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**IN SEARCH OF THE KNOCK-OUT BLOW:
THE DEVELOPMENT OF AIR POWER DOCTRINE
1911-1945**

By

Doctor Alan Stephens

About the Author

Dr Alan Stephens is the RAAF Historian, based at the Air Power Studies Centre. Before joining the APSC he was a principal research officer in the Federal parliament, specialising in foreign affairs and defence, while prior to that he was an RAAF pilot, where his postings included the command of No. 2 Squadron from 1980-81. Dr Stephens is the author of numerous books and articles on defence, air *power and military history*. *His most recent book is High Fliers: Leaders of the RAAF*. He is a graduate of the RAAF Staff College, and the University of New England, the Australian National University, and the University of New South Wales.

INTRODUCTION

In 1911 there was no air power doctrine and no air strategy. That should scarcely be surprising as nor were there any independent air forces. It was, after all, only eight years since the Wright brothers had made the first powered, heavier-than-air flight at Kitty Hawk; and only two years since Louis Blériot's crossing of the English Channel. Yet a mere 34 years later, the two atomic bombs dropped on the Japanese cities of Hiroshima and Nagasaki from United States Army Air Forces B-29 bombers caused the most destruction by single weapons in the history of mankind, and ended World War II.

Military forces which operate primarily in the land and sea environments - that is, armies and navies - have been fighting wars for thousands of years. But never have they experienced anything like the technological rate of change associated with air power's first 30 years. A central point thus arises very early. Doctrine is derived from a combination of history, theory and technology. Perhaps in the case of air power doctrine, technology has been a compelling, even irresistible, force. It is a point which will be frequently revisited in this paper.

First, however, precisely what is meant by the word 'doctrine' must be established. So also must the meaning of the word 'strategy', which too often is used as a synonym for 'doctrine'. Few words in the military lexicon are used more causally than these two, and few are subject to more confusion.

Strategy is, simply, the way in which armed forces are employed to achieve military objectives and, by extension, political objectives.¹ In its broadest sense, a strategy states *how* an armed force intends going about its business. Defence strategies can and do change, and different countries can and do have different strategies. For example, under the leadership of Mao Zedong, the military strategy of the People's Republic of China was 'people's war' (also known as guerilla war). By comparison, Nato's Cold War strategy, devised to counter Warsaw Pact forces on the plains of central Europe, was one of the 'forward defence'. Many complex subsets of military thought and action are implied within both broad descriptions, but the general intention of each is clear. Also clear are the essential force structures which logically would be needed to apply each strategy: vast numbers of foot-soldiers on the one hand; and high-technology aerospace and armoured forces on the other.

As noted above, doctrine is derived from three sources: the lessons of the history of war, theory (which is the outcome of strategic thought); and demonstrated or desired technological developments. Basic air power doctrine establishes the fundamental philosophy for the employment of air power by explaining why the air weapon has developed the way it has, what it can do, and how it influences national defence policy and strategy. In short, it presents what airmen believe to be true. While not immutable, good doctrine should be reasonably enduring and have general relevance.

The relationship between doctrine and strategy is perhaps best illustrated through the example of force structuring. Since World War I, air doctrine invariably has defined

¹ See the Introduction to Peter Paret, *Makers of Modern Strategy from Machiavelli to the Nuclear Age*, Princeton University Press, Princeton, 1986, p 3.

‘control of the air’ and ‘air strike’ as core air power capabilities. However, the people, platforms, systems and infrastructure required to generate those capabilities need not necessarily be present in a particular country’s force-in-being, which will be determined by national policy, finance and defence strategy. A country which adopts guerilla warfare as its defence strategy, for example, is unlikely to need fighter and bomber aircraft; while many air forces are deficient in a range of so-called ‘core’ capabilities simply because of financial constraints. It is axiomatic, however, that professional airmen will have a deep understanding of air power’s full potential, regardless of their own service’s capabilities. It is within that context of professional mastery that doctrine makes its most important contribution to military thinking.

World War I

There may not have been any air power doctrine on the eve of World War I, but there was no shortage of alarming, even apocalyptic, speculation about strikes from the sky. The most notorious fiction, H.G. Wells’ best-selling book *The War in the Air*, published in 1907, envisaged terrifying battles between aircraft culminating in the destruction of civilisation. It was because of the perceived disturbing offensive potential of air power that conferences on the international law and disarmament considered proposals as extreme as completely banning aerial bombing.² Annexes to the Second Hague convention of 1907 explicitly prohibited air attacks on towns, villages, houses, churches, hospitals and the like, even though the capability to do so scarcely existed.

But technology was advancing rapidly. Only four years after the Hague convention, Italian pilots fighting against Turks in Libya became the first to employ powered flight in war when they flew bombing, reconnaissance, artillery observation and leaflet dropping missions.

When World War I started on 2 August 1914, air services belonged to armies and navies; and to the extent that air doctrine existed, it was concerned with reconnaissance and artillery observation in support of surface operations. But an independent air school of strategic thought did exist. Only seven weeks after the declaration of hostilities, Sopwith Tabloid aircraft from the (British) Royal Naval Air Service attacked a Zeppelin shed in Dusseldorf; while by January 1915 Zeppelins in turn were bombing English cities. Although the material damage caused by those early raids was minor, the psychological impact on civilians and politicians was profound. The raids had less effect, however, on generals and admirals, who in the main continued to believe that air forces were subordinate to, and an adjunct of, armies and navies.

As aircraft and their weapons improved, bombing and strafing trenches was added to reconnaissance as the roles most valued by surface commanders. However, in the minds of airman at least, other roles had assumed *de facto* priority. Once aircrews started shooting at each other to try to prevent reconnaissance, control of the air had, *ipso facto*, become a prerequisite for all air activities. Consequently, specialist fighter

² Quester, George H., *Deterrence Before Hiroshima*, John Wiley, New York, 1966, pp 77-89, 123; and Donald Cameron Watt ‘Restraints on War in the Air’, in Howard, Michael (ed), *Restraints on War*, OUP, Oxford, 1979, pp 57-77.

aircraft quickly proliferated. When those fighters then started to use their enhanced performance and offensive capabilities to increasing effect against ground targets, another compelling reason to gain control of the air existed. While that operational imperative may not always have been recognised in official doctrine, it was implicitly recognised in force structures as fighter and attack aircraft began to enter air forces in increasing numbers.³

The appearance of huge formations of aircraft massing to seek combat over the Western Front - the best known example being von Richthofen's Flying Circus - were a practical expression of the need to concentrate force and to take the initiative, that is, to prosecute offensive action in the struggle for control of the air and of the battlefield. Those mass formations were also an indication that air combat might become an end in itself.

The need to control the air was the first of two significant doctrinal concepts to emerge from World War I. The second was an unwavering belief in offensive action. According to General Sir High Trenchard, the commander of the (British) Royal Flying Corps on the Western Front, it was the opinion 'of those most competent to judge that the aeroplane as a weapon of attack, [could not] be too highly estimated'. Consequently, under Trenchard's leadership, the RFC became committed to the principle of an unrelenting offensive. His brief instruction to the RCF of September 1916 entitled 'Future Policy in the Air' - impressive in its uncompromising attitude - remains the classic expression of the inherently offensive nature of air operations.⁴

It has been suggested that Trenchard's attitude to air fighting was little more than an imitation of Sir Douglas Haig's approach to the land war. As commander-in-chief of the British forces in France, Haig subscribed to a 'relentless and incessant' ground offensive, an outlook which led to the squalid, grinding mindlessness of trench warfare and its appalling casualties. The criticism had been made that Trenchard's emphasis on the air offensive was equally misplaced, with dreadful losses such as those suffered by the RFC at Arras in April 1917 bearing testimony to his 'stubborn stupidity'.⁵ That accusation may or may not be true. As far as air power thinking is concerned, the origins of Trenchard's directive and the reverses experienced at Arras are less significant than the focus the policy placed on the general importance of offensive action and air superiority. Like all military concepts, those ideas require judgment in application. In this instance, the irony was that by taking the course he did, Trenchard had reduced air combat to the very model of attrition warfare which air power was supposed to make unnecessary.

The emphasis on the offensive was not restricted to air-to-air combat. Few events during World War I caused more panic and alarm than the attacks on London by

³ For figures on British aircraft numbers during World War I, see Jones, H.A., *The War in the Air*, Appendices, Clarendon Press, Oxford, 1937, pp 154-159, 162-163. See also Morrow, John H., *The Great War in the Air*, Smithsonian Institution Press, Washington, 1993, pp 368-371.

⁴ 'Future Policy in the Air', in Stephens, Alan and O'Loughlin, Brendan (eds), *The Decisive Factor: Air Power Doctrine by Air Vice-Marshal H.N. Wrigley*, Canberra, Australian Government Publishing Service, 1990, pp 131-134.

⁵ RFC losses at Arras were so high that April 1917 became known as 'Bloody April'. Walter Raleigh and H.A. Jones, *The War in the Air*, Volume III, Oxford, Clarendon Press, 1922-35, pp 334-379. See also Sykes, Frederick, *From Many Angles*, London, Harrup and Co., 1942, pp 219-221; and Malcolm Cooper, *The Birth of Independent Air Power*, London, Allen and Unwin, 1986, pp 71-73.

German Gotha bombers in June and July 1917. As a direct consequence of those attacks, within three months the British Government had established what amounted to a strategic bombing unit in France, known as the Independent Force, to conduct reprisal raids against the German homeland; and within a year the Royal Air Force had been formed as an independent service.⁶

The establishment of the Independent Force did more than formalise the notion of air strike operations. First, it contained more than a hint of the notion of ‘deterrence’ which in subsequent years was to become a central feature of air strategy. And second, it implicitly acknowledged the radical theory that future wars might be won quickly and decisively - and, therefore, with minimum human and material loss - by air power alone. That theory rested on a powerful psychological base. In part, it was a reaction to the ghastly, moribund mess on the ground, which had made British Prime Minister Lloyd George desperate for an alternative strategy to liberate his army from ‘the dead hand of Haig’. Additionally, the reports of the Gotha raids against London and the subsequent retaliation by the Independent Force against cities like Cologne starkly revealed the appeal of strategic bombing.⁷ In view of the manifest public panic and fear and the seeming invulnerability of marauding fleets of bombers, the collapse of civilian morale and, therefore, the idea of quick, decisive victory, seemed entirely plausible.

The concepts of control of the air and strategic strike were radical additions to theories of war fighting. The greatest strategic theorist, Carl von Clausewitz had, of course, been describing war between armies, for whom historically defence had been easier to organise and conduct than offence. Clausewitz had also concluded that victory was achieved by defeating an enemy’s military forces in the field.⁸ Air power, however, had *extended* the battlefield. Total warfare could now be waged against an entire nation, with the objective being the destruction of national will rather than armies and navies, which would simply be ignored and overflowed by aircraft on their way to attack true strategic targets. The air weapon threatened to turn traditional military thinking on its head. It was also plain that air strategy intrinsically contained a powerful political dimension.

If air bombardment was a controversial addition to strategic thought, there were few disputes over the value of the large number of roles and missions air forces contributed to surface operations. By the end of World War I almost every role performed by air power in the 1991 Gulf War had emerged, albeit in a sometimes rather primitive form.⁹ For armies, roles such as close air support, transport, reconnaissance, communications, interdiction, artillery spotting, resupply and rescue had made the aeroplane an indispensable contributor to continental strategy. Many of

⁶ Raleigh and Jones, *The War in the Air*, Volume V, pp 26-32; Volume VI, pp 118-174. The RAF was formed by combining the Royal Flying Corps and the Royal Naval Air Service. For comment on the politics of the decision, see Sweetman, John, ‘The Smuts Report of 1917: Merely Political Window Dressing?’ in the *Journal of Strategic Studies*, Volume 4, Number 2, June 1981, pp 152-174.

⁷ See ‘Reports from the Attack on Cologne, 18 May 1918’, in Stephens and O’Loughlin, *The Decisive Factor: Air Power Doctrine by Air Vice-Marshal H.N. Wrigley*, pp 22-25.

⁸ Clausewitz, Carl von, *On War* (ed A. Rapoport), Harmondsworth, Penguin, 1968, pp 113-114, 130-4.

⁹ The only two air power roles which were not conducted in World War I were air-to-air refuelling and electronic warfare. For a classic study of (American) air power roles and missions and theory and practice in World War I, see Holley, I.B., *Ideas and Weapons*, Office of Air Force History, Washington, 1983.

those roles were repeated in support of maritime strategy, in addition to anti-submarine warfare, convoy escort, search and rescue, maritime strike and minefield survey.¹⁰

The Classical Theorists

World War I glamorised air war, a public perception which was enhanced by the exploits of the civilian aviation pioneers in the following years. Long distance air travel which had scarcely existed at the end of the Great War became sufficiently commonplace to change international relations irrevocably. A succession of record-breaking flights captured world attention. Hero-worship of Charles Lindbergh reached astonishing proportions after he piloted the *Spirit of St Louis* across Atlantic in May 1927. Amy Johnson was met by a crowd of 50,000 when she arrived at Mascot in June 1930 following her solo flight from England. Newspapers and newsreels were filled with popular heroes: pilots like Jimmy Doolittle, Alan Cobham, Bert Hinkler and Amelia Earhart. Aviation enjoyed a public profile and glamour which exerted a powerful psychological force.

Nor should the military implications of the feats of the aviation pioneers be overlooked. Achievements in long-distance, high altitude, high speed, endurance and instrument flying demonstrated the rapidly improving efficiency and reliability of airframes and engines and their associated systems, developments with obvious military utility.

Popular perceptions of air power were not based on epic flights alone. The interwar period was also the era of the 'classical' theorists, the most important of whom were the Englishman Trenchard, the Italian Douhet and the American Mitchell. The public profile of the air power debate should not be underestimated. It is not overstating the case to draw an analogy between the fear of atomic weapons which existed at the height of the Cold War, and the fear that the spectre of aerial bombardment created in Europe in the 1930s. The psychological force of classical air power theories - regardless of whether they are considered right or wrong - can be gauged by the fact that today they remain the subject of intense debate in military academies.

Many important, complex and contentious issues were raised by the three major theorists and their contemporaries. There was one, however, which was of overriding moment: the belief that offensive air power through the form of bomber aircraft would dominate future wars, to the extent that it alone could decide the outcome. That proposition was in direct contradiction to the conventional Clausewitzian wisdom, dominant in strategic thinking for almost one hundred years, that defence was the stronger form of warfare, and that an enemy's army was his centre of gravity. Now, the imperative would be to take the war direct to the heart of the enemy homeland and population.

By definition, strategic bombing theory challenged the pre-eminence of armies and navies. Based as it was on limited experience, the belief of victory through air power clearly was going to agitate many people, not least the admirals and generals. That was not a prospect which concerned Trenchard, Douhet or Mitchell (the latter two

¹⁰ Raleigh and Jones, *The War in the Air*, Volume VI, pp 329-396.

were in fact court-martialled by their respective armies for their outspoken views, Douhet in 1916 and Mitchell in 1925).

As chief of staff of the world's first independent air force, Sir Hugh Trenchard dominated the RAF in its formative years. British air power developed squarely from the base of Trenchard's vision and practical experience. Under his leadership the essential building blocks were put in place or consolidated: a central flying school to set and maintain standards; research and development establishments for the technological edge; a cadet college at Cranwell to produce the future leaders; a staff college at Andover to give those leaders the finishing touches; and an apprentice scheme to train the mechanics. The Trenchard model has been emulated by successful air forces ever since.

Doctrinally, Trenchard was committed uncompromisingly to the notion of the offensive. That commitment was in part related to his determination to preserve the RAF as a separate service, for it was offensive action, expressed through the relatively untested but already psychologically powerful notion of strategic bombing, which underpinned the RAF's claim to equal and independent status.¹¹

Trenchard's belief in an unremitting offensive did not initially extend to the notion of strategic bombing, but instead applied only to the use of tactical air power over the battlefield. It was left to others to argue the case for the bomber. In a report on air power prepared for the British Government in mid 1917, the South African soldier and statesman Jan Smuts recognised that strategic air attack might be 'the determining factor' in future conflicts.¹² Trenchard's rival for the leadership of the RAF, Sir Frederick Sykes, was another who promoted the idea of making war-winning strategic strikes from the air against vital targets. Three months before the end of World War I, Sykes advised that British War Cabinet that air power, exercised by an independent force and directed against Germany's munitions industry, submarine force, and moral and political 'heart and brain', would be the 'most prominent determining factor for peace' at the allies' disposal.¹³ The influential newspaper commentator Brigadier P.R.C. Groves was another whose support for bombers was argued publicly and more coherently for some time before Trenchard took up the cause; while Captain B.H. Liddell Hart's writing was also important.¹⁴

None of that detracts from Trenchard's status as the pre-eminent British air power strategist. It was Trenchard who adapted whatever he needed from the work of others, added his own forceful ideas and unique experience, and then provided the

¹¹ Webster, Sir Charles and Frankland, Noble, *The Strategic Air Offensive Against Germany 1939-1945*, Volume I, Her Majesty's Stationary Office, London, 1961, p 54. See also Boyle, Andrew, *Trenchard*, Collins, London, 1962.

¹² Extracts from a Report by General Smuts on Air Organisation and the Direction of Air Operations', in Stephens and O'Loughlin, *The Decisive Factor: Air Power Doctrine by Air Vice Marshall H.N. Wrigley*, pp 1457-1457. There were two members of the Smuts Committee which was formed to report on 'Home Air Defence and the Direction of Aerial Operations': Smuts, and the volatile Prime Minister Lloyd George. The Smuts Report led to the establishment of the RAF as an independent service in April 1918.

¹³ Sykes, *From Many Angles*, pp 555-558; see also Robin Higham, *The Military Intellectuals in Britain, 1918-1939*, Greenwood Press, Westport, 1966, pp 157-159.

¹⁴ Liddell Hart, B.H., *Paris: or the Future of War*, Kegan Paul, London, 1925.

leadership which was necessary to turn beliefs firstly into policy and then into force structure. Trenchard gave the belief in strategic bombing form and official status.

In addition to popularising the airman's belief in the offence, Trenchard was the driving force behind the novel concept of 'substitution', known also as 'Air Control' and the 'Air Method'. The idea was simple: that in many circumstances air forces could be substituted for land or naval forces, and do the job effectively at far less cost in terms of casualties and cash. With the support of Winston Churchill as Minister for War and Air, Trenchard applied the concept in British territories in the Middle East and on the Northwest Frontier throughout the 1920s, using the RAF instead of the army to police vast, remote areas. Errant communities were given a warning, sometimes by note dropped from the air. If they remained refractory, bombing attacks would be conducted, usually against a high value target like crops or herds of animals, often at pre-warned times. Attacks could be sustained if necessary, in effect blockading a village.¹⁵

Substitution was not always successful, particularly when rugged terrain and/or nomadic peoples made targets difficult to find and attack. However, when geography and demography were favourable, the concept could be highly effective. Iraq, for example, proved to be an ideal location for the innovative application of air power in 1921 (just as it did seventy years later), when five RAF squadrons without any army forces in support were successfully substituted for thirty-three Imperial battalions, reducing the annual cost of the garrison from £20,000,000 to less than £2,000,000.¹⁶

Part of the appeal of substitution for airmen was the fact that the concept best suited forces which could be rapidly deployed and change roles, and which placed few friendly lives at risk. In other words, the concept applied far more to the employment of air power than it did to either sea or land power. Not surprisingly, the 'substitution' debate as it came to be known was perhaps the most contentious issue in British defence policy in the late 1920s and early 1930s, a reaction which did not deter Trenchard and his supporters as they sought to introduce the practice as widely as possible.¹⁷

General Giulio Douhet's book *The Command of the Air* was first published in 1921, at the same time as Trenchard was trying to turn ideas into reality in the United Kingdom. Presenting theories the Italian had been developing and publishing for over a decade, *The Command of the Air* gave the concept of strategic bombing its most

¹⁵ Portal, C.F.A., 'British Air Control in Underdeveloped Areas', in Eugene M. Emme (ed), *The Impact of Air Power*, Van Nostrand, Princeton, 1959, pp 351-362. See also Bruce Hoffman, *British Air Power in Peripheral Conflict, 1919-1976*, Rand Corporation, Santa Monica, 1989, pp 13-20; and Glubb, Sir John Bagot, *War in the Desert: An RAF Frontier Campaign*, Hodder and Stoughton, London, 1960.

¹⁶ *Aircraft* (Australia), October/November 1928. See also Hyde, H. Montgomery, *British Air Policy Between the Wars, 1918-1939*, Heinemann, London, 1976, pp 167-174.

¹⁷ According to Sir John Slessor, intense Army and Navy opposition did not deter Trenchard at all. In 1929 Trenchard prepared a paper titled 'The Fuller Employment of Air Power in Imperial Defence', which according to Slessor 'fairly took the gloves off' by declaring 'unequivocally the belief of the Air Staff that real economies with at least no less efficacy could be secured by the substitution of Air Forces for other arms over a very wide field'. Slessor, John, *The Central Blue*, Cassell, London, 1956, pp 45-75.

powerful and influential expression.¹⁸ While Douhet couched some of his notions of air warfare specifically in the context of defending Italy against Austria during world War I, not too much should be made of that setting. Regardless of Douhet's setting air power scholars and practitioners have applied his central themes universally. As Pascal Vennesson has astutely noted, by presenting 'strong distinctions and tough choices [between] offensive or defensive, air force or army, bomber or fighter', Douhet forced strategists to confront the critical doctrinal issues.¹⁹

Douhet's central thesis was unequivocal and was presented under the portentous heading 'The Extreme Consequences': 'To conquer command of the air means victory' to be beaten in the air means defeat and acceptance of whatever terms the enemy may be pleased to impose'. In Douhet's opinion that was not an assertion but an axiom. From that axiom came two corollaries:

In order to assure an adequate national defence it is necessary - and sufficient - to be in a position in case of war to conquer the command of the air, [and]

All that a nation does to assure her own defence should have as its aim procuring for herself those means which in case of war, are most effective for the conquest of the command of the air.²⁰

Douhet accordingly concluded that air forces were destined to become the dominant arm of the military, to the extent that they should gradually be strengthened at the expense of the other services. Air power had introduced a 'new character to war', which emphasised the 'advantages of the offensive' and would make for 'swift crushing decisions on the battlefield'.

General Douhet took his argument even further in his definition of the 'battlefield'. Because of the aircraft's range, speed, relative invulnerability and unparalleled striking power, and its predicted ability to create fear and panic among enemy civilians, it was logical, he stated, for aerial bombardment to be directed primarily at population centres and the national infrastructure. The destruction of 'governing bodies, banks and other public services in a day' would plunge an enemy into 'terror and confusion', especially if, as proposed by Douhet, incendiary and chemical weapons were used in addition to high explosives.

A 'Battleplane' which combined the capabilities of bomber and fighter aircraft and would ensure control of the air was proposed as the means to those ends.²¹ Incidentally, Douhet's idea of the 'Battleplane' was one of the first proposals for a 'general purpose' or multi-role' aircraft, a concept which has been something of an

¹⁸ Douhet, Giulio, *The Command of the Air* (trans. Dino Ferrari), Washington DC, Office of Air Force History, 1983. For contrasting assessments of Douhet, see Segre, Claudio G., 'Giulio Douhet: Strategist, Theorist, Prophet?' in the *Journal of Strategic Studies*, Volume 15, Number 3, September 1992; and Meilinger, Phillip S., 'Giulio Douhet and the Origins of the Airpower Theory; in Meilinger, Phillip S. (ed), *The Paths of Heaven: The Evolution of Airpower Theory*, Air University Press, Maxwell Air Force Base, 1997, pp 1-40.

¹⁹ Vennesson, Pascal, 'Institution and Airpower: The Making of the French Air Force', in the *Journal of Strategic Studies*, Volume 18, Number 1, March 1995, p 57.

²⁰ Douhet, *The Command of the Air*, p 28.

²¹ *ibid*, pp 117-120.

article of faith for airmen ever since and one which, like the belief in strategic bombardment, for many years never quite met the expectations of its advocates.

Staff college libraries are full of analyses of Douhet. Two of the better examinations, those by Edward Warner and David MacIsaac, acknowledge the correctness of several of Douhet's major propositions: that command of the air is vital; that the primary targets of strategic air attack should be national institutions and infrastructure rather than armies; and that it is preferable to attack an enemy's air forces on the ground rather than in the air.²² Equally, they identify Douhet's 'first and gravest error'; namely, his gross overestimation of the damage a given tonnage of bombs could cause, both physically and psychologically. But as Bernard Brodie has noted, time has rescued Douhet from that particular error through the development of the nuclear bomb.²³ Brodie's observation could be extended to include precision guided munitions; indeed, in the wake of the 1991 Gulf War, a number of articles and papers appeared from Western military academies with titles like 'What Will Douhet Think of Next?' and 'Douhet was Right'.²⁴

Testing the validity of those kinds of propositions will keep military historians gainfully employed for years. As far as this paper is concerned, the most intriguing questions are: how influential was Douhet's work during the inter-war years; and how fair is it to categorise the general concept of strategic bombing as 'Douhetism'? Those questions will be addressed once brief comment has been made on the third classical theorist, General William 'Billy' Mitchell.

The suggestion has been made that if Douhet wrote for the professional military audience, Mitchell addressed his convictions on air power primarily to the public.²⁵ Unlike the more scholarly Italian, Mitchell was passionate and outspoken in his beliefs, particularly regarding the independence of air forces. Notwithstanding the difference in temperament, he shared with Douhet an over-riding faith in the inevitable dominance of air power through offensive action. Key factors in that belief were Mitchell's perception of the continually increasing technical superiority of the aircraft over other machines of war, and the fragility of civilian morale. In a moment of the first magnitude in the history of combat, Mitchell's First Provisional Air Brigade provided a dramatic demonstration of his theories by sinking the captured German Dreadnought *Ostfriesland* with 2,000 pound bombs during trials off Norfolk in 1921. From then on, surface ships operating without air cover had to be considered at risk.

²² Edward Warner, 'Douhet, Mitchell, Seversky: Theories of Air Warfare', in Edward Mead Earle, *Makers of Modern Strategy*, Princeton University Press, Princeton, 1943, pp 489-91; and David MacIsaac, 'Voices from the Central Blue: The Air Power Theorists', in Paret, *Makers of Modern Strategy from Machiavelli to the Nuclear Age*, pp 624-47.

²³ Bernard Brodie, *Strategy in the Missile Age*, Princeton University Press, Princeton, 1971, p 73.

²⁴ See Segre, 'Giulio Douhet: Strategist, Theorist, Prophet?'; Melinger, *The Paths of Heaven: The Evolution of Airpower theory*; and Silvanus Taco Gilbert, *What Will Douhet Think of Next?*, Unpublished Thesis of School of Advanced Air Power Studies, Maxwell Air Force Base, June 1992.

²⁵ Warner, 'Douhet, Mitchell, Seversky: Theories of Air Warfare', pp 497-501. See also William Mitchell, *Winged Defense*, Dover Publications, New York, 1998, p x; and Mark A. Clodfelter, 'Molding Airpower Convictions: Development and Legacy of William Mitchell's Strategic Thought' in Melinger, *The Paths of Heaven: The Evolution of Airpower Theory*, pp 79-114.

Mitchell had been a combat pilot in World War I, but his projections for the future uses of air power were, like those of Douhet, excessively speculative. He thus overestimated the extent to which aircraft would achieve technical dominance, and underestimated the capacity of civilian populations and industry to withstand the effects of strategic bombing.

Given the opprobrium area bombing subsequently attracted during World War II, it is noteworthy that, like many other air strategists, Mitchell saw air power almost as a 'civilising' instrument, writing in 1930 that '[bombardment] is a distinct move for the betterment of civilisation because wars will be decided quickly and not drag on for years... It is a quick way of deciding a war and really more humane.'²⁶

As mentioned above, one of the most intriguing questions from the period between the wars concerns the influence of the most enduring and important of the air power theorists, Douhet. The debate is a controversial one. Two of the architects of RAF bombing policy between the wars, Marshals of the Royal Air Force Sir John Slessor and Sir Arthur Harris, stated later in their lives that they had no knowledge of Douhet as they went about formulating that policy, with Slessor adding that as late as 1956 he had not read the Italian's work; while Sir Basil Liddell Hart claimed in his last essay, dated 1970, that Douhet had no influence in Europe generally during the interwar years.²⁷

There is no reason to question the statement that British air policy in the first instance developed independently from the ideas and experiences of men like F.W. Lanchester, Smuts, Sykes, Groves, Liddell Hart and Trenchard. *The Command of the Air* did not appear in translation until 1923, by which time ideas on strategic bombing in the RAF were well formulated. However, with due respect to Slessor, Harris and Liddell Hart, the suggestion that Douhet had no influence at all in the following fifteen years seems curious.

A copy of Douhet's treatise in Italian was available at the RAF Staff College in 1927 and was read in the original by at least one prominent commentator.²⁸ Throughout the 1930s a series of articles on Douhet's work appeared in the pre-eminent publications for British air power scholars, the *RAF Quarterly*. These included a four page summary titled 'The Air Doctrine of General Douhet' in April 1933; and seventeen pages of extracts from *The Command of the Air* in April 1936.²⁹ If Slessor and Harris

²⁶ Quoted in Phillip S. Meilinger, 'Global Air Power and Power Projection', in RUSI's and Brassey's *Defence Yearbook 1992*, London, Brassey's 1992, p 195. Douhet also expressed that view: 'Future wars may yet prove to be more humane than wars in the past in spite of all, because they may in the long run shed less blood'. Douhet, *The Command of the Air*, p 61.

²⁷ Barry D. Powers, *Strategy Without Slide-Rule: British Air Strategy 1914-1939*, Croom Helm, London, 1976, pp 177-8; M.J. Armitage and R.A. Mason, *Air Power in the Nuclear Age* (2nd ed.), University of Illinois Press, Urbana, 1985, p 5, and Higham, *The Military Intellectuals in Britain, 1918-1939*, pp 257-9.

²⁸ Malcolm Smith, 'A Matter of Faith': British Strategic Air Doctrine before 1939', in the *Journal of Contemporary History*, Vol. 15, No.1, January 1980, pp 431-2. Despite that evidence of Douhet's exposure in Britain, Smith argues that the Italian's ideas were neither well-understood nor especially influential.

²⁹ For articles in the *RAF Quarterly* between 1933 and 1939 which refer to Douhet's work, see 'The Air Doctrine of General Douhet', April 1933, pp 164-7; 'The Universal Arm', October 1934, pp 467-72; 'Air Power and Security', July 1935, pp1251-7; 'General Giulio Douhet - An Italian Apostle of Air Power', April 1936, pp 148-51; 'Air Warfare - The Principles of Air Warfare. By General Giulio

(and the other officers responsible for RAF policy) were indifferent to their own service's professional journal, exposure to Douhet might still have come from the book *Air Strategy*, published in London by 1936 by the noted expatriate Russian military scholar Lieutenant General Nikolai Golovine. Golovine's work was described in the *RAF Quarterly* as 'the most complete treatise on the subject yet to be written... a classic on the subject.. required by all students of air warfare'.³⁰ Throughout *Air Strategy*, Golovine assumes some familiarity on the part of the reader with Douhet's main theses.

As regards Liddell Hart's comment that Douhet had no influence in Europe generally, plainly that was not true for Italy.³¹ Nor was it for Germany. Horst Boog, a prominent historian of the *Luftwaffe*, has referred to Douhet's 'great influence' in the pre-war German Air Force, a conclusion supported by the high regard in which General Walther Wever, one of the architects of German air power, held the Italian's theories.³² Douhet's work was well-known in France, if not necessarily officially endorsed.³³ According to Eugene Emme, the Italian's name became virtually a household word in France and England during the Munich crisis of September 1938.³⁴ Even airmen in far-off Australia were familiar with his concepts. During this preparation for the entrance exam to the RAF Staff College in 1936, the RAAF's Flight Lieutenant (later Air Marshal Sir) Valston Hancock studied Douhet, noting that the Italian's thesis that air power could win wars had made him 'prominent on the international scene'.³⁵

Turning to the United States, Mitchell's familiarity - or otherwise - with Douhet's work was, like Slessor's and Harris's, attended by some mystery. In 1922, the Italian

Douhet', April 1936, pp 152-68; 'Air Strategy', April 1936, pp.,169-213; 'Views on Air Defence', January 1937, pp 1-13; 'Air Operations' April 1937, pp 118-140; 'Air Strategy', July 1937, pp 245-253; 'Fighter versus Bomber', October 1937, pp 329-350; 'Ashmore Modernized', July 1938, pp 233-273; 'Rougeron's "Aviation de Bombardment"', October 1938, pp 392-415, and January 1939, pp 34-44; 'Italian Air Strategy', July 1939, p 292; and 'How to Learn from the Experiences of the War in Spain;', October 1939, pp 401-416.

³⁰ N.N. Golovine, *Air Strategy*, Gale and Polden, London 1936. Golovine was formerly a professor at the Russian Academy of the General Staff (1908-13) and chief of staff of the 7th Russian Army in World War I. A supporter of the Whites during the Civil War, he moved to France after the Reds' victory. He was sentenced to death by French communist guerillas in 1944. *Air Strategy* was the fourth of his books published in English, and was written on collaboration with 'a technical expert': see *RAF Quarterly*, April 1936, pp 169-213. The entire book was serialised in subsequent editions of the *RAF Quarterly*.

³¹ See 'Italian Air Strategy' ('which once again asserts Italy's belief in the Douhet theory'), in *RAF Quarterly*, July 1939, p 292; and R.J. Overy, *The Air War 1939-1945*, Papermac, London, 1980, p 16. The *Reggia Aeronautical's* chief of staff in the mid-1930s, General Giuseppe Valle, was 'an ardent admirer of Douhet's theory that airpower alone could decide a war by targeting civilians'; see James S. Corum, 'The *Luftwaffe* and the Coalition Air War in Spain, 1936-1939', in the *Journal of Strategic Studies*, Vol.18, No. 1, March 1995, p 85.

³² Horst Boog, 'Higher Command and Leadership; in the German *Luftwaffe*, 1939-1945,' in Alfred F. Hurley and Robert C. Ehrhart (eds), *The Military Intellectuals in Britain, 1918-1939*, Office of Air Force History, Washington, 1979, p 151; and Max Wever, 'Doctrine of the German Air Force', in Emme, *The Impact of Air Power*, pp 181-185.

³³ Pascal Vennesson, 'Institution and Airpower: The Making of the French Air Force', in the *Journal of Strategic Studies*, Volume 18, Number 1, March 1995, pp 54-56.

³⁴ Eugene M. Emme, 'The American Dimension', in Hurley and Ehrhart, *The Military Intellectuals in Britain, 1918-1939*, p 67.

³⁵ Air Marshall Sir Valston Hancock, Interview, Record No TRC 2841, National Library of Australia. Hancock became chief of staff of the RAAF from 1961-65.

Air Attaché in Washington, Lieutenant Colonel A. Guidoni, sent a summary of the *Command of the Air* to the Air Service Headquarters and to the editor of *Aviation* magazine, Lester Gardner, who told Guidoni that he had discussed the summary with an impressed Billy Mitchell. Following a visit to Europe that same year, Mitchell wrote that he had met 'more men of exceptional ability in Italy... than in any other country', but made no mention of Douhet.³⁶ It would take ten years before Mitchell admitted that he had had 'frequent discussions' with Douhet during his visit to Italy, although the precise circumstances are not fully clear.³⁷ Mitchell's best biographer, Alfred Hurley, found no evidence that his subject fully developed his concept of attacking 'vital centres' until 1926,³⁸ that is, after he had had time to reflect on his discussion with Douhet.

Notwithstanding Mitchell's evasiveness on the subject, there is strong evidence of Douhet's influence in the United States. In March 1922 a five-page extract of *The Command of the Air* prepared by the United States War Department Military Intelligence Division was forwarded to the Air Service's Plans Division.

It was, however, through that remarkable institution, the Air Corps Tactical School, that Douhet's theories primarily found their way into the thinking of American airmen. Established at Langley Field in 1922 before being relocated to Maxwell Field in July 1931, the Air Corps Tactical School was a vibrant, innovative environment, in which the evolving and often competing schools of air power doctrine - fighter versus unescorted bomber fleets, and so on - were argued with a passion.³⁹ Many of the airmen who were to become the leaders of the USAAF during World War II were involved in the debates generated at Langley and Maxwell.

An English translation of *The Command of the Air* was available at the Air Corps Tactical School in 1923.⁴⁰ Extracts of Douhet's work were circulated at the School and amongst members of Congress. In 1933 George Kenney had a summary of Douhet's ideas translated from French into English, and the chief of the Air Corps, Major General Benjamin Foulois, formally endorsed Douhet's theories.⁴¹ General H.H. 'Hap' Arnold, commander of the United States Army Air Forces during World War II, wrote in his biography, 'Douhet's theory came out in 1933, and was studied

³⁶ Frank P. Donnini, 'Douhet, Caproni and Early Air Power', in *Air Power History*, Summer 1990, pp 45-52. For an observation on Mitchell's thinking from those years, see Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960*, Vol I, Air University Press, Maxwell, 1989, pp 21-22.

³⁷ Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960*, p 38; Emme 'The American Dimension', p 67. See also Donnini, 'Douhet, Caproni and Early Air Power'.

³⁸ Alfred F. Hurley, *Billy Mitchell: Crusader for Air Power*, Franklin Watts, New York, 1964, pp 168-169.

³⁹ The institution was originally known as the Air Service Tactical School and was renamed the Air Corps Tactical School in 1926. See Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960*, pp 62-82.

⁴⁰ Raymond Richard Flugel, *United States Air Power Doctrine: A Study of the Influence of William Mitchell and Giulio Douhet at the Air Corps Tactical School, 1921-1935*, Unpublished PhD Thesis, University of Oklahoma, 1965, pp 200-201. See also Richard H. Kohn and Joseph P. Harahan (eds) in the Introduction to Douhet, p ix; and Hurley, *Billy Mitchell: Crusader for Air Power*, pp 75-77.

⁴¹ Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960*, p 69; and the Introduction to Douhet, p ix.

by airmen all over the world'.⁴² Arnold continued, "As regards strategic bombardment, the doctrines were still Douhet's ideas, modified by our own thinking in regard to pure defence'.

According to Claire Chennault, an instructor at the Air Corps Tactical School in the mid-1930s, Douhet's book 'became the secret strategic bible of the Air Corps'.⁴³ Courses taught at the school envisaged massed air attacks being driven home against an enemy's vital centres, while land and sea forces were ignored.⁴⁴

Douhet's impact on the USAAC should not be emphasised at the expense of significant, original American thinkers. In addition to those already mentioned, important contributors in the early years included Kenneth Walker, Donald Wilson, Laurance, Kuter and Haywood Hansell who, as staff members at the Tactical School, promoted the concept of large, fast, heavily armed, unescorted bombers flying in formation deep into enemy territory to make war-winning knock-out blows against 'national organic systems'. Targets would be 'carefully selected as keystone industries on which the enemy's whole economic structure depended'.⁴⁵

Not everyone believed that bombers would be able to operate unescorted. Fighter advocates like Claire Chennault and William E. Kepner argued that fighters would be essential both to defend vital points and to protect bombers. Chennault described the Tactical School as a 'crucible' of doctrinal debate, in which the dispute over the relative effectiveness of fighters and bombers reached 'white-hot intensity'.⁴⁶ The majority of the ACTS staff, however, accepted Douhet's assertion - and it was no more than that - that air superiority would be won either by destroying the enemy's air force on the ground or by the defensive firepower of formations of 'Battleplanes'.

Between the Wars - The Spectre of Douhet

During the years between the World Wars I and II it was the *idea* of air power, as much as any demonstrated capability, which played a dominant role in international affairs, and predisposed statesmen and airmen in the United Kingdom and the United States in particular towards strategic bombing as a potentially war-winning force. More than that, the belief in a rapid 'knock-out blow' from the air appeared to offer an alternative to the squalid slaughter in the trenches, a perception which, in the peculiar logic of warfare, was comparatively humane.

⁴² H.H. Arnold, *Global Mission*, Tab Books, Blue Ridge Summit, 1989, pp 131-2. Arnold presumably was referring to the Kenney translation.

⁴³ Claire Lee Chennault, *Way of a Fighter*, Putman's New York, 1949, p 20.

⁴⁴ Thomas H. Greer, *The Development of Air Doctrine in the Army Air Arm, 1917-1941*, USAF Historical Studies No 89, Manhattan, Kansas, 1955, p 48.

⁴⁵ Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960*, p 65. See also Donald Wilson, 'Origin of a Theory for Air Strategy, in *Aerospace Historian*, March 1971, pp 19-25; Barry D. Watts, *Way of a Fighter*, Air University Press, Maxwell Air Force Base, 1984, pp 17-23; Williamson Murray, 'A Tale of Two Doctrines: The *Luftwaffe's* "Conduct of the Air War" and the USAF's Manual 1-1', in the *Journal of Strategic Studies*, Vol 6, No 4, December 1983, pp 84-93; and Peter R. Faber, 'Interwar US Army Aviation and the Air Corps Tactical School: Incubators of American Airpower', in Meilinger, *The Paths ...*, p 219.

⁴⁶ Chennault, *Way of a Fighter*, p 27.

At the risk of over-simplification, the main point which statesmen, strategists and military leaders drew from the air power theorists was the belief that civilian morale would be fragile and national infrastructures vulnerable in the face of irresistible strikes from the sky, to the extent that offensive air power would dominate future warfare.

The theorists' faith in offensive air power was not based on any kind of operational analysis as that science is understood today; indeed, even to ascribe the use of the word 'analysis' would be generous. Surveys of the bombing attacks of World War II were superficial at best.⁴⁷ But to leave the issue there would be unfair. Trenchard's famous dictum from 1919 that 'the moral effect of bombing stands undoubtedly to the material effect in a proportion of 20 to 1' may have been more than perception of a true believer than the findings of a rigorous analyst, but it was nevertheless a perception arising from substantial, and apparently compelling, observation. The spectre of 'terror bombing' was in the first instance as much the product of popular belief as it was the pronouncements of airmen.

Any reading of the news reports of the bombing attacks against England and Germany during World War I conveys the sheer panic and fear they caused. The raids by Gotha bombers against London in June and July 1917 probably caused more alarm in the United Kingdom than any other event during the war, even though the material damage was slight. Similarly, accounts of German newspapers of the attacks by British bombers against Cologne in May 1918 spoke of the 'terrible panic' and 'deadly terror', of 'nerves ruined for life'; while a captured letter pleaded 'It is really terrible. May God protect us from anything so awful.'⁴⁸

Throughout Europe statesmen were haunted by the spectre of fleets of marauding bombers, against which it was thought defence would be powerless. The notorious claim that the bomber would always get through came not from an airman but a politician, former British Prime Minister Stanley Baldwin, during a speech to the House of Commons in 1932. 'I think it well... for the man in the street to realise', from bombing, whatever people may tell him. The bomber will always get through.⁴⁹ Baldwin's despairing remarks, which envisaged the inconceivable horror of men watching helplessly as their wives and children were slaughtered from the air, were widely reported.

Momentum continued to gather after World War I. The Washington Conference of 1921-22 is often recalled only in relation to naval disarmament. In fact its official title was the Conference on the Limitation of Armament, and one of its sub-committees (of which Billy Mitchell was a member) dealt with aircraft. The conference

⁴⁷ For example, the RAF did not scientifically examine the effectiveness of bombs until June 1938. See Malcolm Smith, *British Air Strategy Between the Wars*, Clarendon Press, Oxford, 1984, pp 280-281; Watt, *Way of the Fighter*, p 65; Robin Higham, 'The Royal Air Force at the Crossroads, 1934', Unpublished Paper, 1993, p 5 esp. fn 12; and Jones, H.A., *The War in the Air*, Appendices, Appendix 23, 'Methods of Bombing', Clarendon Press, Oxford, 1937.

⁴⁸ For examples of both the British and German reactions, see 'Extracts from a Report by General Smuts on Air Organisation and the Direction of Air Operations', 'Reports on the Attack on Cologne' and 'Examples of Effect of Air Bombardment', in Stephens and O'Loughlin, *The Decisive Factor: Air Power Doctrine by Air Vice-Marshal H.N. Wrigley*, pp 22-5, 145-8, 158-62.

⁴⁹ Stanley Baldwin, 'The Bomber Will Always Get Through', Emme, *The Impact of Air Power*, pp 51-52.

recommended that military objectives should be the only legitimate targets for aerial bombardment.⁵⁰

A commission convened under the auspices of the League of Nations in 1925 to control armaments was urged by the United Kingdom to place severe limits on aerial warfare. British officials promoted measures as extreme as abolishing air bombardment; failing that, they recommended confining the maximum weight of aircraft to three tones. The proposals were never adopted, serving instead only to circumscribe the development of heavy bombers in Britain.

The spectre of the *Luftwaffe* intimidated Europe during the 1930s. Because of the fear of air attack, plans were made for the mass evacuation of cities, the construction of shelters and the issue of gas masks. In March 1935, Sir John Simon and Anthony Eden went to Berlin to discuss placing limits on air armaments with Hitler, and were told instead that Germany already claimed equality with Britain's first line air strength, and planned soon to match France, a revelation which caused panic in the British Cabinet.⁵¹ The RAF told the Government to expect 20,000 casualties a day if the *Luftwaffe* attacked London.⁵² During the Munich crisis of 1938, fears of the *Luftwaffe's* alleged bombing capability saw trenches dug in London parks, while nearly one-third of the population of Paris evacuated the city.⁵³

Evidence of the assumed fearful effects of terror bombing was seen in a number of highly-publicised attacks on civilians during the wars of the 1930s. The Italian Air Force flew hundreds of bombardment missions against Ethiopian towns and caravans, as well as military targets, between October 1935 and May 1936, killing many non-combatants. Japanese air forces similarly ranged throughout China during the Sino-Japanese War from 1937 to 1939, bombing major population centres including Beijing, Shanghai, Nanking, Hankow and Chungking. The horror bombing of the Basque town of Guernica by the *Luftwaffe* on 26 April 1937 has achieved enduring international notoriety, partly through the callousness of the attack and partly through Pablo Picasso's powerful painting of the event. Heinkel 111s and Junkers 52s attacked Guernica on market day, repeatedly bombing and strafing a defenceless crowd of about 7,000. Almost 1,700 were killed and another 900 wounded. The razing of Guernica was publicised by the world press, led by *The Times* in London, as the symbol of barbarity. In movie theatres around the world, people for the first time were able to watch similar air attacks against other Spanish cities.

According to one authority, the 'very idea of bombing seemed, especially in the 1930s to portend barbarism and anarchy'.⁵⁴ General 'Hap' Arnold has noted how air bombardment came to be perceived as criminal; that in Anglo-Saxon countries in particular a prejudice developed that bombing was somehow, in some undefined way,

⁵⁰ 'Aerial Bombardment in the Law of War', in *RAF Quarterly*, October 1934, pp 462-464.

⁵¹ Webster and Frankland, *The Strategic Air Offensive Against Germany 1939-1945*, pp 69-70. Simon was the Foreign Secretary, Eden his deputy.

⁵² R.J. Overy, 'Air Power and the Origins of Deterrence Theory Before 1939', in the *Journal of Strategic Studies*, Volume 15, March 1992, p 79.

⁵³ Quester, *Deterrence Before Hiroshima*, p 98. British war planners calculated in 1938 that the *Luftwaffe* could drop 600 tons of bombs a day on Britain compared to the 100 tons a day the RAF could drop on Germany. Watt, *Way of a Fighter*, p 74.

⁵⁴ Noble Frankland, *The Bombing Offensive Against Germany*, Faber and Faber, London, 1965, p 42.

‘less humanitarian’ than an attack by artillery shells or naval gunfire.⁵⁵ The *idea* of air power, typified in Stanley Baldwin’s bleak prognosis, had become a powerful force.

Between The Wars - Theory and Practice

Yet while horrific, the air attacks in Ethiopia, China and Spain bore little resemblance to a fully-developed version of strategic bombing. Most of the aircraft used were short-range, lightly armed fighter/bombers rather than long range heavy bombers, and their objectives were tactical rather than strategic. Often there was little opposition: one historian has described air power’s success in those three wars as ‘victories won in battles that were never fought’.⁵⁶ Nor were the results an unqualified success which drove populations to abject surrender. On the contrary, there was ample evidence of hardened resolve, of an increased determination to resist, prompting claims that the concept of ‘terrorism from the air’ had been ‘tried and found wanting’.⁵⁷

That was a conclusion based on observation and experience. The fact remained, though, that most public reactions to the threat of air bombardment were still based on beliefs, and in Europe and the United States those beliefs were shaped more by images from London on 1917 and Guernica in 1937 than by any rational analysis.

As the menace of Hitler’s Germany became increasingly apparent, thoughts of placing some kind of international prohibition on air striking forces were abandoned. In the United Kingdom in particular, politicians reversed their attitudes and thought instead about acquiring a ‘knock-out’ blow of their own. But the belief that the bomber would always get through was nothing more than that - a belief. An examination of that proposition must focus on the experiences of the Royal Air Force and the United States Army Air Corps, the only two air arms which seriously tried to develop the doctrine and systems of strategic air attack before World War II.

With his powerful personality, authoritative wartime record and great stature as the ‘main creator of the Air Force’, Trenchard dominated the air power debate in the United Kingdom. His prime objective was, simply, to give the RAF maximum offensive power by establishing as many bomber squadrons as possible. Under his influence the government began to channel large amounts of money into Bomber Command, partly at the expense of Fighter Command. It was Trenchard alone who decided that the RAF’s fighters should be short-range, so they would be employed only for home defence; and that long-range fighters would not be needed to protect bombers. As the RAF’s official historians from World War II have noted, this was a decision of fundamental importance to the future development of British air power.⁵⁸ It was also a decision which was opposed by some of Trenchard’s staff officers, who believed that unescorted day bombers would sustain heavy casualties. Trenchard would not be denied, insisting that the next war would be won by dropping the

⁵⁵ Arnold, *Global Mission*, p 159.

⁵⁶ James L. Stokesbury, *A Short History of Air Power*, Robert Hale, London, 1986, p 148.

⁵⁷ Report from the *Saturday Evening Post* of 12-3-38, quoted in Michael S. Sherry, *The Rise of American Air Power*, Yale University Press, New Haven, 1987, pp 69-70.

⁵⁸ Webster and Frankland, *The Strategic Air Offensive Against Germany 1939-1945*, p 54.

heaviest possible bomb load on the enemy's homeland, to destroy the morale of its inhabitants.

But in applying Trenchard's doctrine the Royal Air Force made dangerous assumptions. If strategic bombing were to be a credible strategy, it followed that the bomber force had to be able to penetrate to its targets and accurately drop enough bombs to inflict decisive damage. Implicit in the strategy was a belief in 'precision': precision in aircraft performance, aircrew skills and weapons systems.

The claim to precision was superficially plausible. Aircraft had bombed targets with considerable accuracy in a number of peripheral conflicts during the 1920s and 1930s when operating under favourable conditions. Trials like Billy Mitchell's sinking of the *Ostriesland* - described by General Arnold as the 'beginning of precision bombardment' - had also made a strong impression, again notwithstanding the lack of opposition.⁵⁹ Despite those qualified successes, the fact remained that none of the qualities essential for precision bombing was present in sufficient quantity before the outbreak of World War II.

Characteristics which aircraft designers and air force leaders might build into their bombers included a mix of high speed, good manoeuvrability, long range, large weapons payload, high service ceiling, and heavy defensive armour and armament. For much of the 1920s and 1930s the emphasis in the RAF was on the first two only. A development scheme proposed in 1934 envisaged expanding Bomber Command to 41 squadrons, 22 of which were to be equipped with light bombers, aircraft with performance reasonably equivalent to the fighters of the day, but with limited range and payload. Eventually larger aircraft like the Hampden and the Wellington entered production and, most significantly, design work began on four-engine aircraft. The construction of heavy bombers had not, however, developed sufficiently before the *Wehrmacht* rolled into Poland in September 1939.

In any case, the equation had changed. During the late-1930s fighters with dramatically improved capabilities had started to enter service. After two decades of fabric and wire biplanes, the emergence of low-wing, all-metal monoplanes, fitted with retractable landing gear, propelled by powerful, reliable engines, and armed with heavy calibre guns, was nothing less than revolutionary. The Supermarine Spitfire Mk I of 1938 flew twice as high and three times as fast, and had four times the armament, of the Sopwith Camel F.I of 1918. It is true that bombers were also improving: the Vickers Wellington Mk IC of 1938 carried a bomb load of 2,040 kilograms at a speed of 370 kilometres per hour, compared to the 900 kilogram bomb load at 145 kilometres per hour of the Handley Page O/400 from 1918. But the Spitfire was still 190 kilometres per hour faster than the Wellington, flew 5,000 metres higher, and was immensely more manoeuvrable. The performance gap had widened dangerously in favour of the fighter.⁶⁰

⁵⁹ Arnold, *Global Mission*, p 111.

⁶⁰ Technical details are from John W.R. Taylor, *Combat Aircraft of the World*, Ebury Press, London, 1969; H.F. King, *Armament of British Aircraft 1909-1939*, Putnam, London, 1979; and *Weapons*, The Diagram Group, St. Martin's Press, New York, 1990. For an exhaustive study of technical development between 1918 and 1939, see Allan R. Millett and Williamson Murray, *Innovation in the Interwar Period*, Office of Net Assessment, Washington, 1994.

Improvements in fighter aircraft were complemented by the development of the first effective long-distance control and reporting system, as scientists on both sides of the English Channel produced a revolutionary warning device known as radio detection and ranging apparatus - radar. This was a system which transformed the possibilities of defence against bombers.⁶¹

That gap in the respective capabilities of the offence and the defence was not recognised in doctrine, as the Air Ministry held fast to its belief that the air weapon was essentially offensive, and that the way to beat the Nazis was for the RAF simply to drop more bombs on Germany than the *Luftwaffe* could drop on the United Kingdom. Following a series of development schemes and after prolonged debate, the British Cabinet finally endorsed a proposal in April 1938 under which the RAF would reach a strength of 1,352 bombers and 608 first-line fighters within two years. Aircraft production favoured bombers over fighters by a ratio of 2.3 to one between 1936 and 1939.⁶²

The proponents of strategic bombing now placed their trust in unproven concepts and tactics: flight at high altitude, tight defensive formations, and the notion of the bomber as a 'flying fortress'. Untried practices were supplemented by technical innovations such as defensive armour and self-sealing fuel tanks (the latter a tacit admission of a problem if ever there was one).

High quality navigation and target identification were the second component of the assumption that the bomber could reach and destroy its target. Neither of those precise skills received the attention it demanded. Too much credence was placed on the success of offensive operations in places like Iraq, Somaliland and the Northwest Frontier, where primitive opponents and undefended targets provided neither any measure of how difficult it might be to attack an industrialised enemy, nor the incentive to address the technical and individual challenges which might arise in less favourable circumstances.⁶³ Thus, little thought was given to the challenge of how to find and hit targets by day and night, in unfavourable weather and over unfamiliar territory. The RAF's 1937 manual of navigation advised that night navigation was to be conducted using the lights of towns. Clearly that was operationally naive. Equally clearly, navigation standards were poor: during a night exercise in 1937, two-thirds of a Bomber Command force was unable to find the fully illuminated city of Birmingham.⁶⁴ In the final two years before the war, 478 Bomber Command crews force-landed during exercises in the United Kingdom, having lost their way.⁶⁵

⁶¹ See R.V. Jones, *Most Secret War*, Hamish Hamilton, London, 1978, passim; Frankland, *The Bombing Offensive Against Germany*, pp 53-54, 73; John Terraine, *The Right of the Line*, Sceptre, Sevenoaks, 1988, pp 21-23, 175-176; and Basil Collier, *The Defence of the United Kingdom*, HMSO, 1957, pp 36-40.

⁶² Max Hastings, *Bomber Command*, Michael Joseph, London, 1987, p 49. The endorsed plan was known as 'Scheme L'. See also Overy, *The Air War*, p 20. For a complete list of the RAF's pre-war expansion schemes from 'A' to 'M', see Slessor, *The Central Blue*, p 184.

⁶³ Webster and Frankland, *The Strategic Air Offensive Against Germany 1939-1945*, pp 60-61.

⁶⁴ 'The Effects of Pre-War Theory and Doctrine', Group Discussion Period, in *Reaping the Whirlwind*, Proceedings of a Symposium on the Strategic Bomber Offensive, RAF Historical Society, 1993, pp 43-44. For more detail on Bomber Command's short-comings, see Smith, 'A Matter of Faith': British Strategic Air Doctrine before 1939', pp 270-81; and Slessor, *The Central Blue*, pp 206, 208, 214, 223, 232-233, 239.

⁶⁵ Hastings, *Bomber Command*, p 44.

Finally, the aiming systems simply were not good enough. In 1938 the standard system in the RAF was still the Course-Setting-Bomb-Sight which had been introduced during World War I.⁶⁶ The best-known system from the 1930s was the American Norden tachometric bomb-sight, whose manufacturers claimed it could 'drop a bomb in a pickle barrel from 25,000 feet', a claim echoed by airmen from the USAAC who first used it in 1935.⁶⁷ With clear skies, consistent wind velocities and no enemy opposition, the Norden was an excellent piece of equipment. However, the challenge was vastly more difficult under less favourable conditions. In Northwest Europe, for example, cloud or industrial haze prevailed two days out of every three and meteorological reports were unreliable.⁶⁸ Under those conditions, average bombing accuracies expressed as a Circular Error Probable were more likely to be in the order of three quarters of a mile rather than the circumference of a pickle barrel.⁶⁹ Aiming problems were not confined to the allies. In March 1939, the commander of the *Luftwaffe's* First Air Fleet, Field Marshal Albert Kesselring, doubted whether his average crew could hit a target with any degree of accuracy at night or in bad weather.⁷⁰

The question of precision was to become central to assessments of strategic bombing during World War II, with the crucial point being not much the destructiveness of air strikes - there was no doubt about that - but rather their cost in terms of crews, civilians and collateral damage; and, therefore, their morality.

The approaching war with Germany was preceded in the mid-to-late 1930s by several limited but intense conflicts in which air power was used extensively. Accepting that each of those conflicts was different, valuable general conclusions could nevertheless be drawn.

The Spanish Civil War from July 1936 to April 1939 provided the first instance since 1918 in which the main protagonists fielded air forces of a reasonably comparable size and technical proficiency.⁷¹ The fighting therefore offered an opportunity to test some of the conceptual and technical developments of the past two decades. Nationalist forces were supported by air units from Germany and Italy, and the Republicans by the Soviet Union.

Most of the air power roles which were subsequently to be used in World War II were conducted, including airlift, reconnaissance, counter air, strategic bombing and close air support. While all roles were significant, most attention was directed towards the last three.

A doctrine for strategic bombing quickly emerged. Within a month of the outbreak of fighting, the chief of the Nationalist air forces, General Alfredo Kindelan, had issued

⁶⁶ Sir Michael Knight, *Strategic Offensive Air Operations*, Brassey's, London, 1989, p 20; and Hastings, *Bomber Command*, p 75.

⁶⁷ Arnold, *Global Mission*, p 150. See also Stephen L. McFarland, *America's Pursuit of Precision Bombing, 1910-1945*, Smithsonian Institution Press, Washington, 1995.

⁶⁸ Knight, *Strategic Offensive Air Operations*, p 22.

⁶⁹ Richard Hallion, 'The USAAF Role', in *Reaping the Whirlwind*, p 17.

⁷⁰ Williamson Murray, *Strategy for Defeat: The Luftwaffe, 1933-1945*, Chartwell Books, New Jersey, 1986, p 25.

⁷¹ See R. Dan Richardson, 'The Development of Airpower Concepts and Air Combat Techniques in the Spanish Civil War', in *Air Power History*, Spring 1993.

a directive on the employment of offensive air power. Kindelan instructed his commanders to select targets which were at least 30 kilometres behind the front line, and which were of strategic importance, such as bridges, airfields, railways, factories and munitions works. Later he specifically identified the gasoline depots in the Republican-held cities of Valencia and Barcelona as priority targets. Repeated attacks were called for, as was the systematic bombardment of key railway lines.

Kindelan appreciated from the outset that without control of the air his objective would be placed at risk. Consequently, as early as September 1936 Nationalist strike aircraft were targeting the Republican's air defences through attacks on fighter aircraft, fuel supplies and airfields, as local air superiority was sought for specific operations.⁷² General Kindelan also insisted that whenever enemy fighters were expected, his bombers were to have their own fighter escort, a practice which was to be at odds with the thinking of the RAF and the USAAC in the early years of World War II.

Kindelan's conclusions were shared by *Luftwaffe* commanders in Spain who noted that, while fast bombers were able to survive fighter attacks, slower machines, regardless of how well armed they might be, were a dubious proposition. Even more importantly, the Germans noted for future reference that 'the success of every major offensive and defensive operation of the war was dependent upon air superiority and the effectiveness of that air power'.⁷³ However, perhaps the 'most important and significant result of the German involvement in Spain' was, to quote General Karl Drum, 'the principle of tactical employment of air forces within the framework of ground operations'.⁷⁴

Spain was an invaluable testing ground for the *Luftwaffe*. The Treaty of Versailles which came into effect in January 1920 had prohibited Germany from possessing military aircraft (as well as submarines and tanks). German initiative had, however, countered one treaty with another. In 1922 the pariah states Russia and Germany had concluded the Treaty of Rapallo, ostensibly a trade and diplomatic agreement. Under the umbrella of that treaty, the Germany established secret military flying units in the Soviet Union. Germany's military leaders also made shrewd use of civil aviation. During the 1920s German airlines flew further with more passengers than their commercial competitors in France, Great Britain and Italy combined.⁷⁵ Valuable long-distance and instrument flying skills - both of which are crucial for strategic bomber crews - were developed.

Public demands for a military air arm grew during the 1920s as Germany recovered and regrouped, with one such notable call coming from the floor of the Reichstag in 1929 from the newly elected Nazi Party representative, World War I fighter ace

⁷² Carl A. Spaatz, 'Ethiopia, China, and the Spanish Civil War', in Emme, *The Impact of Air Power*, pp 363-7; and Richardson, 'The Development of Airpower Concepts and Air Combat Techniques in the Spanish Civil War', p 15.

⁷³ James S. Corum, 'The *Luftwaffe* and the Coalition Air War in Spain, 1936-1939', in the *Journal of Strategic Studies*, Volume 18, Number 1, March 1995, p 82.

⁷⁴ Quoted in Richardson, 'The Development of Airpower Concepts and Air Combat Techniques in the Spanish Civil War', p 20. Richardson has noted that Soviet airmen in Spain were also impressed by close air support, with one journal article describing it as the 'decisive factor in modern combat', p 21.

⁷⁵ Murray, *Strategy for Defeat*, p 14.

Hermann Goering. By the time Hitler formally denounced the Versailles Treaty in 1935, Goering - now the Air Minister and Commander-in-Chief - was able officially to reveal the existence of an independent *Luftwaffe* of 48 operational squadrons.

Two men who played a major role in shaping the *Luftwaffe* were the first chief of staff, Walther Wever, and his successor, Albert Kesselring. Some significance is often attached to the fact that Wever was an admirer of Douhet, the implication being that had Wever not died in an aircraft accident in 1936, Germany might have progressed further towards developing a genuine heavy bomber force. Like Douhet, Wever believed that the objective of any war was to destroy the morale of the enemy, and that the bomber was the decisive weapon of air warfare, an outlook which made him a strong supporter of the proposed long-range, four-engine 'Ural' bomber. Nevertheless, it would be a mistake to categorise Wever as doctrinaire.

Wever's basic doctrinal statement was published in 1935.⁷⁶ Titled 'The Conduct of the Air War', it clearly identified a place for so-called independent, strategic air attacks against key enemy targets; attacks which, in the right circumstances, might decisively weaken the opposition's will. But Wever was much more circumspect than Douhet about the possibility of achieving a decisive knock-out blow from the air, instead accepting that major war was more likely to be a drawn-out affair. Thus, in contrast to the strident independence asserted by many of the leading air power thinkers in Britain and the United States, Wever placed his service's doctrine firmly within the higher order of joint operations. According to Wever, strategic bombing was unlikely to be an end in itself, but rather would be just one of a number of air power capabilities which would support the joint efforts of the army, navy and air force, as in combination they pursued their country's national interests.⁷⁷

Wever's view of air power could best be described as balanced. His death was a major blow for the *Luftwaffe* for, while his successors were highly capable men, they perhaps lacked his balance and commitment to the full development of air power, being soldiers first and airmen second. Kesselring, for example, was concerned primarily with close air support for the army,⁷⁸ a position derived partly from his army background and partly from the Condor Legion's experience in Spain. Under the leadership of Wolfram von Richthofen, German airmen fighting in the Spanish Civil War gained a keen appreciation of the power of joint air/land operations, and did a great deal to develop the technical systems - joint planning, air-ground communications, recognition devices, and so on - which had not existed previously, and which were crucial to effective close support.⁷⁹ Consequently, the *Luftwaffe* entered World War II with secondary expectations. Any knockout blow would be delivered by the army, supported by air power which would smooth the path of

⁷⁶ Major General Wever, 'Doctrine of the German Air Force', in Emme, *The Impact of Air Power*, pp 181-5. See also Williamson Murray, 'A Tale of Two Doctrines: The *Luftwaffe*'s "Conduct of the Air War" and the USAF's Manual 1-1', in the *Journal of Strategic Studies*, Volume 6, Number 4, December 1983, p 86.

⁷⁷ Murray, *Strategy for Defeat*, p 17; and 'A Tale of Two Doctrines...', pp 86-87.

⁷⁸ R.J. Overy, 'From "Uralbomber" to "Amerikabomber": the *Luftwaffe* and Strategic Bombing', in the *Journal of Strategic Studies*, Volume 1, Number 2, September 1978, p 155.

⁷⁹ Williamson Murray, 'The *Luftwaffe* Before the Second World War: A Mission, A Strategy?', in the *Journal of Strategic Studies*, Volume 4, Number 3, September 1981, pp 261-270.

advancing ground forces, destroy pockets of resistance, and strike selected 'strategic targets'.⁸⁰

Notwithstanding the priority given to army support, some innovative thinking did emerge from the *Luftwaffe*. Perhaps the most interesting case was the concept of using medium-sized dive bombers for strategic attacks, the idea being that the high degree of accuracy possible with dive bombers would facilitate precision attacks against factories, transport and other 'special' targets.⁸¹ The notion stood in sharp contrast to the allies' preference for large, level bombers, which individually could not expect to achieve the same accuracy. Given the fundamental importance the question of 'precision' was to assume in the strategic bombing debate, that particular idea, which was never translated into any worthwhile effect, could be regarded as somewhat prescient.

Two final observations on German air doctrine are warranted, one on the consequences of materiel shortages and the other on the imperatives of geography. First, the Germans were handicapped by severe structural limitations, having to import almost every raw material needed for a modern war economy.⁸² This placed them at an enormous disadvantage in terms of aircraft production, especially in comparison with the United States. And second, German air strategists knew that from the moment war started their geography meant they faced the certainty of a land battle, a situation which did not affect their British and American rivals, and which implied a great urgency to direct limited resources to the Army's immediate needs rather than to the uncertain benefits of strategic bombing. Because of those dual pressures, the *Luftwaffe's* leaders gambled initially on building a tactical air force, hoping to add a strategic heavy bomber force in the late 1930s or early 1940s. However, when the time came, Germany simply did not have the necessary labour, capital, raw materials and productive capacity, as other apparently more urgent military demands were given priority.

At least German air power was unified. Japan entered World War II with two separate air forces, which had been created, developed and maintained to meet the separate needs of the Army and Navy. The functions of each air arm reflected its origins with the Japanese Army Air Force being committed to ground support; and the Naval Air Force to surface fleet and convoy protection, coastal defence, and sea and anti-submarine patrols.⁸³

Several years of fighting in China in the late 1930s meant that Japanese air forces, like much of the *Luftwaffe* but unlike the allies, entered World War II as combat veterans. In addition to fulfilling their primary role of support for surface forces, Japanese aircrews had carried out long-distance transoceanic bombing raids, sometimes in extremely poor weather, from bases in Japan and Formosa against targets in and around Shanghai, Nanking and Hanchow. The return distance of about 2,000

⁸⁰ Overy, 'From "Uralbomber to "Amerikabomber"', p 158.

⁸¹ *ibid*, p 156; Edward L. Homze, 'The *Luftwaffe's* Failure to Develop a Heavy Bomber Before World War II', in *Aerospace Historian*, March 1977, pp 20-25; Powers, *Strategy Without Slide-Rule: British Air Strategy 1914-1939*, pp 177-178; and Murray, 'The *Luftwaffe* Before the Second World War', pp 264-266.

⁸² Murray, 'The *Luftwaffe* Before the Second World War', pp 261-262.

⁸³ *The Japanese Air Forces in World War II*, Arms and Armour Press, London, 1979, pp 1-4.

kilometres was by far the longest flown by any bombers from any country. Hard lessons were learnt: for example, the Japanese Naval Air Force crews who conducted the long-range strikes against China discovered with 'devastating thoroughness' that unprotected bombers were no match for enemy fighters; conversely, they discovered that escorted bomber groups were far more likely to reach and return from their targets.⁸⁴ It was those kinds of experiences which in 1937 led Brigadier General H.H. Arnold to describe Japan as a 'first rate air power'.⁸⁵

Brief mention should be made of the air forces of the USSR, France and Italy, whose development between 1918 and 1938 also provides useful doctrinal background. Similarly, the evolution of naval aviation warrants comment.

The ridiculously titled Workers and Peasants Air Fleet, later renamed the Red Air Force, was established by Lenin after the 1917 revolution. Like the *Luftwaffe*, the Red Air Force found its development largely determined by the demands of a dominant army. A most strategic bombing capability was acquired, but Soviet air power existed primarily to support land forces. It excelled in that role, Joseph Stalin describing the remarkable Ilyushin Il-2 Shturmovik ground attack aircraft as being 'as essential to the Red Army as air and bread'.⁸⁶

The two remaining major air forces of the interwar period were those of France and Italy. While ostensibly impressive in 1939, neither played a particularly noteworthy role during World War II. The French Air Force possessed large numbers of aircraft but many were of dubious quality. And although Douhet was well-known to French airmen and concepts of 'strategic' air operations were developed,⁸⁷ in general the air force was dominated by the army. It is noteworthy that one of France's most influential military thinkers of the 1930s, the then-Colonel Charles de Gaulle, was fascinated by military technology but showed little awareness of the strategic potential of aircraft. Like most of his army colleagues, de Gaulle invariably relegated air force to the secondary status of army support.⁸⁸

Douhet's countrymen in Italy's *Reggia Aeronautica* used the war against Ethiopia to test the concept of bombing civilian populations into submission, and found that in those circumstances at least it had not worked. They enjoyed more success when offensive air power was applied against land forces in transit or over the battlefield, particularly when combined with a ground assault.⁸⁹

The development of air power was not confined to land-based platforms. Following the appearance of converted aircraft carriers during World War I, warships which for several centuries had been the centrepiece of global military power were now exposed

⁸⁴ Masatake Okumiya and Jiro Horikoshi, with Martin Caidin, *Zero! The Story of the Japanese Navy Air Force 1937-1945*, Cassell and Co., London, 1957, pp 5-6.

⁸⁵ Quoted in Richard P. Hallion, *Strike from the Sky*, Airline, Shrewsbury, 1989, p 116; see also Okumiya and Horikoshi, *Zero! The Story of the Japanese Navy Air Force 1937-1945*, pp 4-5.

⁸⁶ Quoted in John W.R. Taylor, *Combat Aircraft of the World*, p 572. About 35,000 Shturmoviks were built. See also Overy, 'From "Uralbomber" to "Amerikabomber"', p 155.

⁸⁷ See for example, Robert J. Young, 'The Strategic Dream: French Air Doctrine in the Inter-War Period, 1919-1939', in the *Journal of Contemporary History*, Vol. 9, No. 4, October 1974, pp 57-76.

⁸⁸ See Pascal Vennesson, 'Institution and Airpower: The Making of the French Air Force', in the *Journal of Strategic Studies*, Volume 18, Number 1, March 1995, pp 37-67.

⁸⁹ Hallion, *Strike from the Sky*, pp 83-88.

far more to a potential enemy's striking forces. Admirals found themselves having to confront the distasteful question of whether or not a flimsy, relatively lightly armed aircraft could find and sink a battleship. Answers varied. Construction of purpose-built aircraft carriers began in the United Kingdom in 1918. The United States' first specialised carrier, the USS *Langley*, was launched within a year of Billy Mitchell's sinking of the *Ostfriesland*. After trials in the North Sea in 1934, a Royal Navy report concluded that 'Aeroplanes are certain to find and locate a hostile fleet... [and] would probably inflict heavy losses'.⁹⁰ In general, though, the Royal Navy believed reconnaissance was the most valuable role for air power at sea.⁹¹ Britain's First Sea Lord suggested in 1936 that offensive air operations would be made unacceptably dangerous by intense ship-borne anti-aircraft fire, and many captains were contemptuous of the danger posed to battleships from the air.⁹² Consequently, Britain entered World War II with inferior naval aircraft and insufficient naval pilots.⁹³

A more thoughtful appreciation was evident in Japan, which was at the forefront of countries committed to sea-borne attack aircraft. The development of Japanese air power was abetted by the allies, albeit unwittingly. The main discussion at the Washington Conference of 1921-22 had centred around the size and number of battleships various countries would be allowed.⁹⁴ British delegates, believing that capital ships were still the decisive factor in maritime operations, suggested to Japan and the United States that they should each convert two of their uncompleted battle cruisers into fast carriers. By endorsing the proposal, Japan not only complied with the demands of the conference but also satisfied its military objective of increasing fleet striking power. Carriers became central to Japan's Pacific strategy,⁹⁵ to the extent that all officers who aspired to Flag rank had either to have qualified as an aviator or commanded a seaplane tender.⁹⁶

World War II

At the start of World War II many if not most allied army and navy officers had failed to grasp the fact that the inherent sheer speed and range of the air weapon had made the time and space factors which prevailed in World War I outdated and irrelevant: that reaction times had become enormously compressed and battlefields extended. By contrast, the Germans' innovative combination of aircraft, fast armour, infantry and modern communications in the form of blitzkrieg demonstrated a battle-winning understanding of what amounted to a revolution in military affairs:

Whereas the British, French and American armies calculated the speed of any combined arms unit as that of the slowest element, the Germans measured it by that of the fastest (the tank). Aviation allowed for the deep attack of many targets

⁹⁰ 'Night Torpedo Attacks Made on the Fleet', in *Aircraft*, 1-1-35, p 22.

⁹¹ Overy, *The Air War*, pp 6-7.

⁹² Martin Middlebrook and Patrick Mahoney, *Battleship: The Loss of the Prince of Wales and Repulse*, Allen Lane, London, 1997, pp 56-9. See also A.J. Curr, 'What a Hell of a Mine', in *Defence Force Journal*, November/December 1991, pp 31-5; and Slessor, *The Central Blue*, p 277.

⁹³ Overy, *The Air War*, p 7.

⁹⁴ C.G. Reynolds, *The Fast Carriers - The Forging of an Air Navy*, McGraw-Hill, New York, 1968, p 4; and Vice-Admiral Sir Arthur Hezlet, *Aircraft and Sea owner*, Stein and Day, New York, 1970, p 111.

⁹⁵ Overy, *The Air War*, pp 6-7.

⁹⁶ Reynolds, *The Fast Carriers- The Forging of an Air Navy*, p 4.

far beyond the visual range of ground forces, helping to further incapacitate the enemy's strategic resources by destroying critical warfighting and industrial facilities. Air power also supplanted artillery as the principal means of fire support for attacking armoured forces in order to sustain the momentum of the armoured thrusts.⁹⁷

The Wehrmacht's irresistible charge through Poland, the Low Countries and France provided compelling air power lessons, as did the equally stunning advance of the Japanese Imperial Army through South-East Asia two years later.

Exposed to the crucible of war, allied soldiers and sailors learnt quickly. By January 1943, one of the war's greatest leaders, General Bernard Montgomery, was instructing his senior commanders that 'the air striking force is a battle-winning factor of the first importance... you must win the air battle before you embark on the land, or sea, battle.'⁹⁸ By 1945, the Royal Australian Navy had concluded that 'the master weapon of World War II [was] the aeroplane'.⁹⁹

En route to reaching those conclusions, airmen and their surface force colleagues produced a great deal of tactical and operational doctrine; that is, doctrine which described in detail *how* air power should be employed, primarily in joint operations. That process made an important contribution to the development and understanding of the air weapon. But it was within the domain of basic air power doctrine - doctrine which explained in a broad strategic context *what* air power could do and *what* airmen believed - that the real test resided. In the main, the answers were clear cut.

The war almost immediately confirmed control of the air as the prime air role, with the best-known example of the RAF's victory in the Battle of Britain, which averted the planned invasion of the United Kingdom. That battle, incidentally, is one of the few examples of a successful *defensive* control of the air (or counter air) campaign: in general, airmen would prefer to wage an *offensive* campaign, that is, to destroy an enemy's air power on the ground rather than fight a war of attrition in the skies. It is noteworthy that the Germans had been on the verge of achieving an offensive counter air victory during the Battle of Britain when Goering made his fateful decision to shift the focus of the *Luftwaffe's* bombing attacks from the RAF's Fighter Command Control to British cities and ports, thus inadvertently allowing the beleaguered Fighter Command to recover, regroup and eventually carry the day.

Two other actions illustrated the importance of control of the air particularly well. The first was the introduction into service in December 1943 of the long range P-51 Mustang fighter, which was able to accompany USAAF strategic bombers deep into Germany. Prior to the arrival of the Mustang the unprotected USAAF daylight bomber force had been experiencing loss rates which threatened to become unsustainable.¹⁰⁰ The P-51, however, was able to establish *local* air superiority

⁹⁷ Douglas A. Macgregor, 'Future Battle: The Merging Levels of War', in *Parameters*, Volume XXII, Winter 1992-93, pp 33, 37.

⁹⁸ General B.L. Montgomery, *High Command in War* (a pamphlet produced for the General Officers of the Eighth Army), Tripoli, January 1943, pp 3-4.

⁹⁹ Australian Archives, CRS A5954 (Shedden Papers), Box 1841.

¹⁰⁰ For example, during a raid against the ball-bearing factories at Schweinfurt on 14 October 1943, the USAAF's Eighth Air Force lost 60 of 291 B-17 Flying Fortresses, a rate no combat force could sustain.

around bomber formations, thus greatly reducing their losses. As Nobel Frankland concluded, the introduction of the Mustang 'changed the course of the war in the air'. Technical innovation had 'rescue[d] the theorists'.¹⁰¹

The second action concerns the preparations for the Normandy invasion of 6 June 1944. General Eisenhower's deputy supreme commander, Air Chief Marshall Sir Arthur Tedder, believed the most important contribution air power could make to the invasion would be the disruption of the transport system in France. Because Fighter Command had established air superiority over France, allied bombers were able to achieve Tedder's aim relatively free from attack. Basil Liddell Hart later concluded that Tedder's paralysis of the Nazis' communications system was the single most significant factor in the success of the Normandy invasion.¹⁰² It was the control of the air, though, that underwrote Tedder's achievement.

The war also confirmed the growing importance of the air force contribution to the surface operations. On land, the best known example was the now-classic combination of armour, highly mobile infantry and aircraft in the blitzkrieg attack. While blitzkrieg is generally associated with the German Army, the technique was also used to equal effect by others, such as Air Vice-Marshall Coningham's Desert Air Force and General Montgomery's Eighth Army in North Africa; and, on the Russian Front, the Soviet Army in combination with the Ilyushin Il-2 *Shturmovik* ground attack aircraft.

At sea, Billy Mitchell's demonstration from 1921 was quickly given operational expression by a number of actions, the most dramatic being the sinking of HMS *Prince of Wales* and *Repulse* by Japanese aircraft only three days after Pearl Harbour. Six months later, at the Battle of the Coral Sea, a major sea/air battle was fought for the first time in history without surface ships ever coming within sight of each other.¹⁰³ Nor did they exchange fire, as all offensive action was carried out by aircraft at distances in excess of 160 kilometres from their carries. The belief that aircraft had become integral to maritime operations was further strengthened by the role air forces played in the fight against the U-boats, with almost half of all German submarines lose during the war falling to direct air attack.¹⁰⁴ Air/sea cooperation continued to expand as naval and air force units worked together in a wide range of tasks, including convoy escort, maritime strike, mine-laying, reconnaissance, air defence, fleet protection and communications.

Airlift also came of age during World War II, even though it rarely received the same recognition as offensive air power capabilities. The speed of mechanised warfare created an insistent demand for reinforcements, resupply and rapid mobility which only transport aircraft could provide. Further, it might also be argued that on

¹⁰¹ Frankland, *The Bombing Offensive Against Germany*, pp 78-83; see also Stephen L. McFarland, 'The Evolution of the American Strategic Fighter in Europe, 1942-44', in the *Journal of Strategic Studies*, Volume 10, Number 2, June 1987, pp 198-208.

¹⁰² B.H. Liddell Hart, *History of the Second World War*, London, Pan Books, 1973, p 636.

¹⁰³ Samuel Eliot Morison, *History of United States Naval Operations in World War II*, Volume IV, *Coral Sea, Midway and Submarine Actions, May 1942-August 1942*, Boston, Little Brown, 1950, p 63.

¹⁰⁴ Richard P. Hallion, 'Air Warfare and Maritime Operations', *Air Power Studies Centre Paper Number 45*, APSC, Fairbairn, 1996, p 18. Of the 785 U-Boats that were lost, aircraft accounted for 368.

occasions airlift achieved strategic outcomes in its own right, the resupply flights by USAAF transports over the 'Hump' from Burma to China being perhaps the best example.¹⁰⁵

But notwithstanding the vital contribution made to the allied war effort by what was ultimately an enormously large, varied and powerful range of air power capabilities, it was the strategic bombing campaigns which were the prime focus of attention. The contrasting approaches of the major protagonists to this most controversial component of air power doctrine was conspicuous. For most of the war the allies were able to prosecute an air strategy which incorporated all of the major air power roles and missions. By contrast, both Germany and Japan were constrained by their doctrine and equipment to a limited air strategy. The critical distinction was the failure of the axis powers to establish a powerful, independent strategic bombing force comparable to that of the RAF and the USAAF.

By 1942 it was clear that the *Luftwaffe's* faith in medium bombers had been misplaced, as their aircraft lacked range and bomb load and in the prevailing conditions were no more accurate than large level bombers.¹⁰⁶ Responding to the growing military crisis, in the middle of the war the Germans tried to reverse their policy by developing a heavy strategic bomber. They had, however, left their run too late: in particular, the Reich lagged badly behind the allies in the design and development of aero engines, as a consequence of which their factories struggled to provide engines of sufficient power and reliability. No suitable bomber could be produced before the downward spiral of impending defeat started to tear the Nazi state apart.¹⁰⁷ Ultimately the V-1 and V-2 rockets constituted some kind of strategic strike force, but while they created considerable terror they were militarily ineffective because of limited numbers and inaccuracy.

During the course of the war the *Luftwaffe* dropped only three per cent of the tonnage of bombs on Great Britain that the allies dropped on Germany;¹⁰⁸ and nor was the *Luftwaffe* able to mount strategic attacks on any moment against the Soviets on the Eastern Front. Many senior German soldiers subsequently attributed their defeat to the *Luftwaffe's* inability to conduct a strategic air offensive similar to that of the allies.¹⁰⁹

An entirely different doctrinal approach was evident in Great Britain and the United States where, notwithstanding the pre-war controversy over air bombardment, and despite often strenuous opposition, the heirs of Trenchard and the Air Corps Tactical School were able eventually to marshal massive fleets of heavy bombers, which their political masters then directed them to use with increasingly brutal force.

It says much about the nature of the air power that today, more than 50 years after the event, the effectiveness of the Combined Bomber Offensive against Germany is still argued in military academies and universities, often with passion. Central to that argument has been the extraordinary conclusion drawn by the American economist,

¹⁰⁵ See William H. Tunner, *Over the Hump*, Office of Air Force History, Washington, 1985.

¹⁰⁶ Overy, 'From "Uralbomber" to "Amerikabomber"', pp 157-162.

¹⁰⁷ *ibid.*, pp 172-174.

¹⁰⁸ *ibid.*

¹⁰⁹ Overy, 'From "Uralbomber" to "Amerikabomber"', p 154.

academic, diplomat, social reformer and public figure, John Kenneth Galbraith, that allied bombing somehow accelerated German war production. A director of the United States Strategic Bombing Survey at the end of World War II, Galbraith claimed, for example, that the horrific, sustained raids against Hamburg from 24 July to 3 August 1943 'increased Germany's output of war material and thus her military effectiveness'. Galbraith also asserted that, in general, the campaign had stiffened rather than undermined German morale.¹¹⁰ Notwithstanding compelling evidence to the contrary, it has been Galbraith's findings which many historians and commentators have chosen to believe, presumably preferring the comfort of personal prejudice to the trials of academic rigour.

Given the emotion often attached to aerial bombardment, it is essential to appraise the bombing of Germany objectively, to assess only its military effect (as opposed to its moral dimension) on the German war economy and people. Three highly authoritative but distinctly different sources lead to a common conclusion. First, the Germans themselves. According to the Nazis' minister of war production, Albert Speer, if attacks on the scale of those made against Hamburg had been repeated against six more major cities, Germany's armaments production would have been brought to a 'total halt'.¹¹¹ Second, the United States Strategic Bombing Survey - the organisation of which Galbraith was a senior member - concluded in September 1945 that allied bombing had been 'decisive in the war in Western Europe... It brought the [German] economy ... to a virtual collapse'.¹¹²

Finally, the most authoritative scholar of the Anglo-American offensive, Richard Overy, has presented a powerful and grim picture of the physical and mental devastation the bombing caused. It is important to appreciate that the devastation did not really start until 1944, with over 80 per cent of the bombs dropped on Europe falling in the last 18 months of the war.¹¹³ There is no doubt that prior to then the campaign experienced problems which on occasions reached major proportions. But after 1944 its effect was profound.

That effect was both direct and indirect. For example, as a direct result of the allied bombing, during 1944 the Nazis' production schedules for tanks, aircraft and trucks were reduced by 35 per cent, 31 per cent and 42 per cent respectively.¹¹⁴ Additionally, an enormous amount of resources which might have been used to equip front-line troops had to be diverted to air defence. By 1944 the anti-aircraft system was absorbing 20 per cent of all ammunition produced and between half to two-thirds of

¹¹⁰ John Kenneth Galbraith, *The Affluent Society*, Hamish Hamilton, London, 1958, pp 16-18; and *A Life in Our Times: Memoirs*, London, 1981, pp 219, 239-240. Galbraith's post-war analysis of the raids against Hamburg showed that while the centre of the city had been devastated, war industries on the perimeter of the city were not greatly damaged. Before the attacks there had been a shortage of skilled labour in Hamburg. Now, with the loss of thousands of jobs in banks, garages, stores and so on, labour sought employment in the war industries. According to Galbraith the raids thus 'forced a wholesale conversion of Germany's scarcest resource, that of manpower, to war production'.

¹¹¹ Albert Speer, *Inside the Third Reich*, London, Weidenfeld and Nicolson, 1970, p 284.

¹¹² David MacIsaac, *The United States Strategic Bombing Survey*, Volume I, New York, Garland Publishing, 1976, pp 15-16.

¹¹³ Overy, *The Air War*, p 120.

¹¹⁴ Richard Overy, *Why the Allies Won*, Jonathan Cape, London, 1995, pp 131-3. See also Richard Overy, 'World War II: The Bombing of Germany', in Alan Stephens (ed), *The War in the Air 1914-1994*; Air Power Studies Centre, Fairbairn, 1994, pp 113-140.

all radar and signals equipment. Those figures are merely representative of the far broader impact the bomber offensive had on the German war economy.

Physical destruction and the massive diversion of resources were accompanied by psychological demoralisation. Contrary to conventional wisdom that the bombing boosted morale, the sustained campaign had a crushing effect on people's mental state. Post-war surveys found that workers became tired, highly-strung and listless, and were disinclined to take risks. Absenteeism because of bombing reached 25 per cent in some factories in the Ruhr for the whole of 1944, a rate which drastically reduced output and undermined production schedules. When asked to identify the single most difficult thing they had to cope with during the war, 91 per cent of German civilians nominated bombing.¹¹⁵ As Richard Overy has concluded, in the context of the outcome of the war, it 'is difficult not to regard [those kinds of consequences] as decisive'.¹¹⁶

No less decisive was the strategic bombing campaign in the Pacific Theatre. It is sometimes forgotten that Japan - one of the war's major belligerents - surrendered unconditionally with its armies intact before a single allied soldier set foot on the Home Islands. Japan's capitulation is sometimes linked solely to the atomic attacks against Hiroshima and Nagasaki. In fact, the use of the atomic weapons was the conclusion of a devastating bombing campaign during which many more people were killed and far more damage was caused by 'fire bombing' raids conducted with conventional weapons.¹¹⁷ Like the Combined Bomber Offensive in Europe, 50 years after the event, the campaign in the Pacific remains surrounded by controversy. The harsh truth is, like the bombing of Germany, the campaign against Japan was in the end brutally effective.

Whether or not the allies' strategic bombing campaign was morally justifiable is another matter altogether. Individual conclusions are likely to rest on the issues of collateral damage and the rights of an enemy's civilian population in 'total' war. As far as the former was concerned during World War II, bombing often was a very blunt instrument. Notwithstanding the USAAF's claim to have conducted 'precision' attacks in contrast to the RAF's 'area' attacks, in reality there was little difference; and as Max Hastings has pointed out, 'for all the technology embodied in the bomber aircraft [by the end of the war], its load once released was an astonishingly crude and imprecise weapon'.¹¹⁸ However, from the allies' viewpoint, collateral damage was an unavoidable consequence of the imperative to apply decisive force in a fight to the death. Similarly, it is easy to moralise about civilian casualties from a distance of half a century and the vantage point of not fearing for national survival. Still, while the morality of any given war is always likely to be decided by the winners, the international community's response in recent years to war crimes in places like Vietnam, Somalia and Bosnia suggests that the Law of Armed Conflict is acquiring wider authority.

¹¹⁵ *ibid.*, p 132.

¹¹⁶ *ibid.*, p 131.

¹¹⁷ See Michael S. Sherry, *The Rise of American Air Power*, Yale University Press, Newhaven, 1987, pp 257-292.

¹¹⁸ W. Hays Parks, "'Precision' and 'Area' Bombing: Who Did Which and When?", in the *Journal of Strategic Studies*, Vol. 18, No. 1, March 1995, pp 145-174; and Hastings, *Bomber Command*, p 351.

The final observation on World War II must address technology, a contest in which the axis powers were simply overwhelmed. Between them, the Americans, British and Soviets built about three times as many airframes and four times as many engines as their enemies.¹¹⁹ Quantity was complemented by quality: for example, the RAF flew 21 marks of their best fighters, the Spitfire, compared to 11 marks of the Luftwaff's Me-109 and eight of Japan's A6M Zero-Sen; while the axis had nothing to compete with aircraft like the Lancaster, B-17, B-24 and B-29.¹²⁰ Technological dominance was central to allied power doctrine.

Conclusion

In 1911 there were no independent air forces and no air power doctrine. War moved at metres an hour on land and a handful of kilometres an hour at sea. Protagonists observed each other's movements from the highest convenient terrain in the case of armies and from the tops of ships' structures in the case of navies. Generals and admirals who wanted to extend an area of hostilities by deploying forces from, say, Europe to the Far East, could not realistically expect to begin operations in less than a month.

A mere 30 years later, war in the form of jet fighters moved at 1,000 kilometres an hour. The pilots of those aircraft were able to observe and attack armies, fleets and, indeed, the enemy's homeland, at altitudes ranging anywhere from 50 to 15,000 metres. If the allies had wanted to send B-29s from England to attack Japan, their aircraft could have left London on Monday and bombed Tokyo on Wednesday. And as the use of atomic weapons at Hiroshima and Nagasaki showed, those same aircraft could have delivered history's ultimate 'knock-out blow' By radically extending the definition of 'battlefield', air power had changed the face of war.

The extent to which the basic doctrine which evolved with those air power capabilities was formally codified at the end of World War II varied between air forces. Some analysed their experiences and wrote them down to use for teaching and further development; others somewhat optimistically relied on the corporate memory of individuals. Still, regardless of the method used to preserve doctrine, a great deal had been achieved, and many airmen believed that core air power capabilities such as control of the air, strategic bombardment and rapid mobility now held the key to victory. And as the sole proprietors of atomic weapons, airmen seemed to have acquired the means of realising Douhet's vision - of delivering a war-winning knock-out blow at one stroke.

In fact, that was only partly true. Circumstances in 1945 were far more complex than most airmen appreciated. First, notwithstanding air power's increasingly decisive impact on combat, that impact was, with the exception of the atomic attacks, achieved

¹¹⁹ R.J. Overy, *The Air War*, p 150. The USA's peak annual airframe production of 96,318 in 1944 was more than double the best rate ever achieved by any other country. In 1943 the USA alone produced almost three times as many engines as Germany and Japan combined.

¹²⁰ Counting the variants of aircraft is complex as there were numerous 'sub' types of each mark. The wartime 'marks' cited here for each of the fighters are from the following references: John W.R. Taylor, *Combat Aircraft of the World*, Edbury Press, London, 1969, pp 426-431, 182-184, 252; and *Jane's Fighting Aircraft of World War II*, Bracken Books, London, 1989, pp 139-141, 176-177, 187-188.

through attrition warfare, not knock-out blows. In World War I the British Empire was said to have lost the flowers of a generation with the deaths of 38,834 officers, yet in Europe in World War II the RAF alone lost 55,573 aircrew. Nearly 60 per cent of Bomber Command crews became casualties.¹²¹ Air power may have dramatically changed the meaning of warfighting concepts like 'centre of gravity', 'tempo' and 'lethality' but, as those dreadful losses demonstrated, the way in which airmen went about their business too often bore an uncomfortable resemblance to the trench warfare their classical theorists believed would be made obsolete by the air weapon.

And second, there was the 'bomb' itself. Atomic weapons seemed to have made the strategic bomber an *unlimited* instrument of war. The paradox for air strategists, however, was that having achieved the power predicted by Douhet, the appalling consequences of exploiting that power made it untenable other than for the most extreme circumstances or irrational nations. In other words, the 'bomb' could be used only within the most *limited* air strategy. The air power doctrine which had evolved between 1911 and 1945 may have indicated a profound change in the nature of war, but the search for a knock-out blow remained unfulfilled.

¹²¹ John Terraine, *The Right of the Line*, Sceptre, London, 1988, p 682; Martin Middlebrook and Chris Everitt, *The Bomber Command War Diaries*, Penguin, London, 1990, p 708; Henry Probert, *The Forgotten Air Force*, Brassey's London, 1995, p 300.