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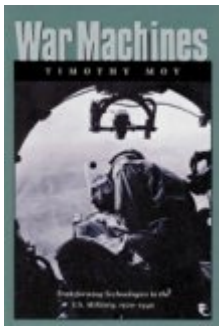
Timothy Moy. *War Machines: Transforming Technologies in the U.S. Military, 1920-1940.* College Station: Texas A&M University Press, 2001. xiv + 218 pp. $39.95, cloth, ISBN 978-1-58544-104-4.



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Of Airframes and Gung-Ho

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When the United States mobilized for World War I in 1917, it did so along a traditional, time-honored pattern of fighting war, in which technology was subordinate to doctrine. Looking back on that war from almost a hundred years, it seems that the American Expeditionary Force had more in common with the Civil War armies of Lee and Grant than with the forces that fought in Europe half a generation later (much less with the high-tech Cold War military). Something obviously had changed between the First and Second World Wars.

The research project that became *War Machines* began as an examination of Cold War technology and its influence on the military, but Moy's focus eventually shifted to the period between the World Wars. Interestingly, Moy's study of the development of technology during the interwar period looks into the doctrinal requirements of the Army Air and Marine Corps between the end of WWI and the beginning of WWII. The Air Corps is an obvious choice, since it was the most extreme proponent of the technological solution to the crushing stalemate that the First World War offered to ground forces. The Marine Corps at first seems to be an unusual juxtaposition, but Moy argues that it provides an alternative model to the Air Corps vision of high technology, one that emphasized more modest solutions to difficulties presented by doctrinal dilemmas. Moy argues that the solutions both reached were far from the only possible ones, but were shaped by shared "beliefs, habits, and practices of mind," which he defines as the institutional "culture" of each service (p. 5).

Moy's argument is neatly laid out. He explains that Air Force's beliefs emphasized science and futurism, and in doing so pushed for technology that used the most cutting edge materials and techniques in the search for a platform to carry out its chosen mission of strategic bombing. In contrast, the Marines were champions of ruggedly simple solutions to the problem of amphibious landing. Both services were struggling for legitimacy in the post WWI military, and developed missions and

technology for those missions which secured operational independence, in the case of the Air Corps, and maintained it in the case of the Marines. The struggle of the Air Corps for freedom from ground control within the Army, and later for institutional independence, is well known. The Marine Corps faced similar difficulties of redefinition, since hanging from the rigging and sweeping the decks of an opposing ship with musket fire seemed unlikely in the age of the steam-driven, steel-armored battleships. The Marines were searching for a mission in order to keep from being absorbed into the Army. This was a real danger since their fine performance as infantry in WWI suggested they were suited for land operations.

Moy notes that neither service were forced to choose the roles they did. The Air Corps had the option to pursue ground attack, and the Marines almost decided to emphasize small wars and counter-insurgency. The choices they made reflected not only military and operational factors, but also a search for missions that would justify an existence free of Army control. Close support operations seemed not to require separating air from ground commands, and counter-insurgency could be preformed under Army control. Perhaps the biggest difference between the Air Corps and Marines was the age of the service. While both services sought a secure position within the military hierarchy, the Marines had the advantage of being an old service searching for a new role. The Air Corps struggled to free what they saw as an entirely new way of fighting from the tradition-bound regular Army, while the Marines tried to avoid being absorbed into the regular ground forces. Those regular forces are the foil for both of Moy's stories, but appear only when their policy conflicts with the extreme ends of the technological innovation scale, high or low.

Another factor that both the Air and Marine Corps had in common was the influence of a particularly powerful patron, Franklin Roosevelt. The Air Corps benefited from his fascination with planes and flying, and the Marines benefited from the reserve commission given to the President's son, James Roosevelt, who was invited along on every important amphibious exercise. In any case, Roosevelt seemed fascinated with ways to avoid another stalemate like WWI, a war in which he liked to think he had participated in some way. Moy's narrative parallels nicely here; Roosevelt rescues the innovators by executive decree, and thus shapes the future of the military establishment on both extremes.

One of Moy's strengths is his ability to make complex technical issues accessible to laymen. For example, although many discussions of bomber engines mention superchargers, Moy condenses a single sentence definition of what they actually do: "blowers that compress the air before it enters the combustion chamber, thereby restoring some of the engine power lost at high altitudes" (p. 43). He has more difficulty explaining the underlying principles of the famed Norden bombsight, which in fairness is much more complex than a supercharger. Moy also mentions that the secrecy surrounding the sight, and some of the wild rumors it generated, played into achieving legitimacy in the public eye, important in a society in which civilians control military organization and funding. Although the cultural emphasis seems more important to his argument, the complexity of the technology involved forces Moy to devote more space to technical explanations than other factors. In fairness, Moy devotes more space to those cultural factors than many other historians of military and technological innovation.

There are three references to Buck Rogers in the book, and while they would have made a nice opening for a discussion of the Air Corps's futurism, Moy chooses to leave the examination of civilian faith in science and progress in the capable hands of other historians. He specifically mentions Eric Schatzberg, whose argument that the shift from wood to metal in various constructions resulted more from a perception that metal was more

"futuristic" than wood appears in each section. Although Moy feels compelled to bring up Schatzberg's theory, he does have to mention that a certain practicality lay behind the Air Corps' construction of bombers from metal. The ability of metal to resist gunfire aside, the need for streamlining in order to achieve greater speeds was a reason less influenced by futuristic beliefs, than by the somewhat obvious institutional conviction that speed was useful in combat (which is not always true; the most successful ground attack planes do not require great speed, and even seem hampered by too much). The Marines' agreement with Andrew Jackson Higgins that his landing craft should be constructed out of wood fits neatly with Moy's image of the Marines, and while his reason for their acceptance seems valid, the reason he gives for Higgins's insistence involves the boat builder's stake in the lumber business rather than a "low-tech" worldview. The whole argument would have been strengthened by an expanded discussion of the civilian world, and the parallel faith in science to solve the world's problems. One of his references to Buck Rogers underscores this point; while "every boy" may have known that the futuristic character was an Air Service pilot in WWI, his contemporary readers may need reacquainting with the wider context of American culture in the first half of the twentieth century.

Moy's discussion of institutional culture leads him to examine how it is passed on to new members, and here he focuses (rightly, this reviewer suspects) on the schools operated by both services, and their role in transmitting beliefs and values. While the schools were undoubtedly important, one must also wonder, especially in the case of the Air Corps, what role self-selection played in peacetime. Futurism and faith in science and technology to solve problems were not unique to the prophets of air power. In a volunteer military, few who denied the importance of technology were likely to choose the Air Corps, especially with the low pay and glacial promotion of the 1920s and 1930s military. It was then a much shorter step to the efficacy of strategic bombing, with a technological bent already assumed, than from a more "low tech" perspective.

Another factor that Moy does not build upon is the power of the concept of "scientific" knowledge in the intellectual world of the time, at least for those who were not completely involved in scientific activity. When the Air Corps Tactical School's bombardment course argued that its principles were worked out according to scientific investigation, they gained a sense of objective certainty, one that for a long time spilled over into history written about them. Although Moy's writing looks beyond that scientific certainty, in doing so he seems to minimize the strength of the Air Corps belief that it had the "truth." The corresponding section on the Marine Corps is somewhat more convincing, although it seems that the Marines were in the process of creating their distinctive features while at the same time being shaped by them.

One must wonder when the "low-tech" image of the Marine Corps, which is familiar today, initially arose. Some of the features Moy ascribes to the Marines seem applicable to any infantryman in the pre-1914 era, and he does not provide any evidence that the Marine image (or self image) did not arise at the same time as the mission he describes. Indeed, he draws heavily on secondary material written after the Second World War, when that image was firmly established, although the majority of works on the Marine Corps do date from that period, and Moy's primary material in his field is well researched. He also locates the decision to study amphibious assault in the Marine Corps in the interwar period, connected with the duty of seizing advance bases for War Plan ORANGE (p. 101). While he is correct in suggesting that the Corps' public image was not that of amphibious assault, Marine officers had been studying the problem since the Spanish-American war demonstrated it might become a necessity, although the work prior to the First World War con-

centrated more on defending bases rather than taking them from the enemy.[1] Before the development of the amphibious mission, the Marine Corps was in search of a new role, and the seizure of operating bases for the Navy was but one of many possibilities they might have pursued.

Moy is not the first to try and understand this process for the interwar period, but other works, such as Murray and Millet's ***Military Innovation in the Interwar Period*** and Winton and Mets's ***The Challenge of Change***, have focused on broader themes (both have an international focus) and more traditional ways to understand innovation. [2] He draws on narrative elements to construct an argument about factors other than the practical ones usually cited as influences on innovation. The history of technology seems to be moving in the same direction as Moy, and the result of this shift in military history is to de-emphasize the more deterministic aspects of military history, and promotes the view that there is less of an externally correct way of doing things. Moy is explicit on this point in his last chapter, where he deals briefly with the Second World War. After assessing the relative success of the two services, he notes that the war in many ways took the shape that the innovators predicted. He also cautions that their prophecies were largely self-fulfilling: "By the time the war came, The Air Corps and Marine Corps were prepared to do little else" (p. 169). Moy's strength is his emphasis upon factors that led to changes in the way parts of the American military establishment fought, and his argument that these factors are not less important or valid because they are not the traditional military ideas of combat or cost effectiveness.

Notes

[1]. Jeter A. Isely and Philip A. Crowl. ***The U.S. Marines and Amphibious Warfare: Its Theory and its Practice in the Pacific*** (Princeton, N.J.: Princeton University Press, 1951), p 21-22.

[2]. Williamson Murray and Allan R. Millet, eds. ***Military Innovation in the Interwar Period*** (Cambridge and New York: Cambridge University Press, 1996.) and Harold R. Winton and David R. Mets, eds. ***The Challenge of Change: Military Institutions and New Realities, 1918-1941*** (Lincoln: University of Nebraska, 2000). Both volumes are edited collections covering the European and American experience between the wars, with a focus on areas of innovation, such as armor and aircraft carriers, as well as from an operational standpoint.

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