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Aerial Warfare: The Battle for the Skies by Frank Ledwidge.

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Modern warfare relies on technological sophistication, particularly in the realm of air power, more than historical experience or cultural knowledge. In *Aerial Warfare*, military historian Frank Ledwidge[1] (Royal Air Force College) traces the introduction and evolution of military aircraft and the strategic-political uses to which decision-makers and theorists have put them to gain air superiority.

From the advent of the biplane in 1903 through the development of present-day remotely piloted aircraft, aerial warfare has centered, Ledwidge argues, on three essentials: reconnaissance, attack, and mobility, regardless of changing technology and terminology (1, 169). The book's nine chapters emphasize (a) the beginning of airpower in World War I and the interwar years (chaps. 1–3), (b) World War II (chaps. 4–5), and (c) the Cold War/Post-Cold War world up to 2018 (chaps. 6–8).

Chapter 9 addresses the implications of twenty-first-century technology, including cyberspace, for an information-driven world comprised of non-state actors. In the case of cyberwarfare, the author finds the same stress—in a new environment—on reconnaissance, attack, and mobility as in more conventional air war. He concludes that actors without access to the machinery needed to conduct aerial warfare can, nonetheless, cause great harm through the use of computers. His excursion into the cyber realm is insightful and usefully prompts reflection on the links between air power theory and the new realm of information warfare.

While his work centers on Europe and the United States, the author also considers the global aspects of airpower and the influence that minor state actors have wielded through its use. Specifically, he adduces strategic bombing raids in Spain and China in the 1930s (56–59) and the role of airpower in the post-World War II wars of national liberation (113–16) in Algeria, Angola, Mozambique, Rhodesia, and Zimbabwe.

Chapters 1–3 highlight the contributions of early pilots like Oswald Boelcke, Manfred von Richthofen, Hugh Trenchard, Billy Mitchell, and Giulio Douhet, to name a few. Chapters 4–5 concern the Air Corps Tactical School, Russian Marshal Alexander Novikov, Air Chief Marshals Sir Arthur Tedder and Arthur "Bomber" Harris, the Dowding system, and Jimmy Doolittle. Chapters 6–8 focus on the influence John Boyd and John Warden had on modern air combat and planning. Throughout, Ledwidge shows a full conversance with the relevant work of scholars like Mark Clodfelter, Eliezer Cohen, Richard Overy, and David Deptula.

Ledwidge argues that reconnaissance, attack, and mobility have always been the backbone of aerial warfare by analyzing the foundations and use of airpower in World War I. He identifies the

1. Ledwidge holds a law degree from Oxford University and a doctorate in war studies from Kings College London; his other works include *Investment in Blood: The True Cost of Britain's Afghan War* (New Haven: Yale U Pr, 2013), *Losing Small Wars: British Military Failure in the 9/11 Wars*, 2nd ed. (id., 2017), and *Rebel Law: Insurgents, Courts and Justice in Modern Conflict* (London: Hurst, 2017).

first strategic application of airpower in the French use of observation aircraft to spot the German army outside of Paris, which led directly to the "miracle at the Marne" (24). Aircraft were quickly adapted for use in attacks as well as reconnaissance; Ledwidge cites the "Dicta Boelcke"—fundamental maneuvers of aerial combat formulated by German flying ace, Oswald Boelcke (31–32). He also describes the logistical application of airpower—something the United States has excelled at above all others, particularly during and after World War II. The Berlin airlift and the use of helicopters in Vietnam were examples of the phenomenal mobility made possible by US air resources. On the use of helicopters, Ledwidge writes that

> Conceptually, Vietnam represented the nadir of airpower thinking. At a loss to understand what to do in the face of an extremely resilient adversary, and without any effective strategic theory to deal with it, the air arms of the US defaulted to what their aircraft and politicians allowed them to do. Further, Vietnam presented a fundamental challenge to the idea that air power could win wars. The division into tactical and strategic applications was ossified. Post-Vietnam, the emphasis focused on methods of delivery, namely aircraft, rather than any constructive thinking as to how those methods might be deployed. (120)

In short, airpower can do many things but not everything—a fact often lost sight of in a modern age that exalts technology above strategy.

The final three chapters demonstrate that airpower alone cannot win wars: the first Gulf War in 1991, the Balkan Wars of the 1990s, and the post-9/11 conflicts have proven that carefully coordinated joint operations are essential to successfully implement any grand strategy. Political and military leaders have, Ledwidge observes, too often imagined that air power could replace direct boots-on-the-ground military intervention. He rightly stresses that even the most sophisticated precision air strikes fall prey to technological malfunctions or intelligence failures (156). Aircraft and munitions may malfunction and human planners can pick the wrong targets, with dire unintended strategic effects. In arguing that strategic targeting is paramount in aerial warfare, he highlights Pearl Harbor, Hiroshima and Nagasaki, Operation Desert Storm, and the 9/11 attacks (154).

Though specialists and scholars will be disappointed in the book's meager bibliography, students and general readers will find in *Aerial Warfare* a discerning introduction to the history of air power as an indispensable element of modern war-making. In a compelling narrative style, Frank Ledwidge clarifies the strategic, operational, and tactical levels of war from the French use of observation balloons in the eighteenth century to today's highly sophisticated fifth-generation fighter planes and remotely piloted drones. Throughout, he tracks major strategic shifts and the work of prominent theorists who have transformed how modern governments seek to make control of the air a precondition for military victory: "one thing is certain—aircraft of one kind or another will continue to be vital components of any military operation.... Airpower is critical to most if not all military operations today" (172).