Policy, prophecy and practice: air power between the wars 1. Strategic air power

A part-summary[1] of a presentation to the Institute on 16 January 2018 by

Michael Molkentin
University of New South Wales Canberra and Shellharbour Anglican College[2]

Between the Great War and World War II, air power theory and practice evolved as did aviation technology. This paper reviews the context for these developments and the resulting changes in the employment of air power strategically during the inter-war period.

Key words: air power; 1919 – 1939; funding; strategic threats; national strategies; aviation technology; influential leaders; Great War; inter-service rivalry; operational experience; strategic bombing; target selection.

Studying military aviation in the inter-war decades sheds light on the extent to which air power developed during the Great War and helps to contextualise what then happened in the air between 1939 and 1945. In the inter-war period, services grappled with the challenge of integrating new technologies and developing capabilities, while facing political and fiscal pressures and commitments to the small-scale and low-intensity conflicts that charted the deterioration of international relations during the period. It is a period to which defence professionals should devote serious study and thought.

This paper will identify the contextual factors that influenced air forces and air power thinking in the inter-war decades. It will then consider one of three significant applications of air power in the inter-war period, namely, strategic bombing. The remaining two – the use of air power in an operational (or combined arms) context in conventional warfare; and the employment of aircraft in what we now describe as asymmetric warfare – will be addressed in Part 2, along with identification of some of the lessons that air forces of the period learned. While not providing comprehensive coverage of the topic, I hope the paper will introduce some useful insights and suggest directions for further reading.

Context

Boyne (2003) identified five factors that shaped air power between the world wars: the level of funding that governments allocated to defence and, in particular, aviation; the strategic threats that governments perceived between the wars; the national strategies that governments devised to address these threats; aviation technology; and influential leaders in air services and governments. To Boyne's five factors, I add three others: the influence of the Great War; inter-service rivalry; and operational experience.

Funding

Generally speaking, the liberal democracies of Britain, France and the United States sharply curtailed military spending after the Great War and kept defence budgets lean until the mid-1930s, severely limiting their aviators from putting ideas into practice and developing the technical and tactical capabilities to support their doctrines. Authoritarian regimes such as Italy, Germany and the Soviet Union invested earlier and more generously in their militaries. In many respects, they were better equipped, both technologically and doctrinally, for World War II.

Strategic Threats and National Strategies

The strategic threats that governments perceived and the national strategies they devised to address these threats led to contrasting approaches to air power. British policymakers, surrounded by sea (but within range of air attack from the continent) and with a vast empire, hoped to avoid another European war altogether and, if one came, planned to use sea and air power to exert strategic pressure. Hence, the Royal Air Force (RAF) provided squadrons to garrison the fringes of the empire while developing fighter and bomber commands to defend the British Isles.

Germany, meanwhile, accepted the prospect of a future war with its continental neighbours and pinned its hopes on avoiding another protracted trench stalemate. Impressed by the mobility of allied forces in 1918, it emphasised the development of operational air power to assist the army in achieving rapid and decisive success on the battlefield.

In contrast, for reasons germane to their own geo-strategic circumstances, the Japanese and United States (US) services focused on developing carrier-borne aviation to operate in the Pacific.

[1] 'Part 2: Air power in conventional warfare and asymmetric conflict' will be publish in *United Service* **69** (3, September), 2018.

[2] E-mail: mail@michaelmolkentin.com.
Website: https://www.michaelmolkentin.com

Aviation Technology

Aviation technology evolved rapidly, especially during the 1930s, providing air forces with enhanced speed, endurance, ordnance carrying capabilities and communications. Technological limitations, however, tempered the predictions of some air power theorists, such as Italian Giulio Douhet, who had predicted that air power could achieve strategic victory on its own. Some historians contend that air forces failed to keep up doctrinally, tactically and organisationally as technology evolved – and did not catch up until mid-way through World War II. In short, air forces of the period had brand new toys but, as yet, lacked the instructions to use them most effectively.

Influential Leaders

The work of influential leaders in air services and governments also was significant, though a lack of funding, technology and incongruence with national strategic priorities relegated the famous air power prophets, such as Douhet, the American Billy Mitchell and the RAF's Hugh Trenchard, to having much less of an impact on reality than their prominence in the historical literature might suggest.

Influence of the Great War

With few exceptions, the 1914-18 air war was one waged in support of surface operations; in 1914 all the belligerents' air services were part of their armies and navies and only in April 1918 did the British form the world's first independent air service, the RAF. The Great War also marked the beginnings of strategic air power. Germany's bombing of Britain, first with Zeppelins and later multi-engined bombers, played a significant role in the British government's decision to establish a separate air service capable of projecting force independently of sea and land operations.

The experiences of 1914-18 cast a long shadow over the air forces of the inter-war decades. Overy (1987: 5) contends that air power's evolution was fixed firmly in an understanding of what aviation had demonstrated itself capable of in the Great War. In many ways, the air forces of the inter-war decades prepared to fight the last war over again.

Inter-service Rivalry

RAF leaders cherry-picked lessons from the recent past that best suited their present aspirations to keep control of air assets away from the army and navy, arguing that the campaigns of 1918 had demonstrated the need for air assets to be centralised and to remain under air force command and control. At the same time, they relegated army co-operation to a low priority, despite having excelled at it in 1918.

Following the British lead, the Italians and Germans established independent air forces, but whereas Germany's Luftwaffe enjoyed a productive working relationship with the army, developing effective doctrine for joint operations, the RAF's bitter rivalry with its sister services hindered its development of operational air power.

In other parts of the world, the army and navy maintained their own aviation arms, although this did not guarantee effective co-operation between air and ground forces either. The US Army Air Corps (USAAC) developed strategic bombing and relegated air support to the fringes. Any air support thinking was in the context of the need to repel a seaborne invasion of the US, not in supporting an expeditionary force. This is an example of national strategy – isolationism in this instance – exerting a stronger influence on the development of an air force than theory or even the service's integration with the army.

Operational Experience

Between 1919 and 1939, air forces were involved in asymmetric wars and conventional conflicts. The most important asymmetric wars were the RAF's experiences in the Middle East and Iraq, where it used 'air control' methods to suppress rebellion; the Spanish and French campaigns against the Moroccan Berbers in the mountainous Rif region; and the US Marine Corps' effective use of air power in Nicaragua.

European and Japanese air services also participated in conventional warfare, most notably through the Italian conquest of Ethiopia in 1935; the Spanish Civil War between 1936 and 1939, to which the German, Italian, Soviet and French governments contributed aviation units; and the Japanese invasion of China, which began in 1937. Finally, beginning shortly after Nazi Germany attacked Poland in 1939 and lasting three months was the Soviet Union's 'Winter War', in which it unsuccessfully attempted to annex Finland.

Air Power's Roles

By 1939, it had been established in both theory and practice that air power could play a decisive role strategically and operationally in conventional warfare and also in asymmetric conflict. We will now consider strategic air power – essentially long-range strategic bombing.

Strategic Bombing

As an idea, strategic bombing predated the Great War and, indeed, even the invention of powered flight. In the late 19th and early 20th centuries, writers of speculative science fiction such as Jules Verne and H. G. Wells imagined aircraft devastating civilian populations and bringing down governments without the intervention of armies and navies. With slightly more restrained imaginations, military theorists of the day predicted the significant impact aeroplanes would have on warfare and acknowledged the strategic role they might play. Notably in Britain, the government's decision to invest in military aviation before 1914 stemmed from the threat Germany's Zeppelin fleet posed to the British homeland.

In some respects, the Great War validated these forecasts of strategic air power. As the British had anticipated, German airships attacked targets in the United Kingdom in a campaign that began in early 1915 and extended into the war's final year. Zeppelins shouldered the burden of raids in 1915 and 1916,

but the Germans switched to twin-engined bombers in 1917. The Allies were slower to engage in a concerted strategic bombing campaign, only establishing an independent air force in late 1917 to attack industrial targets in Germany. It was only really just getting started when the war ended.

Strategic bombing had not produced the cataclysmic results forecast before the war. Losses to both German and Allied bomber forces had been heavy and the technical difficulties manifest; finding long range targets proved hard enough, while reliably and accurately hitting them outstripped the technical capabilities of the day. In four years, the Germans only managed to drop 300 tons of bombs on Britain. This killed 1400 people and caused less damage, in pounds sterling, than rats inflicted on public buildings during the war years (indeed one wonders if the War Office might have been better to invest in cats than anti-aircraft guns). A post-war British survey of targets in Germany likewise revealed disappointing results. The best that could be said was that bombing had affected morale though this, of course, was difficult to quantify.

Nevertheless, all major powers' air forces came to develop a doctrine for long-range bombing and most entered World War II with some capability to attack strategic targets by air. The idea, however, had the greatest impact on the RAF and USAAC – a result of Britain's and the US's geographic isolation, their isolationist and deterrence-focused strategies, and the pressure aviation leaders felt to emphasise a distinct role for air power in the face of inter-service rivalry. The RAF and USAAC would start World War II poised to fight a strategic air offensive that would involve first achieving air superiority and then bombing targets believed crucial to the enemy state's capacity to wage war: its economy, industry and the morale of its civilian population. That is not to say British and American airmen neglected other air power roles entirely – or indeed, that they were even well equipped for strategic bombing (they were not). It is just that they focused on strategic air power and expected to employ their forces that way.

Target: Precision Bombing of Critical Nodes

Despite their shared emphasis on strategic bombing, American and British air leaders did diverge on the question of which targets to prioritise. In the USAAC, the idea of precision bombing predominated, underwritten by the remarkably accurate Norden bombsight introduced in 1931 and the 'industrial web' theory. The latter posited that highly complex modern industrial states had weak points, or nodes, that, if destroyed, could precipitate an economic collapse that would render an enemy nation incapable of sustaining further military operations. When the US went to war in 1941, Army Air Corps doctrine identified Germany's rail system and power grid as the critical nodes on which the Nazi state's war industry and, to a large extent, the comfort of its citizens, depended.

Target: Enemy Morale

In contrast, RAF thinking reflected a traditional British Army emphasis on the importance of morale. Throughout the Great War, British air policy, based on the notion that aircraft were inherently offensive weapons, had been underpinned by the notion that air power posed a far greater threat to morale than it did to matériel. Indeed, by 1921, the RAF's chief, Sir Hugh Trenchard, declared the psychological impact of bombing to be 20 times that of what it could achieve against buildings and infrastructure. By implication, this meant that strategic bombing represented a means by which Britain could deter continental adversaries and, if necessary, employ force against them. At the same time, however, it presented Britain with a new and dangerous threat – enemy strategic bombing of British cities:

> "Unless we can put up an adequate air defence we must be prepared for the dislocation of national life to a degree unthought of in the past … The Navy and the Army cannot materially assist us to face this attack, and no improvements in guns or other passive defences will assist our security. In attack is our best defence, and we must have powerful air squadrons to carry the war into the enemy's country, to attack his forces in the air and his personnel and establishments on the ground, and thus establish our aerial superiority." (Trenchard, quoted by Harvey 2008: 470)

It was on this appreciation of the importance of offensive strategic air power that the RAF justified its existence independent of the army and navy in the 1920s. The perceived psychological benefits of bombing, along with the RAF's lack of a precision targeting capability, provided the foundations of Bomber Command's controversial area bombing policy, in which workers and not their workplaces were the primary targets. British plans to target German civilian morale pre-dated the invasion of France in 1940. By March 1942, this had evolved into a target list of 58 German cities with populations over 100,000, whom the RAF hoped to de-house and terrorise over the following six months.

In spite of Trenchard's rather traditionally British axiom that 'attack represents the best defence', and his scepticism that fighters could stop bombers from getting through to their targets, the RAF did anticipate the need to defend British skies from an enemy bombing offensive. Some on Trenchard's staff asserted that fighters, assisted by radio and sound locators, could inflict losses of a serious enough nature on a bomber force to, over time, dissuade an enemy from using them to attack Britain. From 1923, the RAF was to have a home defence air force – later re-organised as Fighter Command – comprising a third of the RAF's fighting strength. This target was not met during the inter-war years but, nevertheless, between 1926 and 1939, home defence fighter units made up 20 per cent of the RAF's strength and represented its second largest component. Fortunately for the British people, in the 15 years leading up to 1940, the Air Ministry treated home defence seriously and invested in it relatively generously.

A legitimate criticism, however, can be made of the lack of attention that both US and British air leaders gave to the technical and tactical aspects that their respective doctrines required. By 1939, the grand concepts of strategic bombing stood on foundations sparse with

detail; the goal was clear but the means of achieving it was not. In the RAF, thinking about strategic bombing characteristically rested on the assumption that that the ability to drop bombs on long distance targets was enough to deter war, or, if that failed, to secure decisive victory with minimal commitment of land forces. As Ferris (Gray and Cox 2002: 25) puts it: "The need for detailed planning was sapped by the concept that bombing would win quickly and through metaphysical means, by wrecking the 'morale' of a 'nation'". Tight defence budgets, small, insular air services that encouraged group-think, and short-sighted national strategies all contributed to this failing. Less explicable is the American and British air leaders' failure to learn from the examples of strategic bombing that occurred in the 1920s and 30s.

Target: Morale – Experience in Conflicts between the Wars

European air forces targeted civilians during the asymmetric wars that they fought in Africa and the Middle East between 1919 and 1939. These were campaigns that saw force employed against native populations with little restraint, and in which European airmen had undisputed air supremacy. Despite these ostensibly ideal conditions for strategic bombing to demonstrate its potential, the results typically failed to live up to expectations. The Spanish, in 1924 during their conquest of Morocco, in five months their airmen dropped 24,000 gas and fragmentation bombs, deliberately targeting villages, crops and marketplaces. Contemporary observers noted with awe the ability of the native population to emerge from these raids with the will to continue resisting Spanish occupation. It took 300,000 Spanish troops to defeat the 20,000 Moroccan insurgents. Likewise, in 1926, the RAF bombarded the city of Slemani, centre of a Kurdish nationalist insurgency, for seven months without any discernible impact. The British only restored order with the intervention of land forces.

Larger conflicts too, during the late 1930s, called into question the faith that US and British air staff had in strategic air power. The Spanish Civil War, the Second-Sino Japanese War and the Soviet invasion of Finland all featured strategic bombing to an historically un-precedented extent. In all cases – including the infamous devastation of Guernica (Basque region of Spain) by 100 German and Italian bombers in April 1937 – attacking civilians contributed little, if anything, to a conflict's outcome. Rather, operational success on the battlefield exerted the greatest influence. Indeed, some observers even pointed to the manner in which the Japanese bombing of cities such as Nanjing increased the resolve of enemy civilians.

The Soviets probably started World War II with the clearest indication that strategic bombing could not, in itself, prove decisive. During their 1939 invasion of Finland – the 'Winter War' – the Soviet air force's 2000 aircraft faced just 200 Finnish aircraft. With impunity, the Soviets attacked some 2075 civilian targets in three months, destroying 2000 buildings and damaging 5000 others, but only killing 650 civilians – that is, six per day throughout the campaign. Finnish industry lost only 5 per cent of man-hours – hardly the 'dislocation of national life' that Trenchard had forecast in the early 1920s.

Conclusion

Between the wars, air power theory and practice were greatly influenced by Great War and subsequent operational experiences and evolved differentially among nation-states within constraints of funding, perceived strategic threats, consequent national strategies, technological advances and limitations, leadership both military and political, and inter-service rivalry.

British and the United States theorists, in particular, championed long-range strategic bombing, either by precision bombing of critical nodes (US) or targeting enemy morale (Britain). Strategic bombing of enemy populations was employed in colonial conflicts by Britain and Spain and by various European and Asian powers in limited conventional wars. German, Soviet, Italian and French air leaders emerged from these wars of the late 1930s resolved to focus on the development of air power's army support role. Meanwhile the Americans and British largely disregarded strategic bombing's apparent limitations and continued to prepare to fight a strategic air offensive.

The Author: Dr Michael Molkentin is an experienced secondary school history teacher, now teaching at Shellharbour Anglican College, and an adjunct lecturer at the University of New South Wales Canberra. He researches the history of armed conflict, especially where it concerns Australia and the other British settler societies. He is particularly interested in aviation and air power. The author of three books on military history (Molkentin 2010, 2012, 2014), he has a PhD in history from the University of New South Wales. The Australian War Memorial awarded his doctoral research the 2013-14 Bryan Gandevia Prize for Military-Medical History. [Photo of Dr Molkentin: Colonel J. M. Hutcheson, MC]

References and Further Reading

Budiansky, Stephen (2003). *Air power from Kitty Hawk to Gulf War II: a history of the people, ideas and machines that transformed war in the century of flight* (Viking: London) pp. 184 – 218.

Buckley, John (1999). *Air power in the age of total war* (UCL Press: London) pp. 70 – 89.

Boyne, Walter J. (2003). *The influence of air power upon history* (Pelican Publishing Company: Gretna, Louisiana) pp. 169 – 192.

Cain, Anthony C. (2006). 'L'armée de l'air, 1933 – 1940: drifting towards defeat'. pp. 41 – 70 in Robin Higham and Stephen J. Harris (eds.), *Why air forces fail: the anatomy of defeat* (The University Press of Kentucky: Lexington).

Corum, James S. (1997). *The Luftwaffe: creating the operational air war, 1918-1940* (University Press of Kansas, Lawrence) pp. 182 – 223.

Corum, J. S. (1995). The Luftwaffe's army support doctrine, 1918 – 1941. *The Journal of Military History* **59** (1), 53 – 76.

Corum, James S, and Johnson, Wray. R. (2003). *Airpower in small wars: fighting terrorists and insurgents* (University Press of Kansas: Lawrence) pp. 11 – 92.

Ferris, John (2002). 'Achieving air ascendancy: challenge and response in British strategic air defence, 1915-40'. in Sebastian Cox and Peter Gray (eds.), *Air power history: turning points from Kitty Hawk to Kosovo* (Frank Cass: London).

Gray, Peter W. (2001). The myths of air control and the realities of imperial policing. *Aerospace Power Journal* **15** (3), 21 – 31.

Gray, P. W. and Cox, S. (eds.) (2002). *Air power leadership: theory and practice* (HMSO: London).

Hall, David I. (2008). *Strategy for victory: the development of British tactical air power, 1919 – 1943* (Praeger: Westport, Conn.) pp. 13 – 40.

Hallion, Richard P. (1989). *Strike from the sky: the history of battlefield air attack, 1911 – 1945* (Smithsonian Institution Press: Washington) pp. 43 –126.

Harvey, A. D. (2008). The Royal Air Force and close support, 1918-1940. *War in History* **15** (4), 462 – 486.

Horne, Paul (2010). The RAF in command: the policing of Mesopotamia from the air. *Air Power Review* **13** (2), 33 – 42.

Johnson, Wray R. (2001). Airpower and restraint in small wars: Marine Corps aviation in the Second Nicaraguan Campaign, 1927 – 33. *Aerospace Power Journal* **15** (3), 32 – 40.

McCarthy, John (2011). 'An air force fit for air displays? The RAAF 1921 – 1939'. pp. 39 – 44 in Keith Brent (ed.), *90 Years of the RAAF: Proceedings of the 2011 Air Power Conference* (Air Power Development Centre: Canberra).

Meilinger, Phillip S. (1997). 'Trenchard, Slessor, and the Royal Air Force doctrine before World War II'. p. 41 in Phillip S. Meilinger (ed.), *The paths of heaven: the evolution of airpower theory* (Air University Press: Maxwell Air Force Base, Montgomery, AL.).

Molkentin, Michael (2010). *Fire in the sky: the Australian Flying Corps in the First World War* (Allen & Unwin: Sydney).

Molkentin, Michael (2012). *Flying the Southern Cross: aviators Charles Ulm and Charles Kingsford Smith* (National Library of Australia: Canberra).

Molkentin, Michael (2014). *Centenary history of Australia and the Great War, Volume 1: Australia and the war in the air.* (Oxford University Press: South Melbourne).

Murray, Williamson (1980). British and German air doctrine between the wars. *Air University Review,* March-April.

Murray, Williamson, and Millett, Allan R. (1996). *Military innovation in the interwar period* (Cambridge University Press: Cambridge).

Overy, Richard (1987). *The air war 1939-1945* (Papermac: London).

Stephens, Alan (1994). 'The true believers: air power between the wars'. pp. 29 – 68 in Alan Stephens (ed.), *The war in the air 1914 – 1994* (RAAF Aerospace Centre: Fairbairn, A.C.T.).

Van Crevald, Martin (2011). *The age of airpower* (Public Affairs: New York) pp. 51 – 92.

Policy, prophecy and practice: air power between the wars

2. Air power in conventional warfare and asymmetric conflicts

A part-summary[1] of a presentation to the Institute on 16 January 2018 by

Michael Molkentin
University of New South Wales Canberra and Shellharbour Anglican College[2]

Between the Great War and World War II, air power theory and practice evolved as did aviation technology. This paper continues the review of air power between the wars, focusing on the resulting changes in the employment of air power operationally in conventional warfare and asymmetric conflict. It concludes by highlighting certain lessons learned during the period.

Key words: air power; 1919 – 1939; operational air power; close air support; asymmetric conflict.

Studying military aviation in the inter-war decades sheds light on the extent to which air power developed during the Great War and helps to contextualise what then happened in the air between 1939 and 1945. In the inter-war period, air services grappled with the challenge of integrating new technologies and developing capabilities, while facing political and fiscal pressures and commitments to the small-scale and low-intensity conflicts that charted the deterioration of international relations during the period.

Part 1 of this paper (Molkentin 2018) identified the contextual factors that influenced air forces and air power thinking in the inter-war decades; and then reviewed the evolution of the theory of strategic air power and its application to the lower-level conflicts of the period.

This paper reviews the use of operational air power in conventional warfare and in what we now describe as asymmetric conflict. We will conclude with the identification and evaluation of some of the lessons that air forces of the period learned – or should have learned.

Air Power in Conventional Warfare

Like those advocating strategic bombing, supporters of operational air power sought a way of avoiding the trench stalemate of 1914-18. Practically all armies of the inter-war period recognised the aeroplane's speed, range, striking power and psychological impact, though the doctrine, organisation and equipment they selected in the lead up to 1939 differed considerably, depending on the relative status air services held in their respective nations and, above all, on national strategy. Speaking generally, continental powers pursued army support aviation most earnestly in line with their anticipation of another large-scale European war. The deterrence and isolationist strategies of Britain and the United States, on the other hand, discouraged interest in operational air power.

By 1939, Germany's Luftwaffe could fairly claim to be the most capable air force in the world when it came to supporting army operations. This was not the result of better technology or a late, hurried foray into the subject of army co-operation but, rather, a genuine interest in the subject by both army and air force staff over two decades. The Luftwaffe's capacity to work closely with the army was enabled by the close cultural association the two services had; in the 1920s Germany's small army had responsibility for aviation and, when the Luftwaffe formed in 1935, it contained a high proportion of officers from an army background. Further, unlike their British counterparts, Germany's airmen did not feel their independence threatened owing to the political authority held by its chief, Hermann Goering, and the pride of place aviation had in Nazi propaganda and attempts to intimidate the rest of Europe. Indeed, Europe's other two authoritarian regimes – Italy and the Soviet Union – also upheld aviation as emblematic of national strength and prioritised its funding accordingly.

Upon the establishment of the Luftwaffe in 1935, the force's foundational doctrine listed gaining air superiority as top priority, followed by direct support of the army. The Luftwaffe also possessed a strategic bombing capability, but did not consider bombing cites the best employment of air assets. Rather, its doctrine was based on the classical European conception of war that, as the will of

[1] 'Part 1: Strategic air power' was published in *United Service* **69** (2, June), 21 – 25.

[2] E-mail: mail@michaelmolkentin.com
Website: https://www.michaelmolkentin.com.

the nation is 'most strongly embodied in its armed forces', victory and defeat would be decided on the battlefield. By 1939, having had valuable experience during the Spanish Civil War, the Luftwaffe possessed a command and control system that maintained air assets under a centralised air force command, but also enabled close integration with army operations. It also had formed a specialist close air support formation and a logistical capability for maintaining squadrons close to the front during a rapid advance.

Likewise, the Soviet, Italian and French air services emphasised combined operations in the lead up to World War II, especially close air support. By 1939, all three air forces possessed specialist army support squadrons, purpose-designed battlefield attack aircraft and command and control arrangements to integrate air and ground operations. Like the Luftwaffe, they had operational experience in Spain, and, in Italy's case, its invasion of Ethiopia, where Italian army staff noted the way in which aircraft added vital impetus to ground operations and maintained pressure on Ethiopian forces that disengaged and attempted to withdraw. In Spain, despite the worldwide attention accorded to bombing cities, battlefield support emerged as aviation's predominant role. During the war's climactic Ebro River campaign in 1938, some 80 – 85 per cent of Nationalist air sorties supported ground forces. Indeed, during one week in August, Nationalist airmen dropped an average of 10,000 bombs per day, with bomb tonnage approximating the weight of shells fired by Nationalist artillery. Aircraft also demonstrated their flexibility and versatility, swiftly switching between mission types as operations required.

Aircraft for Delivering Operational Air Power

Operational air power nonetheless posed a number of theoretical and practical questions, some of which European air forces failed to resolve before World War II. Unlike aviation's other roles, close air support had emerged late in the Great War and, by the Armistice, few clear and indisputable principles regarding its employment had emerged. Questions remained, in particular, regarding the type of aeroplanes best suited for co-operating with ground forces, the most suitable targets for ground attack sorties and the most effective command and control arrangements.

Regarding aircraft types, two schools of thought had emerged during the Great War. The Germans conceived ground attack as a distinct and specialist role, and, accordingly, designed armoured aircraft to equip dedicated 'battle flights'. The British on the other hand, eschewed specialisation, opting instead to train all fighter pilots in ground attack and employ them in this role as necessary. During the inter-war years, the debate between these approaches continued in air forces around the globe. Generally speaking, advocates of direct or close air support, controlled by the army, wanted specially-trained pilots flying armoured aircraft. Air power advocates countered this by arguing that casualties would be prohibitive among these units given their vulnerability in air-to-air combat and that they were inefficient, being unsuited to any other role. The American, Soviet and Italian air services all developed specialist close air support aircraft during World War II. The Luftwaffe experimented with them, but largely opted for more versatile aircraft. As during the Great War, the RAF rejected specialist ground attack aircraft, deciding to trust this to its fighters and strategic bombers.

Time would prove German and British thinking to be right. The specialised, armoured attack aircraft of continental air forces proved too vulnerable to enemy fighters to operate in anything less than complete air supremacy – a very rare condition. The Americans largely abandoned their specialist close air support aircraft before the war, while German and Italian air forces withdrew theirs following huge losses in the initial campaigns. The Russians kept the IL2 Sturmovik in service and, while it proved effective in the role, it provided an easy kill for the Luftwaffe's fighter pilots: some 12,000 were lost on operations. World War II would see the fighter emerge as the most capable vehicle of close air support. Practically all the classic fighters of the era – the Hurricane, Spitfire, Mustang, Messerschmitt 109 – were conceived as air superiority fighters and interceptors, but proved highly capable in attacking ground targets during the war. Since World War II, "virtually every fighter designed to undertake air-to-air combat has subsequently been modified to undertake ground-attack duties as well" (Hallion 1989: 50).

Operational Air Power Targets

The debate over equipment was part of a broader doctrinal issue regarding the targets against which army co-operation sorties should be directed. By the end of the Great War, a distinction was emerging between attacks on enemy forces engaged on the battlefield and targets behind the lines such as transport, headquarters and supply dumps. During the 1920s and 1930s, most air forces, including the RAF, Luftwaffe and Soviet Air Force, emphasised the latter, arguing that air strikes caused the greatest dislocation to an army's performance when directed at its logistical and support branches and that aircraft attacking these would be exposed to less danger than directly above the battlefield. From this emerged doctrinal and organisational variations regarding the manner in which air forces planned to support their armies. The RAF, for example, completely rejected close air support, arguing that the 'true function' of its aircraft when supporting an army, was to attack targets well behind the battlefield to interdict lines of reinforcement and communications. Only in 'exceptional circumstances' were aircraft to operate over the battlefield itself. The Luftwaffe, on the other hand, adopted a more flexible approach; especially after their experiences in Spain underlined the powerful combination of aircraft and armour. German airmen entered World War II willing and able to support troops directly and switch to interdiction sorties, and even strategic bombing, as required.

Command and Control of Operational Air Power

The third debate characterising the development of operational air power during the inter-war years concerned command and control. Essentially, the dilemma was that centralised command allowed for concentration of force at the most critical point of operations, whereas diffused control of air assets improved the chances of air support intervening promptly and in the right spot. Army commanders, in general, wanted aircraft under their command so that they could employ them in direct support of their troops when and where required. Air staff countered by claiming that this would squander air power's inherent advantages of speed, flexibility and versatility and would also lead to a neglect of air superiority – the prerequisite of effective ground support.

The Soviet and French air forces opted for a decentralised model of command and control, parcelling off aviation units to various army commands. One historian describes how the French army deployed aeroplanes like tanks or artillery and primarily used them in a defensive posture to protect ground forces. Fearing the loss of initiative and sacrifice of air power's unique capabilities this represented, the RAF refused army demands to place aviation units under its command, agreeing instead to a system of liaison to provide the army with assistance as necessary. The two services, however, invested little effort into developing such a system and started World War II with little capability in air-ground co-operation. An Army Co-operation Command was not added to the RAF's structure until December 1940 – after the danger of a Nazi invasion of the British homeland had effectively passed. Had the British Army had to fight the Wehrmacht in Kent in 1940, it would have done so without a mechanism to provide effective close air support. Meanwhile, the Luftwaffe adopted something of a 'happy medium': it insisted on maintaining command and control of its air forces, but invested a lot of time into devising a system of liaison between air and army commanders and training forward air controllers to work with front-line units. This proved critical to German success in operational air power: by 1939, the Luftwaffe could reliably deliver close air support within 45 minutes of a request, whereas French and British airmen took in excess of four hours.

Air Power in Asymmetric Conflicts

The final development in air power during the inter-war years was the employment of aviation in irregular and asymmetric conflicts that, in some respects, resemble modern-day counter-insurgency campaigns. Although these conflicts saw the employment of aircraft in both strategic and operational roles, commentators at the time and since view them as a distinct context for air power.

The use of aircraft against native peoples in colonial warfare occurred before 1914 and in several instances during the Great War itself. It was only after 1918, however, that air forces seriously considered the distinct contribution aviation might make in irregular warfare. During the inter-war years, thinking on this issue was shaped by two traditional assumptions about colonial warfare: firstly, that non-Europeans only understood strong demonstrations of force; and, secondly, that aircraft would have an especially strong moral impact on native peoples who had not encountered them before.

Iraq

The punitive expedition represented the traditional method European powers used to coerce and subdue unrest in their colonies. The aeroplane proved a perfect adjunct to this approach, being capable of reaching remote areas faster, and having a greater psychological impact than mounted columns. The British Government officially embraced this concept in October 1922 when it appointed an RAF officer in charge of all air and ground forces in the mandated territory of Iraq. It withdrew a large proportion of the expensive British garrison, 'substituting' them, with eight RAF squadrons. Over the next decade, in the lead up to Iraqi independence, the RAF oversaw the policing of this turbulent territory. Aircraft participated in joint operations with ground forces – especially armoured cars – and fulfilled a broad variety of roles, including air mobility sorties to ferry troops, police and supplies to widely dispersed outposts; the evacuation of wounded troops; and the distribution of propaganda and famine relief.

Force, nevertheless, remained integral to British thinking about air power in imperial policing. As one RAF wing commander wrote in 1921, well within the tradition of the punitive expedition, air attacks must be made on the most inaccessible village of the most influential tribe. "The attack with bombs and machine guns must be relentless and unremitting and carried on continuously by day and night, on houses, inhabitants, crops and cattle … It must be made brutal to start with. The threat alone in the future will prove efficacious if the lesson is once properly learnt" (Corum and Johnson, 2003: 58). In its tactical notes on the use of aircraft in Iraq, the RAF emphasised the economy of this method, noting how in 45 minutes five aircraft could flatten a village, killing or injuring a third of its inhabitants. Hence, the two doctrinal pillars of British air control were lethality and economy – or maximum impact for minimum cost; a notion compatible with the 1920s politics of defence austerity.

Indeed, the so-called 'air control' experiment in Iraq proved economically successful, reducing British expenditure on its garrison by 75 per cent during the 1920s. It, along with strategic air defence, also justified the RAF's existence during the early 1920s when army and navy chiefs were pressing for its re-incorporation in their services. Contrary to the popular image, however, the RAF did not quell unrest in Mesopotamia alone. Over the long term, aircraft permitted the army to reduce its presence in country. The four major rebellions that occurred during the British mandate, however, required the deployment of large forces to restore British control. Alone, air power only exerted adequate influence in the most minor and isolated deviations from submission to British authority such as tax evasion or banditry.

North Africa

The Italian, Spanish and French had broadly similar experiences of using air power in asymmetric wars in North Africa during the inter-war decades. Despite ruthlessly employing aircraft against indigenous resistance – including the use of gas by Italian airmen – aviation failed to exert decisive strategic leverage. It did, however, make a considerable contribution to joint operations by enhancing the responsiveness and firepower of infantry-based and cavalry-based forces and enhancing the mobility of European armies attempting to control large territories that lacked road and rail infrastructure.

Nicaragua

It was the United States (US) Marine Corps, however, that exploited air power's application in irregular warfare to the greatest extent and devised the most sophisticated ideas for employing aviation in combat against insurgent forces.

In late 1926, the US government committed marines to Nicaragua to support a conservative government against radical oppositionist forces led by Augusto Sandino. Unlike comparable scenarios in the Middle East and North Africa, in Nicaragua the marines had to support an extant government and, hence, employ force sparingly. Although the marines' parameters for employing force loosened as the insurgency escalated, throughout the conflict they applied a notable degree of prejudice against using firepower. Marine aviators studied insurgent tactics to help distinguish them from civilians, rigorously reconnoitred targets before striking, and refrained from attacking even high value targets when civilian casualties seemed likely.

Johnson (2001) argues that the marines employed their aerial weapons with such restraint because they – in contrast to their European counterparts – had a more sophisticated understanding of counter-insurgency. Whereas the Europeans tended to see the suppression of rebellion as a military problem, the Americans had a nascent understanding of the political and social dimension of counter-insurgency – that is, the need to isolate insurgents from popular support, while cultivating the strength and legitimacy of government. Accordingly, the marines employed aviation on such political tasks as disseminating propaganda and providing logistic support to elections. On polling day in 1928 for example, at the insurgency's height, marine aircraft visited 237 towns and villages throughout Nicaragua to facilitate polling.

When they employed force, however, marine aviators had some outstanding successes. In July 1926, 400 of Sandino's guerrillas attacked the remote government outpost at Ocotal, garrisoned by fewer than 100 marines. An aerial patrol first identified the rebel attack and, with the nearest ground forces six days away, five marine aircraft provided the only immediate support. Making the 320km return flight from their aerodrome at the capital, the five available marine aircraft attacked and drove off the insurgents besieging Ocatal. Hallion (1989) describes the marine garrison at Ocotal as the "first American unit that is known to have survived a ground assault by vastly superior forces thanks to aerial intervention". In another striking example of the success of air intervention in support of ground forces, in January 1928, Sandino forces ambushed a marine force at Quilali, a deep valley in the country's remote north. Marine airmen dropped supplies to the besieged column, including land clearing tools and instructions to prepare an airstrip in the jungle. Once able to land, marine aircraft evacuated wounded troops and, afterwards, escorted the US column out of the valley, driving off ambush parties on three occasions.

Following the destruction of Sandino's stronghold by US aircraft in November 1927, the rebels dispersed. Throughout the pacification campaign that followed, aircraft supported marine patrols as they worked their way into the rugged Nicaraguan interior and established widely dispersed outposts. This task was aided by the arrival of five Fokker Tri-Motor Transports, which could carry a load of passengers or supplies between the capital and Ocatal in two hours – a 10-day journey overland. In their first six weeks, the Marine Corps' first tri-motor carried 12 tons of supplies and 204 passengers around the countryside. When, in late 1931, unrest flared up in the country's western provinces, threatening to overwhelm government forces, the marine transport squadron rapidly deployed reinforcements who successfully suppressed the guerrillas.

Application of Asymmetric Conflict Experience

For all the rich and diverse experience that western militaries had in asymmetric conflict between the wars, they applied little to the doctrine and organisation of their air forces. As the 1930s progressed, national strategies focused less on the imperial fringes and more on the European and Asian centres in which rivals of comparable strength seemed increasingly likely to clash. Even the US Marines, after producing the world's first dedicated counter-insurgency doctrine, switched to a focus on supporting amphibious landings. Indeed, the experience of irregular warfare in the 1920s and 1930s would have little apparent practical value until the Cold War. Although we need to be careful about applying direct and specific lessons from operations in the 1920s to contemporary thinking, the asymmetric conflicts of the inter-war era indicate a number of important principles that airmen and soldiers would do well to consider. The essays in Corum and Johnson (2003) are highly recommended, as is Gray's work on British air control (Gray 2001) and the Marine Corps' operations manual (USMC 1935).

Lessons Identified

So, what are the lessons we can identify from the development of air power theory and air forces in the twenty years between the world wars? I will propose three, leaving the reader to reflect on others.

Avoid cherry picking lessons: Ironically, the first lesson identified is that services need to take great care when drawing lessons from operational experience. An

intriguing aspect of the period is the manner in which well-informed and intelligent defence professionals could draw contradictory lessons from the same experience and how they sometimes used good data to develop deeply-flawed conclusions. Observers tended to take away from operations what they wanted to believe. Air forces such as the RAF and United States Army Air Corps that had invested in a core capability of strategic air power, for example, largely ignored the underwhelming impact strategic bombing had had on the outcome of the Spanish Civil War. At the same time, American and British air leaders selectively – though correctly – used examples from Spain to justify maintaining centralised command of air assets and keeping aircraft from army command and control. The lesson seems to be that cherry picking lessons encourages institutional parochialism and passes up the rare opportunities organisations have to glimpse themselves in a critical light. To appropriate the historian E. H. Carr's axiom: the facts don't speak for themselves: they only speak when someone calls on them to make a particular point (Carr 1961: 5). The process of identifying lessons is not simply gathering facts; it is an interpretive, and hence highly subjective, process subject to personal or institutional biases and agendas.

Joint operations: The second lesson is that, as in the Great War, during the 1920s and 1930s, air power proved most effective, both in conventional and irregular warfare, when employed in joint operations. This should not be read as 'under army control'; indeed, one of the resounding lessons of the period and the world war that followed was, in my view, that centralised command and control of aviation exploited its unique capabilities to the greatest extent. These include air power's mobility and its capacity for rapid concentration and delivery of firepower at a decisive point, as well as its inherent flexibility and versatility; or in other words the diverse range of operationally-useful tasks aircraft can conduct and their ability to promptly switch between them. In theatres as diverse as Spain, Nicaragua, Ethiopia, Iraq and China, air power proved not the decisive weapon proclaimed by strategic bombing advocates, but a component of combined operations that enhanced the capabilities of other arms on the battlefield. The successful employment of centralised control of air assets in a large and complex war is a challenge that remains for air forces today: the US Air Force's doctrine of 'centralised control/ decentralised execution' attempts to grapple with this issue and negotiate the fine and often indistinct line between the advantages of having air assets grouped under a single command and having them available to meet the needs of the army's lower levels of command.

Inter-service co-operation: Thirdly, the inter-war years seem to suggest the importance of co-operation at the institutional level between air forces and armies – in the development of joint doctrine; the research, development and procurement of equipment; and the working out of command and control arrangements for integrating aviation into operations carried out to support national strategy and policy. Here, the RAF and British Army represent a case study of what not to do: the unco-operative relationship between the two services after they had worked so effectively together in the Great War restricted the capabilities of British forces in 1939. In contrast, the Luftwaffe's productive relationship with the army saw a far more efficient working of air and land power emerge – one indeed, in which air units had the capability and flexibility for supporting troops with reasonably reliable combat air support and interdiction, while also being available to, under centralised command, fight for air superiority and, if necessary, conduct a strategic bombing campaign.

Conclusion

The inter-war decades of the 1920s and 1930s saw the development, at times rapid, of air power theory and aircraft, and the gaining of valuable operational experience through several small conventional wars and asymmetric conflicts. Valuable lessons emerged, but these were not necessarily identified correctly, leading to the need to re-learn the lessons in World War II and later conflicts.

The Author: Dr Michael Molkentin is an experienced secondary school history teacher, now teaching at Shellharbour Anglican College, and an adjunct lecturer at the University of New South Wales Canberra. He researches the history of armed conflict, especially where it concerns Australia and the other British settler societies. He is particularly interested in aviation and air power and is the author of three books on military history. [Photo of Dr Molkentin: Colonel J. M. Hutcheson, MC]

References and Further Reading

Budiansky, Stephen (2003). *Air power from Kitty Hawk to Gulf War II: a history of the people, ideas and machines that transformed war in the century of flight* (Viking: London) pp. 184 – 218.

Buckley, John (1999). *Air power in the age of total war* (UCL Press: London) pp. 70 – 89.

Boyne, Walter J. (2003). *The influence of air power upon history* (Pelican Publishing Company: Gretna, Louisiana) pp. 169 – 192.

Cain, Anthony C. (2006). 'L'armée de l'air, 1933 – 1940: drifting towards defeat'. pp. 41 – 70 in Robin Higham and Stephen J. Harris (eds.), *Why air forces fail: the anatomy of defeat* (The University Press of Kentucky: Lexington).

Carr, E. H. (1961). *What is history? The George Macaulay Trevelyan lectures delivered at the University of Cambridge, January-March 1961* (Cambridge University Press: Cambridge).

Corum, James S. (1997). *The Luftwaffe: creating the operational air war, 1918-1940* (University Press of Kansas, Lawrence) pp. 182 – 223.

Corum, J. S. (1995). The Luftwaffe's army support doctrine, 1918 – 1941. *The Journal of Military History* **59** (1), 53 – 76.

Corum, James S, and Johnson, Wray. R. (2003). *Airpower in small wars: fighting terrorists and insurgents* (University Press of Kansas: Lawrence) pp. 11 – 92.

Ferris, John (2002). 'Achieving air ascendancy: challenge and response in British strategic air defence, 1915-40'. in Sebastian Cox and Peter Gray (eds.), *Air power history: turning points from Kitty Hawk to Kosovo* (Frank Cass: London).

Gray, Peter W. (2001). The myths of air control and the realities of imperial policing. *Aerospace Power Journal* **15** (3), 21 – 31.

Hall, David I. (2008). *Strategy for victory: the development of British tactical air power, 1919 – 1943* (Praeger: Westport, Conn.) pp. 13 – 40.

Hallion, Richard P. (1989). *Strike from the sky: the history of battlefield air attack, 1911 – 1945* (Smithsonian Institution Press: Washington) pp. 43 – 126.

Harvey, A. D. (2008). The Royal Air Force and close support, 1918-1940. *War in History* **15**, (4), 462 – 468.

Horne, Paul (2010). The RAF in command: the policing of Mesopotamia from the air. *Air Power Review* **13** (2), 33 – 42.

Johnson, Wray R. (2001). Airpower and restraint in small wars: Marine Corps aviation in the Second Nicaraguan Campaign, 1927 – 33. *Aerospace Power Journal* **15** (3), 32 – 40.

Meilinger, Phillip S. (1997). 'Trenchard, Slessor, and the Royal Air Force doctrine before World War II'. p. 41 in Phillip S. Meilinger (ed.), *The paths of heaven: the evolution of airpower theory* (Air University Press: Maxwell Air Force Base, Montgomery, AL.).

Molkentin, Michael (2018). Policy, prophecy and practice: air power between the wars 1. Strategic air power. *United Service* **69** (2), 21 – 25.

Murray, Williamson (1980). British and German air doctrine between the wars. *Air University Review*, March-April.

Murray, Williamson, and Millett, Allan R. (1996). *Military innovation in the interwar period* (Cambridge University Press: Cambridge).

Overy, Richard (1987). *The air war 1939-1945* (Papermac: London).

Stephens, Alan (1994). 'The true believers: air power between the wars'. pp. 29 – 68 in Alan Stephens (ed.), *The war in the air 1914 – 1994* (RAAF Aerospace Centre: Fairbairn, A.C.T.).

USMC (1935). *Small wars operations manual* (United States Marine Corps: Quantico, VA).

Van Crevald, Martin (2011). *The age of airpower* (Public Affairs: New York) pp. 51 – 92.