to acquire mobile targets. The chances of finding the target are significantly increased if the operator can relate the picture on the TIALD display to an image of the target area that he has pre-studied; for this reason pre-planned targets are much easier to acquire than targets of opportunity.

These sensors allow navigation and targeting against infrastructure by day and night. Tactical targets can be acquired visually during the day but only with an attendant casualty risk. At night, it is almost impossible to find tanks. Only those found by ground based forward air controllers (FACs) that can be triangulated with respect to nearby, unique, electro-optically significant, identifiable

ground features offer any chance of success. On grounds of effect, fast jets against can only be use rarely against dispersed tactical targets at night, especially if friendly forces near or amongst the target set add to the fratricide risk.

It follows that fast jets should be used for AI against infrastructure both by day and night, while attacks against tactical targets are likely to fail at night and to result in either high casualty rates or mission failure in the day.

APACHE CAPABILITIES AND CONSTRAINTS

Apache-D is a mature, combat-proven, attack helicopter. It is potent, robust and capable. It will give the Joint Task Force Commander the means to exploit the battlefield with increased tempo, firepower and flexibility, in both close and deep operations.

Designed with survivability in mind, the Apache-D can withstand up to 12.7 mm calibre hits throughout, and up to 23 mm calibre hits on critical systems such as the main rotor hub, gear-boxes and cockpit glass. It is furnished with redundant flight control systems, two well-separated and shrouded engines with angled exhaust diffusers and oil-less angle and tail-rotor boxes that are greased for life. A radar frequency interferometer radar warning receiver, radar and IR jammers, chaff, and a laser warning receiver provide passive and active defence, while numerous wire cutters guard against wire-strikes. It has to be survivable; at £18 million per copy, Apache-D is too expensive an asset to risk losing and, therefore, arguably, to risk using. Task Force HAWK, the Apache-A deployment to Tirana during Operation ALLIED FORCE, suffered from just such a dilemma.[55]

Apaches took an active role in Kosovo

…at £18 million per copy, Apache-D is too expensive an asset to risk losing and, therefore, arguably, to risk using

The key to Apache-D's capability is its sensor suite. The LONGBOW fire control radar excels in finding tactical targets. Coupled with the interferometer, able to detect 1,000 potential targets out to approximately 7-km range in a snapshot, tracking 256, while displaying 16, it can then data-link results to, and inter-link results with, other Apaches close by. Apache-D's target identification systems are primarily electro-optic. The pilot's night vision system, a steerable IR sensor, offers up to 39 times (optical and electronic)

magnification and is allied to the TV (127 times magnification but daylight only) and IR Target Acquisition Designator Sight (TADS). Although its sensor technology is of the same generation as current fast jets, Apache crews have the critical advantage of time to study the target. The Apache's weapons are likely to be fired from the hover. Therefore, its crews have time to identify the target. If they cannot, they have the ability to move to somewhere (closer) from where they can. Thus, the use of a helicopter, instead of a fast jet, against armour significantly decreases the chances of fratricide.

With up to 16 Hellfire missiles, or up to 76 CRV7 rockets, and a 30mm gun, the Apache is extremely potent against armour but is less so against infrastructure targets. Consequently, the target sets against which it should be employed are defined by type and effect not space. Armies are the Apache's preferred target set. Moreover, conceptually, it should achieve a 'one shot – one tank' kill ratio because its weapons are guided, or in the case of its 2.75in-rockets pointed, and the chances of their missing are small. Against modern armour, especially when compared to a fast jet (which has a 'one pass – one tank' capability using cluster bombs of questionable effectiveness against post-80s armour) the attack helicopter has an order of magnitude more utility.

With up to 16 Hellfire missiles, or up to 76 CRV7 rockets, and a 30mm gun, the Apache is extremely potent against armour but is less so against infrastructure targets

Apache's concept of operations, comprises Raids and Air Manoeuvre Operations (AMO). Raids are sorties flown against specific targets such as headquarters, marshalling areas and logistic nodes. These missions have historically been carried out by fast jets that, intelligence and tasking timescales permitting, are not only more capable but are, in many cases, preferable choices of platform for the role. Fast jets have longer range than helicopters and can carry more firepower to the target and can be easily integrated with SEAD for these Battlefield Air Interdiction (BAI) missions.[56] On the other hand, in raids, Apache can be more discriminate and, because it would normally be controlled by a land component commander (LCC),[57] could be better coordinated and integrated into the land scheme of manoeuvre, potentially operating at a faster tempo than fast jets.

'Air Manoeuvre is manoeuvre unconstrained by the ground.'[58] AMO are rightly the focus for the British Army Apache doctrine. The LONGBOW and the TADS have significant utility for reconnaissance operations and Apache brings sustained presence (compared to fast jets), accuracy, discrimination and substantial firepower to attack, escort and support operations. CAS is not mentioned by name but the Apache-D's strengths play to this role. 'CAS is optimised when fully integrated with other fire support assets. [It] is a tactical level operation which can create and exploit operational opportunities.'[59]

In 1939, Slessor defined three circumstances when air power would be used in direct support of armies: 'to break the crust of the [enemy] defence… to turn a retreat into a rout… [and] in a critical situation… to stop a hostile breakthrough…'[60] The former used to be called BAI. The second could be termed Offensive CAS and for the purposes of this essay is expanded to include AMO. The last is Defensive CAS where air power is applied to relieve beleaguered ground forces.

Apache will be based with or near the land component headquarters. Its crews will be as well placed as anyone to know the current disposition of forces and the commander's scheme of manoeuvre and intent. Their proximity to the battle means they can be responsive. Apache's slow speed and hovering capabilities mean that it can be allocated a very small piece of airspace from which to engage the enemy. Apache should be easy to control;[61] however, only other Apaches can receive their picture so, today, they have to be trusted, in accordance with the principles of mission command, to hit the critical targets, at the right time, without fratricide.

Attack helicopters are better placed to take these Offensive CAS responsibilities than fast jets. Invariably, fast jets are based well to the rear. The incompatibility of intra-theatre, inter-service and international communications means their crews carry 'latest intelligence' that is hours, if not tens of hours, out of date. They are unlikely to be aware of either the LCC's detailed scheme of manoeuvre or his intent. Unless there are sufficient aircraft to be held in a cab rank, fast jets have response times measured in hours. They require large areas of airspace, both to hold and to attack, and require close coordination and control to bring them to bear at the right time down the correct route to the correct target. The FAC has to verbally describe the chaos inherent in the manoeuvrist approach from his constricted viewpoint, with the limited information he gleans from his commander, through unreliable communications.

Attack helicopters are better placed to take these Offensive CAS responsibilities than fast jets. Invariably, fast jets are based well to the rear

Attack helicopters have many advantages

The aircrew have to translate this description and identify the target either from two or three miles high (if they are to survive and from where they can see hundreds of square miles) or alternatively, in a few seconds from a low-level attack. The scope for misidentification is huge. As we have seen, even in near perfect conditions in the desert of Iraq in 1991, 24 per cent of US casualties were due to fratricide. From the LCC's point

of view, the requirement to '*check fire*' other joint fire systems means his simultaneity and battle rhythm have to pause while the fast jet makes its pass. To add insult to injury, fast jets give a low probability of kill and a significant risk of fratricide, especially at night. It follows that Apache is the platform of choice for Offensive CAS; fast jets should only be used in desperation.

For Defensive CAS any air power platform can and should be used. The risks of fratricide become more acceptable if air power alone offers a way out of an otherwise hopeless situation. Apache would have greater utility as described above, but fast jets can deliver a significant weight of weapons with tremendous physical effect and considerable impact on both enemy and friendly troops' morale. Just as No 1(F) Squadron accepted in June 1999, if friendly troops are in contact, and especially if they are losing, the benefits of changing the local balance of power might outweigh the risks of fratricide.

CONCLUSION

Increasingly, the RAF will be engaged in low-intensity wars of choice. While acting as a force for good is comfortingly altruistic, the British public may not wish to see its sons and daughters die '*saving strangers*.'[62] The Government has to balance the risks it takes in becoming involved in these conflicts with losing the support of the public at home. Over the last 10 years mitigating those risks has involved increasing reach down, gradualism, and the increasingly conservative use of air power. These effects hamstring military effectiveness so this paper has questioned the assumptions and proposed some solutions.

Fratricide is perceived as tragically wasteful incompetence. The British military has been slow to tackle the problems of combat identification on the battlefield with technology. In the meantime, at the land-air interface procedural deconfliction has to be used. RAF fast jets have a limited survivability over the battlefield during the day, especially at the heights at which they need to fly to make their targeting sensors effective. At night their finding tactical targets from any height is nigh on impossible. Nevertheless, they can provide effective AI in the close and deep battlespace to presage and facilitate land manoeuvre.

Additionally, when the Army is pinned down, fast jets can bring decisive firepower to a contact if the Army accepts the significant risk of fratricide and the RAF accepts the risk of casualties. However, the imminent introduction to service of Apache permits the transfer of Offensive CAS, the role in which fast jets are least effective, to the attack helicopter force. In the manoeuvrist chaos of the close battlefield, fast jets cannot reliably provide the service that the Army wants. There is a significant risk of fratricide in the day, the effect is unlikely to be decisive to a land force that is winning anyway and there is almost no capability provided at night.

In order gain and maintain public support for an intervention there needs to communication of and, if necessary, debate of the issues. If the public can be persuaded to take ownership of the conflict, for altruistic or national interest reasons, public support

In order gain and maintain public support for an intervention there needs to communication of and, if necessary, debate of the issues

should be easily maintained. A concerted, coordinated, coherent, information campaign is one of the first lines of operation that should be taken. Although it will be primarily defensive it will have important offensive side effects, deterring to the enemy, wresting the initiative from him, and driving coalition consensus. A clear, unambiguous and achievable aim should be communicated at the earliest opportunity. Subsequently, evidence that the military is winning, is acting decisively, morally, legally and legitimately, and that the mission is not creeping needs to be communicated. Dithering gradualism does not pay. 'We should always be sceptical when so-called experts suggest that all a particular crisis calls for is a little surgical bombing or a limited attack. When the surgery is over and the desired result is not obtained, a new set of experts then comes forward with talk of just a little escalation – more bombs, more men and women, more force. History has not been kind to this approach to war making. In fact this approach has been tragic.'[63]

While retaining command and making their political and military intent clear to the operators, the political and military leaderships should follow the doctrines of mission command and decentralized execution. Reach down limits effectiveness and lays the military open to accusations of incompetence. Support decays in concert. 'Given the potential importance and complexity surrounding targeting issues, policy and direction of UK targeting is [and should be] retained at the strategic level,'[64] not the grand strategic. Relying 'on political approval'[65] for the clearance to strike every target is inconsistent with mission command and slows down air power's 'observation, orientation, decision, action' cycle (its OODA loop). The military has the legal and strategic skills to approve most targets, should and can shoulder the responsibility for doing so and has demonstrated highly professional restraint on operations. Airmen are well aware that their tactical acts can have strategic consequences.

This paper has found wanting the widely accepted assumptions that the public is casualty averse and will not accept collateral damage. It finds that collateral damage, while it provides sustenance to media sensationalism, is a legitimate consequence of war about which the public is sad but that it both expects and accepts. An honest IO, clearly portraying air power's capabilities to minimize collateral damage, within the context of maximizing military effectiveness and limiting the casualty risk, would undermine the media's opportunity to be sensationalist. Without straying into propaganda, but contrary to the current IO policy, the national media and the public need to be fully informed about the laws of armed conflict, the theoretical realities of war and the specifics of each conflict using the IO campaign.

The public can withstand higher casualty levels than the politico-military leadership but acceptable casualty levels need to be objectively assessed. Casualty aversion would be reduced by outlining the inherent risks in using military force and by articulating why those risks need to be taken through the IO campaign. Casualties are almost inevitable in war and lives should not be squandered but the importance of the issue may require risking the ultimate sacrifice.

Above all and throughout, the IO campaign must be truthful; one lie will undermine everyone involved and everything that might have been achieved. Furthermore, the IO line of operation should continue beyond a conflict's end. Inevitably there will be public recriminations, assessments of effectiveness and lessons identified. The military needs to prove that it was competent, professional, and effective, that it was proportional, discriminate and took the required precautions in attack, even after the fact. Without completing this last chapter of the information campaign, it will fail to set up the preconditions for the next conflict and that operation will be all the more difficult for it.

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General W Jertz. German Air Force, 15 March 2000.

General Jertz was a NATO commander during Operation ALLIED FORCE and during the latter half of the campaign doubled up with Jamie Shea as a NATO media spokesman for the Operation.

Squadron Leader C R Huckstep. Royal Air Force, 30 Jan 2000.

Squadron Leader Huckstep was the Officer Commanding Attack on No 1(Fighter) Squadron during Operation ALLIED FORCE.

NOTES

1. *Strategic Defence Review*, (SDR) The Stationery Office, London, 1998, para 21.
2. Ibid, para 45.
3. This essay defines RAF offensive air power as fast jets (Tornado GR1/GR4, Jaguar [all marks] and Harrier GR7) and helicopters (currently the Lynx-Mk7 but imminently the Apache-D on which it focuses).
4. This essay adopts the US Army Training and Doctrine Command definition of amicicide: 'the employment of friendly weapons and munitions with the intent to kill the enemy or destroy his equipment or facilities, which results in unforeseen death or injury to friendly personnel.'
5. Garden, Sir Timothy. Brief to ACSC 4 at Hendon Museum on 21 Nov 00.
6. Both Hussein in 1991 and Milosovic in 1999 identified Alliance cohesion as being the Allied operational centre of gravity. They attacked it by denuding coalition members' public support through IOs based on the premise that Allied air power was being used indiscriminately.
7. *Kosovo Lessons Learn*t, The Stationery Office, 2000.
8. Unpublished MOD Paper
9. SDR, op cit, para 45.
10. UN Charter Article 2(7) declares that '*nothing contained in the present Charter shall authorize the UN to intervene in matters which are essentially within the domestic jurisdiction of any state*,' although it would permit '*Chapter VII enforcement measures,'* to counter the *'existence of any threat to the peace, breach of the peace, or act of aggression*' (Article 39). The Charter gives the UNSC primary responsibility to decide whether a human rights violation contravenes international law and if it threatens international peace and security. Human rights violations are not, in themselves, enough to warrant intervention. Nevertheless, over northern and southern Iraq, Bosnia and Haiti, the UNSC authorized the use of military force to counter threats to international peace posed by 'human rights violations.' This implies the sovereignty of human and international norms, and the UN, over the nation state. One of the UN's purposes is to '*reaffirm faith in the fundamental human rights, in the dignity and worth of the human person, in the equal rights of men and women and of nations large and small*.' Other treaties support the argument that '*intervention on behalf of individuals or groups suffering maltreatment is in fact justified, since the moral fabric of the international community suffers if states are allowed to violate basic human rights*.' There is a customary law argument that '*human rights norms are so fundamental that they invalidate rules consented to by states treaties or customs*.' Therefore, the Government's view was that Operation ALLIED FORCE was morally just. See: Tomes, R. '*Operation Allied Force and the Legal Basis for Humanitarian Interventions*.' Parameters, Spring 2000.
11. Blair, A. Speech to the Economic Club of Chicago, 22 April 1999.
12. Hyde, C, K. *Casualty Aversion*. Aerospace Power Journal, Maxwell, Alabama, Summer 2000.
13. Lieutenant General Cosgrove. Briefing to ACSC 4 on 22 November 2000.
14. Foreign Secretary Robin Cook declared that 'UK ground troops will not be deployed to Kosovo in order to impose peace unless there is a clearly defined end-state to be achieved.' BBC News, 19 January 1999.
15. 'I would like to point out that we have no intention of employing ground forces.' Sir John Day, (DCDS Commitments). MOD Press Briefing given on 24 March 1999.
16. Clarke, W. *House of Commons Defence Committee – Fourteenth Report*. The Stationery Office, London, 2000, para 128.
17. Hastings, M, and Jenkins, S. *The Battle for the Falklands*. (London, Joseph 1983), p357.
18. There were 18,000 battlefield-casualty beds set up for Operation DESERT STORM.
19. Unpublished MOD Paper
20. Unpublished MOD Paper
21. Clarke, W. Idem.
22. The aircraft loss rate in WW2 was one in 100, in Korea one in 500, in the Gulf one in 3,000, in Bosnia one in 4,000 and in Kosovo one in 5,000. Even in peacetime, it is this order of magnitude.
23. See Hislop, P. *The Bodybag Factor: A study into the Decreasing Public Tolerance toward Attrition in War*. The Hawk Journal, 1996. p48.
24. Feaver, P, D, and Gelpi, C. '*A Look at Casualty Aversion: How Many Deaths Are Acceptable? A Surprising Answer*.' Washington Post, 7 November 1999.

25. John Mueller, Eric Larson, and Karl Mueller provide nearly 30 years of research into casualty aversion. Their papers document changing views over 3 decades. Casualty aversion amongst the public has been exaggerated, and it is the other factors (strength of leadership, likelihood of winning, ownership of the issue and nationalism) in the cost-benefit equation that decide the level of public support. It seems incontrovertible that casualty aversion really lies with the political and military leaderships. See the bibliography for details of their work.
26. An effective and positive IO campaign at home.
27. Hyde, C, K. op cit.
28. Franks, N, R, and O'Connor, M. *Number One in Peace and War*, London, Grub Street; 2000. p241; Kosovo Lessons Learnt, op cit, p36.
29. Unpublished MOD Report
30. Interview with General W Jertz on 15 March 2001.
31. Larson E,V. *Casualties and Consensus: The Historical Role of Casualties in Domestic Support for US Military Operations*, Santa Monica: Rand 1996.
32. AP 3000, p1-3-4.
33. Unpublished MOD Paper
34. AP 3000, p1-3-4.
35. Jertz, W. Op cit.
36. Many times this was due to the weather, but many times it was due to target discrimination or to collateral damage considerations. Interview with Squadron Leader C R Huckstep DFC on 30 January 2001.
37. Johns, R. *Sir Rederick Tymms Memorial Lecture*. Supplement to the Guild of Air Pilots and Navigators Newsletter, November 1999.
38. Jertz, W. Op cit.
39. Jertz, W. Idem, and Harris, P, V. Briefing given to ACSC 4 at RAF Waddington on 12 October 2000.
40. Jertz, W. Idem.
41. Larson E,V, Op cit.
42. Human Rights Watch estimated that there were 90 incidents involving fatalities with two thirds of the (approximately 500) deaths being due to just 12 incidents. *Human Rights Watch Report into Civilian Deaths in the Former Yugoslavia*, February 2000.
43. Subsequently, however, the revelation that the tape had been played at 3 times real speed opened up NATO to accusations of a cover-up. Honesty remains the best policy.
44. Johns, R. Op cit.
45. Hampson, F. Briefing to ACSC 4 on 4 November 2000.
46. Shrader, C, R. '*Friendly Fire: The Inevitable Price*.' Parameters, Autumn 1992, p31.
47. See Steinweg, K. '*Dealing Realistically with Fratricide*' for compelling arguments that historical fratricide levels are more likely to be 10-15 per cent.
48. See Shrader, C, R. '*Amicicide: The Problem of Friendly Fire in Modern War*.' US Army Command and General Staff College, 1982.
49. Cooperative IFF provides only recognition of a friend.
50. The US Marine Corps have proven the utility of the Position Locating Reporting System (PLRS). The US Air National Guard have proven the Enhanced PLRS known as Situational Awareness Data Link in both air-to-ground and ground-to-air environments and also its compatibility with air-specific data links such as the Joint Tactical Information Distribution System (JTIDS). The British Army has tested both the Beyond Line of Sight Battlefield Combat Identification System (BCIS) and the Situational Awareness Beacon with Reply (SABER).
51. Acquisition, recognition and identification require increasing levels of resolution in order to define the target with increasing surety.
52. Unpublished MOD Report
53. Unpublished MOD Report
54. 20:40 means half normal eyesight resolution.
55. Brigadier General Cody describes how weaknesses in training communications and electronic warfare systems were '*Why Apaches sat out Kosovo*,' Defence Helicopter August-September 1999. William Cohen and General Shelton state that the Apache was not used because the risks of being shot down outweighed the benefits of using them in the '*Kosovo After Action Review*,' Senate and Armed Services Committee, US Congress, 14 October 1999.

56. Although this useful term has fallen from grace, BAI is air action against hostile land targets that are in a position to affect, but are not actually engaged with, land forces. Historically, such targets are away from the battle-front but, particularly with low intensity operations, the geographically-based definition is less useful than an effects-based one.
57. Unpublished MOD Paper
58. See ADP1 Operations for detail on the concepts of Air Manoeuvre Operations.
59. ATP-27(C).
60. Unpublished MOD Paper
61. Apache is the Army's first step in digitising their battlespace. Unfortunately, its picture is incompatible with any other link so C2 functions will be radio based. Inevitably, this will involve procedural deconfliction and require positive target identification to avoid fratricide. With increased digitisation of the battlespace positive control would be viable.
62. Wheeler, N, J. '*Saving Strangers*.' Oxford University Press, 2000.
63. Powell, C. '*US Forces: Challenges Ahead*.' Foreign Affairs, Winter 1992/3.
64. AP 3000, p1.1.14.
65. Idem.