German and British Adaptations and the Context of German Strategic Decision Making in 1940-41

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Historians usually characterize the Battle of Britain as a great contest between the *Luftwaffe* and RAF Fighter Command that lasted from early July 1940 through to the massive daylight bombing of London during the first two weeks of September. The RAF is slightly more generous in placing the dates for the battle as occurring between 10 July and 15 October 1940.[1] But the long and short of it is that the historical focus has emphasized the daylight, air-to-air struggle that took place over the course of three months: July, August, and September, 1940.

This article, however aims at examining adaptation over a wider space of time – from early June 1940 through to the end of May 1941, when the *Wehrmacht* turned east with Operation Barbarossa, the invasion of the Soviet Union and what the *Luftwaffe*'s chief of staff termed "a proper war."[2] It also aims at examining adaptation on both sides in the areas of technology, intelligence, operations, and tactics, rather than simply the contest between British fighters and German bombers and fighters – although the latter is obviously of considerable importance. Moreover, it will also examine the questions surrounding the larger strategic issues of German efforts to besiege the British Isles over the course of 1940 and the first half of 1941.

The period of the Anglo-German war between the fall of France and the German invasion of the Soviet Union in June 1941 is of particular interest because it involved the integration of a whole set of new technologies and concepts into conflict as well as the adaptation to a complex set of problems that those new technologies raised, the answers to which were largely ambiguous. In the largest sense, despite their technological and scientific advantages, the Germans proved less capable than the

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1 Francis K. Mason, *Battle over Britain, A History of German Air Assaults on Great Britain, 1917-1918 and July-December 1940 and of the Development of Britain's Air Defences between the World Wars* (Garden City, NY, 1969), p.

2 David Irving, *The Rise and Fall of the Luftwaffe, The Life of Field Marshal Erhard Milch* (Boston, 1973), p. 123.

British of adapting to the strategic and operational conditions that the Battle of Britain raised. And finally, this case study should be of interest because the undefinable qualities of leadership and imagination played crucial roles in determining not only the immediate outcome, but the course of the war as well.[3]

Setting the Framework for the Battle of Britain: The Initial Lessons of the War

Much to Hitler's surprise, the British and French declared war on the Third Reich two days after the German invasion of Poland. After the destruction of the Polish state, the Germans immediately turned to problem of the Western Powers. Within the first week of October, Hitler had set out his strategic goals for the German military. The Führer directed that the *Wehrmacht* was to attack the Low Countries and northwestern France before the end of the fall. The explicit goal was not only "to defeat as much as possible of the French Army and of the forces of the allies fighting on their side," but "at the same time to win as much territory as possible in Holland, Belgium, and Northern France, *to serve as a base for the successful prosecution of the air and sea war against England...*(author's italics)."[4]

Underlying Hitler's response to the strategic difficulties confronting the Reich in fall 1939 was his belief that the British would collapse. As he had announced shortly before the invasion of Poland in September 1939: "The men I met at Munich are not the kind to start a new world war."[5] And if the British had made the mistake of declaring war on the Reich in September 1939, they were certainly not capable of standing against Germany in their present circumstances. What Hitler and the other senior German leaders failed to understand was the fact that the British leadership

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[3] I am indebted to the authors of the *9/11 Report* for their emphasis on the importance of imagination or lack of imagination as the case may be in determining the failure of the bureaucratic organs of the United States government to uncover the Al Qaeda plot that resulted in the destruction of the Twin Towers and a portion of the Pentagon.

[4] H.R. Trevor-Roper, ed. *Blitzkrieg to Defeat, Hitler's War Directives* (New York, 1965), Directive, No. 6, 9.10.39, p. 13.

[5] Franz Halder, *The Halder War Diary, 1939-1942*, ed. by Charles Burddick and Hans-Adolf Jacobsen (Novato, CA, 1988), p. 23.

had, for the most part, undergone a considerable rethinking of the German danger, a rethinking that Winston Churchill's ascension to power on 10 May 1940 only strengthened. Thus, at the most important level of adaptation – namely the strategic level – not only Hitler, but his military leaders as well failed to recognize a major and crucial alteration in the strategic landscape.

Before the onset of *Fall Gelb* ("Case Yellow"), the Germans launched a major campaign against Denmark and Norway in April 1940. The former fell without serious fighting, but the latter invasion ran into serious opposition that stressed the *Kriegsmarine* to the breaking point. Much of the German destroyer force was lost at Narvik in the campaign's first days, while the cruiser force also suffered heavy losses. By the end of the campaign, the German Navy had lost virtually all of its front line strength, the fighting having reduced it to a single heavy cruiser and four destroyers.

The campaign against Allied military power in the west seemingly went more smoothly – at least on the ground.[6] The battles in the air, however, cost the Germans significant losses in pilots and aircraft, as the French Air Force, with considerable help from the RAF, inflicted serious casualties on the *Luftwaffe* in the Battle of France. By the time the campaign in the west was barely six weeks old, the *Luftwaffe* had lost 30 percent of its bomber force, 30 percent of its dive bombers, 40 percent of its transport aircraft, and nearly 20 percent of its Bf 109s.[7] Nearly 50 percent of its surviving aircraft had been damaged on active operations.[8] Even more seriously, the *Luftwaffe*'s single-engine fighter force suffered a loss of over 15 percent of its Bf 109 pilots.[9] These losses certainly explain why it took the Germans nearly a month-and-a-half after the French campaign to recover their aerial strength, and redeploy to forward bases, from whence they would launch air operations against the

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[6] The best operational history of the overall campaign in the west remains Telford Taylor's *The March of Conquest, The German Campaign in the West* (Baltimore, MD, 1991). The most recent important contribution to the literature on the defeat of the French Army and the fall of France is Karl-Heinz Frieser, *Blitzkrieg Legende, Der Westfeldzog 1940* (München, 1995).

[7] BA/MA RL 2 III/1025, gen. Qu. 6 Abt. (III A), "Front-Flugzeuge Verluste," 1940.

[8] Ibid.

[9] BA/MA, RL 2 III/707, Gen. Qu.6.Abt. (I), Übersicht über Soll, Istbestand, Einsatzbereitschaft, Verluste und Reserven der fliegende Verbände.

British Isles.

The RAF's losses were equally high. Overall the RAF lost 950 aircraft during the Battle of France, approximately 50 percent of its front-line strength on 10 May. Among the aircraft lost were 386 Hurricanes and sixty-seven Spitfires.[10] The bottom line was that the attrition on both sides of a battle that had lasted less than four weeks had been extraordinarily high in both aircraft and aircrew.

What is particularly noteworthy is a comparison of how the opposing sides evaluated the larger lessons of the air battles in France. For the British the battle represented a wake up call in terms of the production needed to support Fighter Command's front-line strength. Between May and October the factories producing fighters in the United Kingdom built an additional 692 Hurricanes and Spitfires above and beyond their expected totals.[11]

Matters were different on the European Continent. There, the mood was euphoric. The French enemy, who had thwarted the Germans for four long, terrible years in the First World War had collapsed in a matter of weeks. Quite simply the Germans believed they had won the war. The fundamental assumption that virtually all the Germans were working under was that Britain was through, and all they needed to do was persuade the recalcitrant Britishers to see the realities of the situation. There was certainly no one in Göring's *Luftwaffe* bureaucracies who recognized that major increases in the production of fighters and bombers were in order. Thus, the German high command's conception of the war and the Reich's strategic situation in summer 1940 remained befuddled both by success and a belief that the British remained the same opponent who had so cravenly surrendered at Munich.

Intelligence and Planning: Preparing for the Battle of Britain

On the 6th of June 1940 a young, twenty-eight year-old physicist by the name of R. V. Jones, at the time serving as the scientific adviser to the air ministry and staff,

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[10] Ibid., p. 100.

[11] Collier, *The Defence of the United Kingdom*, p. 121. See also Hough and Richards, *The Battle of Britain*, p. 102.

appeared before Churchill and his war cabinet to argue that the *Luftwaffe* was preparing to use radio beam technology to improve significantly the accuracy of its bombers at night and in bad weather.[12] Virtually all of Britain's scientific establishment and all the senior officers on the air staff argued that the Germans not only did not possess such technology, but that it was not even worth the effort to test Jones' hypothesis, which admittedly rested on relatively scanty evidence. Nothing underlines more the key role that individuals play in history than Jones' effort to bring this matter to the attention of those comfortable in their illusions, or Churchill's recognition that whatever the odds, the possession of such a capability by the Germans could have a disastrous impact in the case of a German strategic bombing campaign against the United Kingdom.

The prime minister asked what was to be done; Jones replied that first the existence of the beams must be confirmed and then a number of counter measures could be taken. "Churchill added his weight to [my] suggestions... adding as he angrily banged the table, 'All I get from the Air Ministry is files, files, files!'"[13] He, therefore, ordered the RAF to fly the necessary test flights at night to see whether such beams existed. That evening a British aircraft, flying a route that Jones had plotted, established the existence of *Knickebein.* A month later, emergency measures to distort or jam the German blind bombing radio beams were already in hand.[14]

Not surprisingly, Jones, himself, had a spectacular career as one of the most important intelligence analysts of the Second World War. But he was not alone. Forced by the woeful state of their intelligence services in 1939, the British had gone all out in recruiting talented individuals to work in their steadily expanding intelligence organizations. Thus, Jones was only one of a considerable number of individuals recruited from civilian life directly into British intelligence and then, if they were exceptional, given extraordinary responsibilities in analyzing the raw and ambiguous data and materials, on which good intelligence depends. Another example of how the British used individual talent to repair their weaknesses in intelligence was

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[12] For a discussion of the background of how Jones came to his conclusions on the basis of scanty evidence, see Jones, *The Wizard War,* pp. 92-100.

[13] Jones, *The Wizard War*, p. 102.

[14] Ibid, pp. 102-105.

the case of Harry Hinsley, recruited directly from Cambridge before he had even earned an undergraduate degree and given the task in September 1939 of analyzing the *Kriegsmarine*'s radio traffic.[15] Only in his early twenties, Hinsley was to play a major role in analyzing German naval moves over the course of the remainder of the war and was to set in motion the most important intelligence coup of the war.[16] It was this ability to utilize exceptional people in intelligence and fold them directly into the processes of operational decision making that was to provide the Western Allies an increasingly significant advantage against their German opponents. Beginning in mid-April 1940, Bletchley Park broke into the *Luftwaffe*'s Enigma ciphers on a wholesale basis; unknown and unrecognized by the Germans. The intelligence game had now begun to tip heavily against German military forces.

The*Luftwaffe*'s intelligence picture of early July 1940 suggests the extent of the gap between British and German intelligence. On 16 July, General "Beppo' Schmidt, the chief of *Luftwaffe* intelligence, signed out his assessment of the correlation of forces. He estimated that both the Spitfire and the Hurricane were inferior to the *Luftwaffe*'s twin-engine, long-range fighter, the Bf 110, failed to mention Britain's radar capabilities, entirely missed the nature of the air defense system, miscalculated the rate of British fighter production, and ended up on the optimistic note that "the *Luftwaffe*, unlike the RAF, will be in a position in every respect to achieve a decisive effect this year."[17] About the only thing that Schmidt and his intelligence analysts got right in their assessment was the number of Spitfires and Hurricanes that Fighter Command possessed.

Two weeks earlier Göring had signed out an operational directive that underlined the *Luftwaffe*'s operational focus as well as its doctrinal understanding of air war. In it the *Reichsmarshall* had underlined that: "As long as the enemy air force is not

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[15] David, Kahn, *Seizing the Enigma, The Race to Break the U-Boat Codes, 1939-1945* (New York, 1991), p. 121.

[16] We will discuss Hinsley's role in the breaking of the U-boat Enigma code at the end of this article. The fact that Hinsley as a twenty-year old was to become the chief intelligence analyst of the *Kriegsmarine*, while the chief analysts in today's intelligence agencies are in their fifties, suggests a great deal about what is wrong with current intelligence bureaucracies.

[17] Mason, *Battle over Britain*, Appendix K, OKL, 16.7.40, Operations Staff Ic.

destroyed, it is the basic principle of the conduct of air war to attack the enemy air units at every possible favorable opportunity – by day and night, in the air, and on the ground – without regard for other missions."[18] The destruction of the RAF would then enable wider scale attacks on British imports and supplies, as well as set the conditions for a successful invasion of the British Isles. Thus, the *Luftwaffe*'s target was not just Fighter Command, but the RAF's other commands as well. As a last possibility, "terror" attacks on British cities represented an option should the British fail to recognize their hopeless position. As Jodl suggested, the army could then launch the invasion of Britain – the final blow ("*Todesstoss*") against an already defeated country.[19]

Nevertheless, if there was a certain realism in the first directive, realism was certainly not the mark of the rest of German planning. Nowhere do German documents suggest that the limited range of the Bf-109 represented a limiting factor in the coming campaign, perhaps not surprising given the high rating given to the Bf 110. Overall assessments were that it would take the *Luftwaffe* only a few weeks to destroy Fighter Command, the front-line strength of which the Germans believed the British had deployed on forward air bases in southern England. Here *Luftwaffe* planners missed the fact that Dowding had only a portion of the command forward deployed, while back-up squadrons covered the east coast and north of the British Isles – a force that represented a major reserve to be fed into the battle to replace burned-out fighter squadrons or to reinforce the command should a landing occur.

The initial *Luftwaffe* estimates on the duration of the coming campaign were that it would take four days to defeat Fighter Command. Thereafter, four weeks would be sufficient for German bombers and long-range fighters to police up the remainder of the RAF and destroy Britain's aircraft industry.[20] On 21 July Göring further

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[18] BA/MA RL 2II/27, "Allgemeine Weisung für den Kampf der Luftwaffe gegen England," ObdL, Führungsstab Ia Nr. 5835/40, 30.6.40.

[19] Chef WFA, 30.6.40,"Die Weiterführung des Krieges England."

[20] Collier, *Defence of the United Kingdom*, p. 160. The optimistic estimates by German intelligence in 1940 would find a solid echo in 1941 when their intelligence estimates on the military capabilities of the Red Army, not to mention the productive capacity of Soviet industry, would be even more optimistic – and wrong.

explicated his conception for the campaign. Besides the RAF, he emphasized destruction of the aircraft industry as crucial to gaining air superiority. On the tactical level, he underlined that the fighter force should not remain tethered to protecting the bombers, but should utilize their speed and maneuverability to attack the RAF wherever possible.[21] Three days later *Fliegerkorps* I was emphasizing four critical missions in the coming air campaign against the British Isles: the gaining of air superiority; support for the army and the navy, when landings on the British coast eventually took place; attacks on British supplies, ports, and imports; and finally ruthless "retaliatory" attacks on major British cities.[22] All of this made considerable sense. The problem was that the picture provided by German intelligence was and remained so skewed that *Luftwaffe* commanders never gained a clear idea of the nature of their enemy, or the targets that might achieve their goals. And without a clear picture of their opponent or a realistic assessment of the correlation of forces, they were not going to be able to understand the conditions they actually confronted.

The problem was that German planning and conceptualization at the strategic and joint operational levels was deeply flawed. Neither Hitler nor his senior military leaders were able to put together a coherent conception or strategic plan about how they might defeat the British. The *Kriegsmarine* itself was waging an independent war, in which the submarine force was simply trying to sink ships – where it did so and how it might maximize British weaknesses never emerged in Dönitz's mind or headquarters.[23] Thus, while the small U-boat force had sunk a considerable number of British ships over the war's first ten months, the Germans had lost as many boats as their industry and the U-boat training command had managed to produce and train up for combat operations.[24] Thus, while the assault on Britain's SLOCs caused serious

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[21] BA/MA RL 2 II/30, "Besprechung Reichsmarshall am 21.7.40."

[22] BA/MA RL 8/1 Generalkommando 1. Fliegerkorps Abt. 1a Nr. 10260/40, 24.7.40, "Gedanken über die Führung des Luftkrieges gegen England."

[23] For an assessment of the weaknesses inherent in Dönitz's conceptions for the U-boat campaign see particularly: Holger Herwig, "Innovation Ignored: The Submarine Problem – Germany, Britain, and the United States, 1919-1939," in *Military Innovation in the Interwar Period*, ed. by Williamson Murray and Allan R. Millett (Cambridge, 1996), pp. 236-241.

[24] For the obdurate and largely unimaginative development of the U-boat force in the inter-war

difficulties, it never really came close to breaking those lines.[25]

The Opening Moves

Over the period of the Phony War, the Germans flew a number of sorties across the Channel, partially to test the defenses, partially to begin mining operations against British ports, and partially to check out *Knickebein* signals. By so doing they gave away a great deal: The loss of one of the special mission He 111s provided R. V. Jones with some of the crucial evidence on which he built his case for *Knickebein*'s existence.[26] These small raids also alerted the British to the fact that the Germans possessed magnetic mines, while a He 111, which had crash-landed in relatively undamaged condition, provided the RAF with an opportunity to examine that aircraft's weaknesses in minute detail.[27]

The opening of the campaign against France and the Low Countries saw a considerable increase in the number of *Luftwaffe* forays into British air space. The German rationale appears to have been a desire to gather tactical and electronic intelligence. But again the British gained the most by having their vulnerability to night air attack underlined, while providing their air controllers with opportunities to build up their skills and evaluate how the Germans would operate in the future at night.

Although the air campaign against Britain was not scheduled to begin until early to mid August, redeployment of the *Luftwaffe*'s bombers and fighters to bases along the

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period see ibid.

[25] This author is in complete agreement with Gerhard Weinberg's position that the German conduct of the U-boat offensive represented a waste of resources that would have been far better spent on other theaters and capabilities in the German war effort. In March 1943 it placed sufficient pressure on the SLOCs so that some officers on the Admiralty Staff suggested that the convoy system might have to be abandoned. The suggestion, however, was never seriously considered. For Professor Weinberg's analysis of the U-boat campaign see Gerhard Weinberg, *A World at Arms, A Global History of World War II* (Cambridge, 1994), pp. 386-387.

[26] Jones, *The Wizard War*, p. 85.

[27] Ibid., p. 69.

Pas de Calais and Norman coast began immediately after the French had signed the armistice at Compiegne. Two of Göring's *Luftflotten* – the Second under Field Marshal Albert Kesselring and the Third under Field Marshal Sperrle – were to control the air units in France, while *Luftflotte* Five under General Hans-Jürgen Stumpff would control a smaller force of bombers and long-range fighters from Norway and Denmark. In stark numbers, Fighter Command confronted an overwhelming force.

In mid-July Stumpff deployed 129 He-111s and Ju-88s (ninety-five in commission), supported by thirty-four Bf 110s in July (thirty-two in commission).[28] The main forces of *Luftflotten* 2 and 3 in France massed 150 reconnaissance aircraft, 1,131 Ju 88s, He 111s, and Do 17s (769 in commission), 316 Ju 87 Stukas (248 in commission), 246 Bf 110s (168 in commission), and 809 Bf 109s (656 in commission). Opposite the Germans, Fighter Command possessed approximately 800 fighters with a significant reserve of replacement aircraft in the depots.[29] Approximately one third of Dowding's force consisted of Spitfires, while two thirds were Hurricanes. He also possessed a squadron of useless Defiants and a number of Blenheims, which were the test beds for experiments with airborne radar. At the time, Fighter Command's squadrons were running operationally ready rates of approximately 70 percent. In addition to Fighter Command, the RAF possessed over 1,000 medium and light bombers, which would not play a direct role in the air-to-air battle, but which were in a position to interfere with any German landing attempts, as their attacks on the invasion barges the Germans were gathering in the Channel ports in early September underlined.[30]

Approximately, 40 percent of Dowding's force was under No. 11 Group, commanded by Air Vice Marshal Keith Park, a feisty New Zealander – its mission to

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[28] Collier, *The Defence of the United Kingdom,* p. 161. *See also* Hough and Richards, *The Battle of Britain*, p. 111.

[29] For a listing of Fighter Command's squadrons, the strength of each squadron and the numbers of aircraft in and out of commission on 1 July, 1 August, and 1 September 1940 see Mason, *Battle over Britain*, pp. 130, 203, 333.

[30] This fact underlines why the Germans placed a significant effort in attacking British air bases that belonged to commands other than Dowding's.

protect the most vulnerable areas of southeast Britain. Directly to the north, defending the east coast and the Midlands of England was Number 12 Group under Air Vice Marshal Trafford Leigh-Mallory, an ambitious and duplicitous individual. Finally, Number 10 Group defended the southwest, while No. 13 Group defended the north of Britain up to Scapa Flow.

The first phase of the Battle of Britain lasted from early July through mid August. The Germans launched a series of exploratory raids over the Channel – attacking convoys plying up and down the Channel with smaller attacks on the ports on England's southern coast. The aim seems to have been to wear Fighter Command's front-line strength down, feel out how the British would fight the coming battle, and, if possible, shut down the Channel convoys. Yet the pay back for the Germans for these initial skirmishes was minimal. Over a five week period they managed to sink 30,000 tons of shipping, a minuscule amount given the scale of effort, and inflict minor damage on the ports along Britain's southern coast. Moreover, they lost 286 aircraft of all types (105 of which were Bf 109s), nearly double Fighter Command's loss of 148 aircraft.[31] The loss in RAF fighter pilots was serious, eighty-four or 10 percent of those pilots on active duty.[32]. The British gained considerably, however. They had a month-and-half to restore and refresh their front-line squadrons, especially those burned out by the fighting in France. Moreover, the increasingly heavy air-to-air combat provided Fighter Command – especially its controllers – considerable experience and thus the ability to adapt to German tactics and procedures, and to estimate the size of assembling or incoming raids.

For their part the Germans seem to have learned little about how Fighter Command was using its radar as a key piece of a systematic approach to the air defense of the United Kingdom. Here the Germans failed to use their radar sites in France to examine how the British were reacting or failing to react to German raids. Nor did they pick up the fact that the performance of British fighters had significantly improved over their performance during the Battle of France.

By the end of this period, despite its losses, Fighter Command was in a far stronger position than at the beginning of July, both in terms of new production from

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[31] Collier, *The Defence of the United Kingdom*, p. 171.

[32] Based on the loss tables in Mason, *Battle over Britain,* pp. .

British aircraft factories, as well as the experience level of the whole air defense system. Dowding could now view the future with some optimism. On 8 August British listening posts picked up and Bletchley Park soon decrypted a message from the *Reichsmarshall* to the *Luftwaffe* forces on the French coast; its was soon in the hands of Britain's leaders: "Operation Adler [Eagle]. Within a short period you will wipe out the British air force from the sky."[33]

Eagle Day and the Assault on Fighter Command: 11 August – 15 September

Adlertag (Eagle Day) got off to a bad start. Göring scheduled the start for 13 August, but even before that day the *Luftflotten* was ratcheting up the pressure. Heavy fighting on the 11th over ports in southern England, for example, cost No. 11 Group twenty-seven fighter pilots, 7 percent of available pilots. *Luftwaffe* losses were high as well: thirty-nine aircraft, twelve of which were Bf 109s.[34]

On the 12th the Germans carried out a particularly effective attack on the Ventnor CHL site with Ju 87s, which completely wrecked this crucial radar site on the Isle of Wight. The cost for the Germans was high with the British shooting down over ten percent of the attacking force, including two of the most experienced German bomber leaders. Nevertheless, the attack on Ventnor was exceedingly worrisome to Fighter Command's senior leaders, because radar represented the eyes of the whole defensive system, and the Germans appeared ready to poke the eyes out. Ventnor was only one of a number of RAF targets struck that day; it was clear that the *Luftwaffe* was coming after the RAF with a vengeance. The Germans struck airfields at Manston, Lympne and Hawkinge, as well as five other radar stations beside Ventnor, all of which were operating in a relatively short time. The attacks failed to do significant damage to the other radar stations, and while that failure may have frustrated the Germans to a certain extent, their real failure was to divine how the British were using radar. In retrospect the attacks on the 12th were meant to set up "Eagle Day" for success. They did not.

Not until 15 August did the Germans get good weather, and air operations on

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[33] Quoted in Terraine, *The Right of the Line*, p. 186.

[34] Based on tables in Mason, *Battle over Britain*, pp. 227-230.

that day reflected a maximum effort. In the north, *Luftflotte* 5 executed its only major raid of the battle, which ran into seven fighter squadrons of British fighters (three Spitfire, two Hurricane, and two Defiant). Overall *Luftflotte* 5 lost over 15 percent of the attacking force, a loss level that ensured that it would not appear in the battle again. But there was a larger lesson the Germans ignored. Fighter Command's devastating riposte to Stumpff's raid should have suggested that there were fundamental weaknesses in the other assessments of *Luftwaffe* intelligence. The *Luftwaffe* did not take the suggestion..

In the south, a series of massive raids ran into fierce opposition from Fighter Command. *Luftflotten* 2 and 3 launched everything they had in an effort to break Dowding's command. An almost continuous series of raids targeted RAF airfields, radar stations, command and control sites, and a number of other sites. The raids had mixed success, but when it was all over the *Luftwaffe* had suffered the heaviest casualties it would suffer during the entire battle. The Stukas suffered particularly heavily. A number of British airfields were badly battered, some to the extent that they had to be closed down for short periods of time. The Germans also attacked a number of radar sites, but all were back up and running after a short period of time. Unbeknownst to the British, that same day Göring raised serious doubts as to the wisdom of the raids attacking the radar sites because of the difficulty in damaging them, as well as the heavy losses attacking German aircraft suffered.[35]

The air battles that now ensued placed enormous pressure on both sides. Between 13 and 19 August (a one week period), the Germans wrote off 284 aircraft, approximately 10 percent of the aircraft deployed against Britain.[36] A sustained battle of attrition now took place: it began in mid-August and lasted through the first week of September. The *Luftwaffe* put extraordinary pressure on Fighter Command and its support structure – with the exception of the radar sites. Both sides suffered a terrible attrition of pilots. In the last ten days of August, Dowding lost no less than 126 fighter pilots, or 14 percent of his force.[37] The losses were substantial enough to

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[35] BA/MA Besprechung am 15.8.40.

[36] The figures for German aircraft written off come from the tables in Mason, *Battle over Britain* , pp. 241-243, 247, 263-264, 272-272, 274, 281-284, 286-287.

[37] Based on the tables in Mason, *Battle over Britain.*

force both sides to make substantial adaptations in their approaches. The Germans stopped using their Stukas and limited the use of unescorted bomber attacks. Moreover, much to the disgust of his fighter pilots, Göring placed the Bf 109 fighters on a tighter and tighter leash by forcing them to mount close escort of the bombers, while decreasing the size of the bomber force to decrease losses. This considerably cut into the effectiveness of the *Luftwaffe*'s single-engine fighter force by robbing them of their height and positional advantages.

Yet, the Germans still had no clear idea of the nature of the system they confronted. Their intelligence officers continued to provide optimistic assessments as to how well the campaign was proceeding. Here, German estimates of the number of RAF fighters shot down were approximately three times greater than Fighter Command's actual losses. These overestimates skewed the overall picture German intelligence analysts were providing.

The British also had considerable adaptations to make in the face of the German aerial assault. The rising loss rate forced Park to order his pilots not to pursue damaged German aircraft out over the Channel. More important was his instruction for his fighters to ignore the Bf-109s and go immediately after the German bombers. Meanwhile, the losses forced the RAF to cut the time new pilots spent in operational training units in half. It also forced the air staff to take the extraordinary step of transferring pilots from Bomber Command and the Royal Navy directly to Fighter Command after only a few hours transition time in fighters.[38] Yet, perhaps, the full measure of the pressure on Fighter Command was Dowding's decision in early September to allow the transfer of a number of the most experienced pilots from the squadrons in the north to those fighting the battle in the south, which would inevitably lower the capabilities and integrity of the fighter squadrons affected.[39]

By the first week in September the opposing sides were exhausted. Thus far, Fighter Command had shown no signs of weakening, although its losses in fighter pilots over the past two months had been extraordinarily heavy. In July it had lost 10 percent of its pilots on duty at the month's beginning; in August that number swelled to 26 percent. The *Luftwaffe*'s Bf 109 forces were 11 percent and 15 percent for those

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[38] Collier, *Defence of the United Kingdom*, p. 200.

[39] Hough and Richards, *The Battle of Britain*, p. 251.

two months – a figure which does not include the heavy losses being suffered by German Bf 110 and bomber crews. In September the British would lose 28 percent of their fighter pilots on active duty at the beginning of the month. German fighter pilot losses would swell to over 23 percent.[40] Equally indicative for the pressures on the *Luftwaffe*'s combat squadrons was the fall in the percentage of fully qualified aircrew in the bomber squadrons. At the beginning of July 75 percent of bomber crews were fully mission qualified; by the end of September that number had fallen to below 60 percent.[41]

The Germans now decided on a fundamental shift in their operational approach. Hitler had already signed on to the idea of "retaliatory" raids because of small British raids on Berlin. In the largest sense the decision to mount an all out attack on London had been inherent in German conceptions of a war against the British Isles from the beginning. And now a British raid on Berlin by Bomber Command, which had not done much damage, had aroused the Führer's ire.

On 7 September the great German assault on London began. Shortly before 1600 hours, the first report of a buildup for a coming German raid came into Blently Priory: twenty plus German aircraft. That number soon multiplied by the moment until it was clear that Fighter Command was confronting the largest raid of the war. Altogether 348 bombers, accompanied by 617 fighters – nearly 1,000 German aircraft – covered 800 square miles. The target was London.

Since Dowding and Park were expecting a continuation of *Luftwaffe* attacks on Fighter Command's airfields and infrastructure, they were caught by surprise by the switch to London. Nevertheless, the day saw ferocious dogfights taking place all over southeast England. When the day's fighting was over, Fighter Command had lost sixteen Spitfires – ten pilots uninjured – and twenty Hurricanes – ten pilots uninjured.[42] The German losses were relatively light: twelve bombers, eight Bf 110s,

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[40] Based on the loss tables for each day of the Battle of Britain in Mason, *Battle over Britain;* and on BA/MA, RL 2 III/707, Gen. Qu.6.Abt. (I), Übersicht über, Soll, Istbestand, Einsatzbereitschaft, Verluste und Reserven der fliegende Verbände.

[41] Williamson Murray, *Strategy for Defeat, The Luftwaffe, 1933-1945* (Washington, DC 1983), p. 51.

[42] Mason, *Battle over Britain*, tables, pp. 365-366.

and seventeen Bf 109s.[43] The damage done to London, particularly the docks and housing in the East End, was massive. Moreover, the fires the daylight attack started allowed the night raiders to find London without difficulty. But the one consolation for the British that came from the switch to London was the fact that Fighter Command received a respite from the grueling weeks of attacks that had savaged its base structure. That period sufficed to allow Fighter Command's infrastructure to recover, although its fighter squadrons, as the losses suffered on 7 September underlined, continued to take heavy losses.

Over the next several days, the weather limited the *Luftwaffe*'s daylight attacks. The climax came on 15 September, as Kesselring and Sperrle mounted their second massive raid on the capital. This time the British were ready. They also had the advantage of knowing how hard they were pressing the Germans, while the *Luftwaffe*'s leadership, again misled by its intelligence, believed Dowding was down to his last fighter pilots. Moreover, the planning for the raid, perhaps a reflection of German overconfidence, provided virtually no feints and false alarms to divert and dilute No. 11 Group's response.[44]

What happened on 15 September finally ended the German illusion that Fighter Command was on the brink of defeat. From the moment the Germans crossed the Channel and reached the English coast, German bombers ran into a buzz saw of opposition. Park's fighters, upwards of 170 Spitfires and Hurricanes, began breaking up the bomber formations before they reached London.[45] Bomber crews began dropping their loads over Kent and Surrey, and turning desperately for the coast, a sure sign that their morale had cracked. For those brave enough or lucky enough to reach London, Fighter Command had an even nastier surprise. A mass formation of Spitfires and Hurricanes, over eight fighter squadrons, tore into the bomber formations.

The RAF would claim 185 enemy aircraft destroyed; in fact, the Germans lost approximately sixty aircraft, in comparison to Fighter Command's thirty fighters lost –

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43 Ibid., pp. 367-369.

44 Collier, *The Defence of the United Kingdom*, p. 242.

45 Mason, *Battle over Britain*, p. 389.

but the British recovered a number of their pilots unhurt.[46] The crucial point was that the morale of the *Luftwaffe* bomber crews had broken.[47] The Germans would not launch another massive daylight attack, like those that had marked the previous ten days. They would now turn to new avenues of approach, which depended on how willing they were to analyze the larger strategic and operational situation.

The Night and Sea Offensive against the British Isles

In fact, the German offensive against the British Isles continued over the next eight months, but the Nazi political and military leadership consistently failed to address the larger issues confronting them. Instead, each service chartered its own independent course without reference to its sister services or to a larger strategic framework. In July 1940 Hitler had already decided that what was keeping the British in the war was the hope that the Americans and the Soviets would intervene on their side.[48] His solution was to launch an invasion of the Soviet Union. The invasion was to begin in May 1941, a choice that the army's senior leaders delightedly endorsed.[49]

The *Luftwaffe* began its night campaign against Britain with bomber forces that had already suffered heavy losses in both aircraft and aircrews over the course of the previous five months. With the emphasis already swinging to efforts to prepare the German Army for the invasion of the Soviet Union, the Germans failed to increase the production of fighters or bombers to any significant extent. The night offensive

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46 Ibid., pp. 391-392.

47 Just as would occur after months of devastating losses in October 1943 after the second attack on Schweinfurt and in March 1944 with Bomber Command after the Nuremburg raid.

48 Halder, *The Halder War Diary*, p. 244.

49 In fall 1940 Hitler would approach the Spanish and the French in an attempt to persuade them to join the war, but that effort was at best half hearted and seems to have been as much aimed at keeping the British occupied until Barbarossa had disposed of the Soviets as waging a serious effort against them. For a persuasive argument that Hitler had decided to invade the Soviet Union in July 1940 and for the most thorough examination of German planning see Boog, et al., *Das Deutsche Reich und der Zweite Weltkrieg*, vol. 4.

against the British reflected a number of factors. On the British side, Fighter Command, in spite of desperate efforts, would not possess night fighters with airborne radar capabilities until March 1941. Thus, the only factor cloaking Britain would be darkness and bad weather.[50] On the German side, the *Luftwaffe* possessed blind bombing capabilities far in advance of what other air forces in the world possessed. But the Germans had already lost much of that advantage, since the British had uncovered *Knickebein*'s existence.

There were some things British jamming could not do; London was such an enormous target that *Luftwaffe* raids could not miss hitting substantial portions of the city and inflict considerable damage; nor, as would occur in the raid on Coventry over the night of 14/15 November 1940, could the British do much on a clear moonlit night. But even in terms of the raids on London, the British impeded German efforts to achieve concentrated bombing – a factor that had an even greater impact on German bombing efforts further inland against smaller targets.

Exacerbating the *Luftwaffe*'s difficulties was a considerable dispersion of effort into three distinct areas, each of which reflected different operational objectives and differing conceptions of what the campaign should involve. The bombing of London represented a Douhetan belief that the enemy's morale would collapse under heavy air attacks. Adding to such beliefs was German overconfidence that had marked their approach throughout. The second target set was manufacturing cities: Manchester, Birmingham, Coventry, Sheffield, and Nottingham. Here the Germans inflicted serious damage, but British countermeasures against the blind-bombing beams considerably mitigated the results achieved. The third target set involved raids on major British ports, particularly Liverpool and Glasgow, but Bristol, Portsmouth, Southampton, Belfast, and Plymouth also received attention.[51] Here again the Germans inflicted painful damage, but never on a sufficient level to affect Britain's overall strategic situation.

Moreover, with the exception of London, the Germans rarely followed up major

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[50] As the official history notes, the weather during December was such that on fifteen nights no major raids were possible at all. Collier, *The Defence of the United Kingdom*, p. 272.

[51] Map 26, "The German Night Offensive, September 1940 – May 1941," provides a clear representation of German efforts. Collier, *The Defence of the United Kingdom*, pp. 278 and 279.

raids with attacks on following nights. The dispersion of German efforts insured that none of the targets received sufficient attention to insure really serious harm. Since Hitler had declared a total blockade of the British Isles, a clear emphasis on the major ports might have seemed in order. But neither the *Kriegsmarine* nor the *Luftwaffe* were willing to cooperate. In March British efforts to get radar equipped fighters up and running finally began to achieve success. Over the course of the first three months of 1941, the Germans lost ninety bombers to the defenses. In April, that total rose to seventy-five bombers, the majority shot down by the increasingly effective night fighter force. Losses in May would have been even heavier, but the bomber squadrons began to move east during the last half of the month in preparation for the campaign in the east.

While German bombers were dealing out heavy punishment to British cities, the U-boat offensive was posing an increasing threat to Britain's sea lines of communications. The victories of spring 1940 in Scandinavia and western Europe had significantly improved the geographic position of Dönitz's U-boats, but they were hardly sufficient to overcome the lack of submarines. The Germans were barely able to keep seventeen U-boats on station at any one time, which meant that the task of breaking Britain's lifelines by unrestricted submarine warfare was simply not in the cards.[52] Yet, the German effort over the fall and winter of 1940/1941 was to have a profound impact on the Battle of the Atlantic – and in this case much in favor of the British, at least over the long run.

It did not seem so at the time. The great difficulty the British confronted in late summer and early fall 1940 was the fact that the concentration of destroyers and a considerable number of other anti-submarine craft in the eastern and southern ports to meet the invasion had stripped the convoys of protection. At this time protection for convoys barely reached out to the central Atlantic. With little protection inbound and outbound convoys were easy meat for the U-boats. The result was a slaughter of British and Allied merchant shipping. Adding to British woes was the fact that a number of merchant vessels were still sailing without escorts. In the period between July and November 1940 the British lost 144 unescorted vessels to U-boats and only

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[52] For each submarine on station, another would be transiting to or from shore station, while another was in port refitting for its next patrol.

seventy-three in convoys.[53]

Yet, in the long-term the Germans were the losers. The terrifying losses forced the British to set in motion a set of adaptations in both the immediate and long term that were to have a profound impact on the course of the Battle of the Atlantic.[54] Obviously, the return of the escort vessels as the invasion threat died down immediately improved the situation in the Atlantic. Almost immediately it became apparent that the special hunter-killer groups failed to pay dividends, while concentrating escorts to protect convoys provided greater opportunities to attack the U-boats. It was also clear that air protection would be an important element in convoy protection.

In the long-term, the painful tactical success of the U-boats led the British to develop and push for a whole host of adaptations and changes in their approach to anti-submarine warfare. The most obvious was to focus on increasing the number of escort vessels. Technologically, the British set in motion a whole set of adaptations, from developing and then equipping escorts and Coastal Command's aircraft with radar, improving ASDIC, developing direction-finding gear to allow escorts to identify the immediate position of U-boats shadowing convoys, improving the power of depth charges and developing new weapons such as the hedge-hog to improve the lethality of escorts, and reintroducing high-powered searchlights on aircraft (the Leigh light). On the tactical side, the British moved to the idea of training up escort groups of anti-submarine vessels that would work and fight together over the long haul, thus maximizing their potential by developing common understanding and tactics. Finally, the command of Britain's Western Approaches moved in February 1941 from Plymouth to Liverpool, where along with the co-located headquarters of the RAF's No. 15 Group of Coastal Command, it would be in closer contact with the battle in the North Atlantic.

Many of these factors soon had an influence on the battles occurring in the eastern Atlantic. In March of 1941 British escort vessels not only sank five U-boats, approximately one-fifth of the fleet the Germans had operating at sea, but U-47 and U-100 carried Prien and Schepke to their deaths, while the sinking of U-99 led to the

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53 Roskill, *The War at Sea,* vol. 1, p. 349.

54 Winston S. Churchill, *The Second World War*, vol. 3,(Boston, 195).

capture of Kretschmer, three of the most successful U-boat "aces" the Germans possessed during the war.[55] Already Dönitz was being forced to move his U-boats out into the central Atlantic, where the British would possess the room to maneuver their convoys and where intelligence would become more and more a crucial player in the battle.

But the greatest adaptation that the British were to make in the battle occurred at the end of our period in the ethereal world of code-breaking and intelligence. So far, the solving of the *Luftwaffe*'s Enigma code had only had an impact on the air battle. The story begins with Harry Hinsley, the Cambridge undergraduate discussed earlier. By May 1941, the U-boat offensive, despite the loss of three of its greatest aces in March was swinging into high gear. Monthly losses of merchant vessels in the North Atlantic had reached well over 300,000 tons. Meanwhile, Bletchley Park appeared no closer to breaking into the U-boat Enigma traffic. Hinsley recognized that if British cryptanalysts could get the settings for a sustained period of time they would have a shot at breaking the U-boat traffic over the long haul. One day, Hinsley suddenly remembered that the German weather ships off the north coast of Iceland had been transmitting their reports on weather conditions in the same Enigma code as the U-boats were using.[56] And since they were on station for sustained periods of time, he surmised that it was likely that they carried the Enigma settings for the whole period they were at sea. Now on the recommendation of a twenty-one year-old Cambridge undergraduate, the Royal Navy executed a major cutting out operation, on involving three cruisers and four destroyers under a vice admiral, to seize the weather ships.[57]

The resulting capture of the weather ship *München* provided significant Enigma materials, including settings for the next two months. Almost immediately thereafter, the British captured U-110, with more Enigma material and in late June the British mounted a further cutting out operation that netted a second weather ship, the *Lauenberg*, which yielded more valuable cipher material,. As a result of these seizures, Bletchley Park was able to break into the U-boat Enigma on a regular basis

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[55] Roskill, *The War at Sea*, p. 365.

[56] Kahn, *Seizing the Enigma*, p. 154.

[57] Ibid., 156.

for the next six months. Armed with key decrypts indicating where Dönitz was positioning his U-boat patrol lines, the British could maneuver their convoys around the U-boats for the next six months. British losses of merchant shipping dropped by two-thirds, and the British had gained a key breathing space during which their adaptations, technological and other, would begin to come into full force.

And what were the Germans doing in terms of adaptation during this critical period of the Battle of the Atlantic? Virtually nothing beyond their cloying focus on numbers of ships sunk and the tactical framework of the wolf pack which they began introducing into the increasingly complex battle in the Atlantic. The *Luftwaffe* and the *Kriegsmarine* obdurately refused to cooperate. The naval high command remained entranced by the concept of big-ship cruiser warfare, which the sinking of the *Bismarck* underlined was a dead end. Dönitz screamed for more submarines, but the focus of the U-boat war remained on looking for weak areas, where the U-boats could enjoy the kind of success they had enjoyed in fall 1940. Quite simply, the Germans sought after none of the kinds of innovations that the British were developing in response to the threat. And the U-boat war was now to become the sole means the Third Reich had to strike at the growing threat from the West – a threat that German strategic bungling in December 1941 would catastrophically exacerbate with Hitler's declaration of war on the United States, a decision that his senior military leaders enthusiastically endorsed.

Conclusion

The year 1940 was undoubtedly one of the great watershed years in the history of the twentieth century. The *Wehrmacht*'s victories in the west in spring 1940 allowed the Germans to break out from their scarce resource base. In effect those victories set the stage for the Third Reich to wage a global conflict. Yet, confronting the enormously changed summer world of summer 1940 the German military proved incapable of making the kinds of adaptations required to fight the war of their Führer's dreams. Instead like Hitler they became enveloped in beliefs about their own genius and the racial inferiority of those whom they opposed. In effect, the Germans adapted at best at the tactical level, but then only marginally.

At the strategic and operational levels the German military leadership never

seems to have grasped or understood the extent of the challenges that they were confronting. In some areas, such as intelligence, the general failure of the whole system should have suggested that a fundamental reevaluation of the entire system was in order. To a certain extent, one can ascribe the failure to execute such a reassessment to the nature of the Führer state itself. But that is too glib an explanation. Within months of the failure of intelligence in the Battle of Britain, German intelligence was proving as over optimistic about the *Wehrmacht*'s prospects in the upcoming campaign against the Soviet Union. Even in the sphere of technology, the Germans appeared willing to rest on their early war laurels. The U-boat of 1943 would look virtually the same as the U-boat of 1940; nor would its capabilities change during the course of the three years. The contrast between the technological changes that American fleet boats would undergo in the same period underlines how few the adaptations were that the Germans were to make. In every respect the Germans seem to have considered virtually no serious adaptations to the failure of their campaign to defeat the British.

On the other side of the channel, British adaptiveness at every level suggests how impressively they were able to adapt to the grim conditions that confronted them. The air defense system steadily adapted to the threat that the *Luftwaffe* posed. In the long-term the British clearly recognized that the coming struggle with the Germans in the air over the continent was going to rest on numbers. Thus, the long-term response to the experiences of the Battle of Britain was to emphasize massive programs of crew training and the production of fighters and bombers in numbers that only the Americans would exceed. But the area where the British would show the most stunning set of adaptations would occur in the Royal Navy's anti-submarine forces. Here, in every area from "Huff Duff," to radar, to the weaponry of anti-U-boat warfare, to the training up of escort groups, to the business of intelligence, the British achieved a dominance that was to bring the U-boat to a dramatic end in May 1943 and seal the fate of the Third Reich. In every respect the Battle for Britain reflected the widest sort of adaptations, encouraged and pushed by a senior leader who demanded "action this day."

In almost every respect the German senior leadership – military as well as Hitler and Göring – stand in stark contrast to Dowding and Churchill. Ironically, the *Luftwaffe*'s prewar doctrine enunciated a far clearer view of the contribution that air

power would make to the coming conflict that the Germans were to start so enthusiastically. [58] Nevertheless, that doctrine reflected the Continental *Weltanschauung* that had characterized the German military in the First World War and which was to dominate the conduct of the second. Thus, while the *Luftwaffe*'s leaders understood that the whole RAF must be their target, they never thought through the implications of the fact that they now confronted a pure air war, in which operations on the ground would contribute nothing. Moreover, the German conduct of the campaign against Britain reflected an arrogant assumption of superiority that fed both the intelligence and the operational approaches to the air war. Significantly, that arrogance – that belief in the inherent superiority of German military prowess would dominate the German conduct of war through to the final smash up in 1945. In effect, the Germans learned nothing and forgot all in their adaptations to the defeat of their campaign against Britain in 1940/1941.

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[58] For the *Luftwaffe*'s basic doctrine see particularly: *Die Luftkriegführung* (Berlin, 1936).