

The Shock of *Blitzkrieg*: Influence, Exchange, and Development of Ideas
Relating to the use of Tanks in the Interwar Period.

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A Thesis Submitted to
Saint Mary's University, Halifax, Nova Scotia
in Partial Fulfillment of the Requirements for
the Degree of Bachelor of Arts, Honours in History.

April, 2021, Halifax, Nova Scotia

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Date: 27 April, 2021

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Abstract

The history of the German *Blitzkrieg* into France in 1940 often looks at the German advances as unique and as a surprise to the armies of France and Great Britain. This study considers this image in relation to the spearhead arm of the German advances, the tank. It examines the theory and doctrine behind the use of the tank in the German offensives of 1940, and the origins of these ideas. By comparing developments in Germany with its Second World War opponents such as France and Great Britain we see that the proliferation of ideas regarding the organization and employment of tanks in warfare was widespread. Furthermore, the historical impression of the swift advance of German tanks in 1940 as a surprise to the French or British is revealed as problematic, as these ideas had been widely explored in these nations throughout the interwar years. The exchange of ideas between military thinkers in the interwar period is shown through an examination of the published material and modern historical analysis relating to the development of these ideas in each nation considered.

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Introduction

In his memoirs of the 1940 German invasion of France, Hans von Luck described the French reaction to the rapidly advancing German tanks as nothing short of shock.¹ In this campaign, von Luck was with a reconnaissance unit spearheading the German 7th panzer division, allowing him to directly witness the impact of the mobility-centric form of warfare Germany unleashed upon France in 1940. This mobility-centric form of warfare has been popularly called *Blitzkrieg*, and the campaign of 1940 has been described as the highest point of the capability of *Blitzkrieg*.² Historians, ever since fascinated with the rapid collapse of Allied forces defending France, have tried to find reasons for France's defeat, or for Germany's victory. At the forefront of this rapid advance were machines such as tanks, armoured cars, aircraft, and trucks; machines that captivated the imaginations of those who still vividly remembered the entrenched stalemate on the Western Front in the First World War. The image of the tank in the German *Blitzkrieg* was one of the vanguard of the offensive. Though tanks were not the only feature of *Blitzkrieg*, they were the most important part of it.³ Mass forces of tanks were seen to be the leading force of these effective German advances of 1940. For Germany and those examining early German victories, the tank provided the keystone to these victories. The conventional understanding of the French reaction to the German use of tanks was one of shock, of surprise. But was it really a surprise? How well prepared were the armies of France and Britain to understand the concepts the German army used

1 Hans von Luck, *Panzer Commander: The Memoirs of Colonel Hans von Luck* (New York: Dell Publishing, 1991), 39.

2 Robert M. Citino, *Armoured Forces: History and Sourcebook* (Westport, Connecticut: Greenwood Press, 1994), 69.

3 Bryan Perrett, *A History of Blitzkrieg* (New York: Stein and Day, 1983), 69.

to exploit shock with their tanks? This idea of shock has led to a myriad of historical writings on the origin of the German victories, and thus the origin of *Blitzkrieg*. In trying to understand how the German military achieved what it did in the early years of the Second World War, historians have dug deep into the development of the German military in the interwar period. The history of German military developments as well as the reasons for the losses incurred by nations such as France in fighting off the German *Blitzkrieg* have both been explored by historians in order to understand what made the *Blitzkrieg* unique to Germany and its success a surprise to its opponents. What this paper aims to do is understand how much the French and British understood the concepts for the use of the tank that Germany put into practice in May 1940. Did the French army really encounter completely new ideas when German tanks invaded, or did they understand these ideas already? By examining aspects of the German *Blitzkrieg* in 1940 that are attributed to the employment of tanks, it will be seen that these aspects were not new ideas for France or Great Britain. Instead, in many ways the Western Allies pioneered these ideas, and it was Germany who learned from their developments and put them into practice. In this respect, the German employment of tanks in 1940 should not properly be considered a surprise to the armies of France or Britain beyond the military application of shock. Rather the surprise may be that Germany managed to put into practice these ideas instead of the nations where they were developed.

The tank has its origins in the First World War and as such, by 1940, understanding of how to use the tank had seen more than two decades of examination and experimentation. Much of how the Second World War was fought was influenced by the

experiences of the First World War and many of the officers who held commanding roles in the Second World War experienced the First World War themselves. Because of this many of the lessons learned from the First World War formed the roots of successful doctrines of the Second World War. Many of the experiences which informed these lessons however, were not shared across states. What the French army learned from its battles was not the same as what the German army learned from those same battles. This much can be seen easily in studying the analysis of either army of the same battles. What is less obvious is how two different armies will come to different conclusions based on the same experiences in their experiments with tanks and mechanization both during the First World War and after. This is something that will be examined in this paper, as France and Germany shared several similar experiences while experimenting with tanks in the interwar period while coming to radically different conclusions.

A Note on Terminology

The word *Blitzkrieg* is a controversial one among historians of the Second World War. It is a term virtually unheard of in the German military prior to 1939, with most of its more emphatic usage originating in foreign literature after the start of German hostilities in 1939.⁴ It has largely seen use describing German offensive operations from 1939 to 1941, particularly in relation to the use of tanks and aircraft by the German army. For many historians the idea of *Blitzkrieg* as a specific doctrine is largely a myth, borne

4 J.P. Harris, "The Myth of Blitzkrieg," *War in History* 2:3 (1995): 336.

primarily from the successes of German troops in 1940.⁵ Its use among historians has varied depending on the individual and the period. Some, notably J.P. Harris, have been critical of its use to describe German operations in detail due to not only its lack of German military origin, but the vagueness in its meaning.⁶ Still, the term appears in common use even among detailed historical works on the German army of the period. The term has largely entered common use for the early offensive campaigns itself, particularly 1940, rather than a specific doctrine or ideology. It is with this common use in mind that the term is reluctantly employed in this paper. *Blitzkrieg* is employed here not to describe any ideological framework or official practice, but to evoke the impact of the rapidity of German operations in 1940.

Throughout this paper a number of military terms will be used to describe elements of armed forces relevant to this study. Military terms vary widely across languages and even across time periods and service branches, and as a result there can be considerable confusion in comparing these terms. For the purposes of this paper, the exact numbers or details of unit and formation sizes, not their specific names in a given language are not necessary. Instead, a generic English language set of terms based on common American usage will be employed in order to facilitate an easier understanding of the concepts. The system in common American use has been chosen due to its ease of distinction between various unit sizes and its ease of understanding between these sizes and other concepts. Under this system a distinction is made between the terminology of a unit and a formation wherein the former is primarily a single-arm organization not

5 Matthew Cooper, *The German Army, 1933-1945: Its Political and Military Failure* (New York: Stein and Day, 1978), 218.

6 Harris, "The Myth of Blitzkrieg", 338.

inherently capable of conducting independent combat operations while the latter is capable of conducting independent combat operations with attached supporting elements such as supply, administration, medical, as well as other combat units. Or in other words, a formation can conduct a battle, a unit is attached to other units to create a formation, or attached to formations to enable it to conduct a battle. Similarly it must be understood that there is a difference between ideas which are discussed as theories by individuals or groups, and those that are put into practice as doctrine by an army. Both types of ideas are discussed in this paper, often alongside each other.

In order to easily differentiate between different sized units, the following will outline the generic terms employed in this paper. A division is the standard fighting unit of most armies. Most large operations are conducted with divisions, and most combined arms formations are division sized in order to provide enough men and material to function. A group of divisions is a corps, and a group of corps is called an army, and a group of armies is an army group. Going downwards, a brigade is smaller than a division. A division and a brigade will both be comprised of battalions, which will in turn be made up of companies. A division is often also comprised of brigades, or demi-brigades, though both of these may also be independent. A demi-brigade as it is described in in a later chapter, is half as many battalions in a group as a normal brigade. These descriptions and terms are not universally applicable in military history, as terminology changes with language, nation, force, and time period. However, this rough approach to a common terminology aims to keep comparison between ideas simple for the purposes of this paper.

As the technical realities of military machines are essential to understanding these ideologies it must be noted what is meant by some specific terms which will come up. A tank should be understood simply as an armoured and armed vehicle moving on caterpillar tracks, capable of moving across many terrains. An armoured car is similar but on wheels and thus tied more closely to road systems. Cavalry, when referring to a unit type, will almost always be referring to cavalry with horses and not machines. Where cavalry refers to a tank force taking on a traditional cavalry role, it will be described as armoured cavalry. The terms motorized and mechanized are typically used to differentiate between truck-borne and tracked-vehicle-borne troops, but for this paper will be used interchangeably, as their differentiation is irrelevant for the theories discussed in the interwar period, and because this distinction is also not universal across the armies considered.

Finally it must be noted that the terms armoured, panzer, and tank when referring to organizations such as divisions, are not used interchangeably in this paper. As a term, armoured units are defined for this paper as formations having the tank as their primary arm, but also with their own supporting arms such as infantry, artillery, engineers, and signals attached as a combined arms force. A panzer division is merely a German armoured division, and is used to differentiate the German from French and British forces when discussing them together. A tank unit, such as a tank brigade, denotes a unit comprised almost entirely of tanks and attached to other units in order to support them. Mechanized and motorized are used largely interchangeably for the purposes of discussion here however. The latter two denote units which employ motorized vehicles,

whether armoured and armed or not, to provide mobility, but do not emphasize the tank as their primary arm.

The Fall of France

As it is not the goal of this paper to examine the 1940 German invasion of France in detail, it will be outlined sufficiently to understand the role of tanks in the German army as it advanced through France. The German invasion began early on 10 May 1940 with one hundred and thirty five German divisions advancing into France, Belgium and Holland, split into three army groups.⁷ The three army groups were arranged in a line, with the Northern Army Group B entering Belgium and Holland as a feint attack to draw the French and British allies north. The Southern Army Group C would attack the French defensive Maginot line in order to keep French attention there. The main thrust would come in the centre with Army Group A attacking through the Ardennes forest region. The German force numbered ten panzer divisions in total, with three assigned to Army Group B in the North, and the remaining seven with Army Group A's main thrust.⁸ The Allied armies, expecting the main thrust to come through Belgium, advanced the majority of their forces north to meet Army Group B.⁹ Under the Allied plan, the Belgian army would defend the line of the Albert canal while French and British troops advanced from the South and set up along the Dyle river for the primary defensive line, at which point Belgian troops would retreat South and link up with allied troops on the Dyle line. As

7 Perrett, *Blitzkrieg*, 89.

8 Ibid, 88.

9 Ibid, 91.

part of this operation, the French army Cavalry Corps advanced with regular French forces into Belgium as a screening force to the main body of French troops. The Cavalry Corps contained the first French armoured formations, the *Division légère mécanique*, or DLM. The DLM were armoured cavalry formations that will be discussed later. When the Cavalry Corps engaged German panzer divisions of Army Group B in the area of Gembloux on 12 and 13 May, the French high command took this as confirmation that the primary German thrust was in the north. On 14 May the seven panzer divisions of Army Group A began crossing the Meuse river approximately Sedan a day behind schedule.¹⁰ The French army also consisted of four brand new *Divisions Cuirassées de Réserve*, or DCR, which were to be the first proper armoured formations of the French army rather than the much lighter armoured cavalry formations. Three of these four DCR, which were formed between 16 January and 20 March 1940, were tasked with counter attacking the advancing German panzer divisions from 14 to 16 May.¹¹ These divisions were not employed as a single group and were, rather, assigned to various infantry corps, operating under them. The French armoured division attacks were a disaster. The 1st DCR was virtually wiped out overnight on 15-16 May, unable to stop the rapidly advancing Germans. The 3rd DCR had its mobile counterattack cancelled by the local infantry corps commander and was ordered to be dug in south of Sedan acting as static fortifications only to be ordered to counterattack again the next day and was severely beaten by German infantry supporting the panzer divisions. The 2nd DCR was moving north into Belgium with its tanks by rail and the rest of the division by truck when it was

¹⁰ Ibid, 94.

¹¹ Ibid, 95.

redeployed south to counter the German breakthrough at Sedan. The tanks were immediately sent south but nobody bothered to inform the division commander until the division arrived at its original destination in Belgium and had to turn back south to get their tanks. The fourth DCR was hastily formed on 15 May 1940 under Charles de Gaulle, five days after hostilities had begun.

By 17 May the Germans had punched a forty-mile-wide gap in the French lines near Sedan.¹² French units around Sedan had virtually disintegrated before the advancing German panzer divisions, and attempts to counter attack the German forces in order to prevent their breakthrough all failed. It was only a matter of days before, on 20 May, Heinz Guderian's panzer corps reached the English channel. In a matter of ten days the German panzer divisions had broken through the French border, wiped out most of the French army's independent armoured forces, and driven across France to the English Channel. Though the campaign itself lasted a mere six weeks from start to finish, it was these ten days that built the image of the German tanks and the shock they brought to the French army.

Chapter One: Historiography

Writing about the Fall of France

In his book *Machine Warfare*, J.F.C. Fuller describes the early campaign from the Allied side as foolishly undertaken. He wrote critically of the French operations, stating that the French Army had "forthwith set out to commit suicide" in their response to German invasion.¹³ Fuller was clearly unimpressed with the French conduct in 1940.

¹² Ibid, 96.

¹³ J.F.C Fuller, *Machine Warfare; an Enquiry into the Influences of Mechanics on the Art of War* (London, New York etc.: Hutchinson &, 1942), 122.

Highly critical of the advance into Belgium, Fuller described the French Army maneuver north thus: “the great crustacean unshelled itself and moved forward, a 1918 army naked of defences to meet its 1940 adversary clothed in armor.”¹⁴ According to Fuller, that French and British troops knew before they fully advanced into Belgium that German tanks had breached French lines to the south was a critical failure in French command not following its own doctrine, instead committing itself to an act of suicide by pressing on into Belgium.¹⁵ These sentiments would be echoed less harshly in Fuller’s postwar study *The Second World War 1939-45: A Strategical and Tactical History*, wherein he attempts to provide a thorough examination of the war from his own understanding of modern war. The book does not criticize the French Army directly, but does make extensive use of the same source materials as his earlier work which was critical of the French Army and its command.¹⁶ Fuller would echo this sentiment in a more subdued way in his later publication *The Conduct of War*, wherein he would shift primarily to a pro-German view rather than being critical of French operations.¹⁷ Fuller does, however, focus on the reporting of a British staff officer for his views, in all three of these books. In this case, Fuller recounts the reports of an “Unknown Staff Officer” wherein the French Army is described as in utter shock at the advance of German tanks from 14 to 22 May.¹⁸ As Fuller shares these reports, they are critical of the French Army for its paralysis and inability to grasp the idea of a mobile war.

14 Ibid, 123.

15 Ibid.

16 J.F.C Fuller, *The Second World War, 1939-45: A Strategical and Tactical History* (Cambridge, MA: Da Capo Press, 1993), 74.

17 J.F.C Fuller, *The Conduct of War 1789-1961* (London: Methuen & Co Ltd, 1979), 259.

18 Ibid, 258-259.

The criticism of French operations was echoed by others early on, including B.H. Liddell Hart. In his postwar book *Strategy*, Liddell Hart argued that proper employment of German tanks resulted in a failure of the French Army to properly respond to rapidly changing situations. The breakout of German forces at Sedan allowed the Germans to direct their forces into any number of targets, from the Channel coast to Paris and this, argues Liddell Hart, caused the French Army to panic.¹⁹ The inability of the French Army to counter the movements of German forces was tied directly to the slowness of their timing, being based primarily on a positional method of war.²⁰ This slowness, as Liddell Hart describes, spread a paralysis throughout the French Army command system at all levels.²¹ Though likewise full of praise for the German side of the operation, Liddell Hart's condemnation of French operations, like Fuller's earlier writing, is representative of some of the views immediately following the war on the differing capabilities of the French and German armies in the first decade following the campaign. As otherwise widely read and later widely cited English writers in the very earliest years of analysis of the campaign, and with a direct interest in the events, they provide an interesting insight into wider views of the French performance in 1940.

In both the instances discussed previously, the French inability to properly respond to German mobility due to their use of tanks weighs heavily in analysis of the battle itself. Both Fuller and Liddell Hart, seeking to tie their own ideas to German successes have sought to balance the capability of Germany with the incapability of France. This tendency changed following the end of the Second World War as the

19 Basil Henry Liddell Hart, *Strategy: Second Revised Edition* (New York: Meridian, 1991), 231.

20 Ibid, 231-232.

21 Ibid, 232.

political climate shifted regarding Germany and its wartime past, and the focus begins to be on German operations instead of French operations. This shift will be discussed later in this chapter, as criticism of French operations experienced a resurgence in the later years of the Cold War. After a period of focus on German capability, historians once again began to criticize the French portion of the 1940 campaign. Bryan Perrett, in his book *A History of Blitzkrieg*, focused primarily on German capability while analyzing the campaign, though careful mention was made of the lack of French capability. For Perrett, the inability of French tanks to operate with the freedom, and according to the same principles of mass and shock as German tanks appeared to, was key to the French defeat.²² The shock factor for the tanks was such that reports of tanks seen would send French troops into a panic, even if the tanks seen were French.²³ This incapability, tied by Perrett directly to the refusal of the French Army to heed the advice of the likes of J.B.E. Estienne or de Gaulle in developing large, mobile armoured formations, was the reason for the French failure of 1940.²⁴ In this way Perrett was echoing Fuller and Liddell Hart in their early assessments of the French role in the campaign. Though unlike Fuller and Liddell Hart, Perrett was not focusing on promotion of their role in developing these ideas, but rather as a historical study.

Postwar memoirs of the invasion of France from the German side provided direct observational support for the concept of a critical approach to the French actions before, and during the 1940 campaign. In his memoirs von Luck recounts hearing French soldiers declare as early as 17 May, “La guerre est finie, je m’en fou,” only a week after the

22 Perrett, *Blitzkrieg*, 94-95.

23 Ibid, 93.

24 Ibid, 58-59.

invasion had begun.²⁵ Von Luck was, at this stage, operating to the rear of French forces around the French town of Avesnes, having crossed the Meuse river near Dinant in Belgium, approximately a hundred kilometres to the East, only three days prior. Erwin Rommel described the French reaction to advancing German tanks in similar terms. Recounting one event in which a French motorcycle unit ran into his command unit with accompanying tanks, he described the French as “so shaken at suddenly finding themselves in a German column that they drove their machines into the ditch and were in no position to put up a fight.”²⁶ The descriptions of the campaign in Rommel’s posthumously released book of the advance through France follow much the same line, with many examples of French troops merely surrendering or being too disorganized to fight as German tanks advanced.²⁷ Because this book was edited by Liddell Hart, and has been questioned by historians since for its validity due to this fact, it should be considered carefully. Guderian, though substantially more favourable in the limited attention he gives to the French Army, cited similar reactions from his interactions with captured French officers. At one point, Guderian related the capture of a French order he believed came from General Maurice Gamelin himself that declared “The torrent of German tanks must finally be stopped!”²⁸ As with early scholarly work on the campaign, the early published postwar recollections of German officers tended to be equally critical of the conduct of the French army in 1940. This trend has not disappeared, though it has been less explicit. Historians such as Martin Alexander have argued that the failure of French

25 Luck, *Panzer Commander*, 39.

26 Erwin Rommel, *The Rommel Papers* (New York: Harcourt, Brace, 1953), 16.

27 Ibid, 19-22.

28 Heinz Guderian, *Panzer Leader* (London: Penguin Books, 2000), 108.

command to understand the pace of modern warfare led to the inevitable bad gamble in committing French troops north into Belgium.²⁹

While it is interesting to examine the history of the 1940 campaign from the viewpoint of French failures leading to defeat, it should be noted that France did not defeat itself. Historical analysis of the campaign has always had elements both critical of French actions and capability, and high in praise for the German aspects. While at first it may appear that these two approaches to understanding the events of 1940 are very similar, or at the least complimentary, they are in fact quite different in their focus of analysis. Where the scholarship described earlier sought to understand why France lost, at some point this became a secondary concern to understanding how Germany won the 1940 campaign. This shift gives weight to the idea of a unique German approach to mechanized war, to the idea of *Blitzkrieg*. Why this shift took place and the impact it had on historical study of the campaign is beyond the scope of this paper. The shift, however, is important in understanding the perception of the use of tanks in scholarly works.

Beginning mainly in the 1960s and running at least until the 1980s there has been a trend in viewing the German actions of 1940 as exceptional. This shift follows with the global political situation at the time, the growing tensions between the West and the Soviet Union, and the reformation of the German military.³⁰ The later, in particular, required rehabilitation of the wartime German reputation in order to incorporate German troops and experience into the greater military effort against the Soviet Union. It is for this reason that in these works German actions were the primary agent of events, not

29 Richard Carswell, *The Fall of France in the Second World War: History and Memory* (Cham, Switzerland: Palgrave Macmillan, 2019), 219.

30 Norrin M. Ripsman, "The Curious Case of German Rearmament Democracy, Structural Autonomy, and Foreign Security Policy." *Security Studies* 10:2 (2000): 27.

French actions. There are a number of factors which influence this model of examination of the campaign. One important factor which shows up in the scholarship is the widespread availability of German source material. German officers widely published their memoirs in the 1950s, and in many cases these were taken at face value by historians and those writing about the history of the 1940 campaign. Fuller, in his 1961 book *The Conduct of War* favoured the German side of sources more heavily than in his 1948 book *The Second World War*. For the former book, Fuller relied almost entirely on Guderian's memoirs as the source on the 1940 campaign, with little effort to broaden the source base as he would do with other aspects of the Second World War.³¹ For the earlier book however, Fuller relied heavily on news reports, official documents, and personal statements from French and British officers, as well as Allied analysis of German capability, with far less emphasis on German sources themselves.³² This is perhaps understandable given that English language translations of many relevant German sources were not available until the early 1950s.³³ Liddell Hart would likewise follow a similar trajectory. For Liddell Hart, however, praise of German actions had a direct link to his own claims to influence those successful German actions.³⁴ Besides assigning himself credit for the ideas behind the German operations in 1940, Liddell Hart's 1954 book *Strategy* described the campaign in terms of the impact and use of shock by the German army to defeat France.³⁵ For Liddell Hart, the French defeat was not related so

31 Fuller, *Conduct*, 256.

32 Fuller, *The Second World War*, 70-82. See footnotes describing the fall of France without a single German source reference.

33 Guderian's *Panzer Leader* was first published in English in 1952, *The Rommel Papers* were published in English in 1953.

34 Azar Gat, *British Armour Theory and the Rise of the Panzer Arm: Revising the Revisionists* (Hampshire: Palgrave Macmillan, 2000), 44.

35 Liddell Hart, *Strategy*, 225.

much to French preparedness, or capability, but to the superior use of shock by Germany, particularly in preventing action by the French. Once German tanks crossed the Meuse river, argues Liddell Hart, they caused a breakdown in French response because they were poised to advance in a number of directions.³⁶ The French lost because the German army could strike anywhere in France from then on. An organized defence was thus impossible, and the French army crumbled before the advancing German tanks.

In a more applied approach to the campaign, retired British Army Brigadier Richard Simpkin took this approach further in his analysis of tank warfare. Writing in the 1970s Simpkin's works were historical for practical application in the Cold War as part of understanding how to fight the Soviet Union better. For Simpkin, the best lessons to be learned from the 1940 campaign were the lessons which led to victory, and therefore he was primarily interested in the German actions. Simpkin's description of the German victory lies entirely in the German use of shock. First, Simpkin asserts that taking of "unacceptable risks" by German tank officers, particularly Rommel, during the campaign was a significant gamble which paid off greatly in 1940.³⁷ While Simpkin acknowledges that these risks were contrary to German training and doctrine at the time, they were essential to the German victory. By undertaking the unexpected, officers such as Rommel were able to surprise French forces.³⁸ This was important according to Simpkin because Germany was not able to counter an enemy which could withstand them on an equal footing, and thus relied on shock to attain victory.

36 Ibid, 231.

37 Richard E. Simpkin, *Tank Warfare: An Analysis of Soviet and NATO Tank Philosophy* (London; New York: Brassey's; Crane Russak, 1979), 9.

38 Ibid, 45.

More recent scholarship has taken a more complex and nuanced approach to the 1940 campaign. Though both sides have individually received more detailed attention from scholars, the trend has been to focus less on the specific failures or unique greatness of either side, but rather to take a holistic approach to understanding the campaign. In his books *The Breaking Point* and *Seeds of Disaster* historian Robert A. Doughty outlines the failure of the French army in properly fighting the German invasion without the earlier emphasis on the French army being to some degree incompetent. Doughty is critical of the French army, its command, doctrine and operations, while also being critical of the previous scholarship to focus on the French side of the campaign. With regard to Fuller's analysis of French army performance, Doughty argues that Fuller incorrectly understood the role of tanks in the campaign dismissing the more important role of German infantry and artillery and ultimately forming an incorrect assessment of French tanks in response.³⁹ Doughty agrees with Fuller, and others', assessment that France was unprepared to fight a mobile war in 1940.⁴⁰ The particular reasons why France was unprepared to fight a mobile war are discussed in *Seeds of Disaster*, where Doughty breaks down the development of French doctrine in the interwar period. To summarize, Doughty asserts that French doctrine set out to conduct a methodical battle of position, where every aspect was carefully planned and conducted according to that plan. The faster tempo and unpredictable nature of the German invasion caused the French army to be paralyzed in its decision-making capability, and thus unable to properly resist the invasion. He argues that because the collapse occurred primarily in French sectors, and

39 Robert A Doughty, *The Breaking Point: Sedan and the Fall of France, 1940* (Hamden, Connecticut: Archon Books, 1990), 324.

40 Ibid, 325.

because Germany was much better prepared for the war itself, France was very clearly not prepared to fight the kind of war Germany wanted to.⁴¹ He wrote of this: “The complete collapse of the French army in 1940 demonstrated that it had failed to prepare adequately for the demands of modern warfare... [France] was prepared to fight precisely the type of war that Germany wanted to avoid.”⁴² Julian Jackson, in his analysis of the failure of the French army to properly meet the German challenge, identified failures in the French intelligence service in properly identifying the main thrust of German forces.⁴³ Further to this, Jackson has asserted that the French army was well aware of the possibility of a German advance through the Ardennes region with armoured forces, even going so far as to indicate the French army accurately predicted the amount of time such a move would take as early as 1938.⁴⁴ Instead the failure of the French army in this case was not the lack of foresight, but the inability to properly address this issue due to sending the strategic reserves required to do so north into Belgium based on faulty intelligence. While still critical of France, this no longer held France to be incompetent, rather the failures of the French army were not unique to France.

Historians of the German military have likewise been kinder to France’s 1940 performance in attempting to explain the German successes. James Corum, for example, argues that the French army was frozen in 1918, with a strong emphasis on the power of defence from generals such as Philippe Pétain.⁴⁵ This left interwar French army training

41 Robert A. Doughty, *The Seeds of Disaster: The Development of French Army Doctrine, 1919-39* (Mechanicsburg, Pennsylvania: Stackpole Books, 2014), 3.

42 Ibid, 4.

43 Jackson, *Fall of France*, 219-220.

44 Jackson, *Fall of France*, 32.

45 James S. Corum, *The Roots of Blitzkrieg: Hans Von Seeckt and German Military Reform* (Lawrence, Kan.: University Press of Kansas, 1992), 204.

inadequate to prepare troops for a modern war of mobility. Further, Corum argues that the French army, having amassed the largest tank force of the First World War, had so many obsolete tanks following the war that they dictated French doctrine development. This was not, however, the case with Germany, which had had its tanks banned by the Versailles treaty.⁴⁶ Robert Citino has asserted that the French army was so ill prepared for mobile warfare that by the time German tanks emerged from the Ardennes forest on 12 May 1940, Germany had already won the campaign. It did not matter then that the French 55th and 71st divisions facing the German tanks around Sedan panicked.⁴⁷ In his detailed analysis of the German aspect of the 1940 campaign German historian Karl-Heinz Frieser has been kind enough to attribute German successes more in line with unexpected events and good luck than French failures.⁴⁸ The role of unexpected events and luck has taken more prominence in understanding the 1940 campaign in the decades since the 1970s.⁴⁹

Writing about *Blitzkrieg* as an idea

With the success of German offensives in 1939 and 1940 it became an important topic among some theorists to emphasize their contribution to the German capacity. In writing of the actions of German tanks in 1940, Fuller described them in terms directly linked to his Plan 1919. The German operations, he claimed, took their inspiration from his plans, and thus he can be seen as attempting to establish an early link between British theorists and the successful German operation.⁵⁰ While Fuller is important to consider

46 Ibid, 98-99.

47 Citino, *Armoured Forces*, 76.

48 Carswell, *Fall of France*, 221.

49 Carswell, *Fall of France*, 218.

50 Fuller, *Conduct*, 255.

here because his 1932 work *Lectures on F.S.R. III: Operations Between Mechanized Forces* formed the basis for another publication in 1942 titled *Machine Warfare* in which he sought to explain German success and how to defeat Germany through his own proposals, the key player in this period was Liddell Hart. While *Machine Warfare* would quote *Lectures on F.S.R. III* heavily, it would also draw from Fuller's experiences with Germany since 1932, and particularly from reports from the Second World War itself which Fuller employed to favourably promote himself as intellectual originator of the very concepts Germany employed in 1939 and 1940.⁵¹ It has conversely been argued that Fuller's influence had largely waned by the 1930s, leaving German doctrine based on the theories of Liddell Hart.⁵² Liddell Hart's early writing on armoured warfare has been described as virtually identical to Fuller's, with historian Azar Gat arguing this is due largely to Liddell Hart's adoration of Fuller in the 1920s.⁵³ Liddell Hart, however, would endeavour to place himself as a major influence on German military thought through the defeated German officers themselves. Through publication of the memoirs and papers of some of the major German generals associated with *Blitzkrieg*, largely edited by Liddell Hart in their English releases, he ensured he was credited directly in the postwar narrative.⁵⁴ Though this credit has come under scrutiny since the 1980s, which will be discussed later, for much of the Cold War Liddell Hart's influence was accepted as a fact. The major document which provides the evidence for Liddell Hart's influence is the English translation of Guderian's autobiography *Panzer Leader*, which describes Liddell

51 Fuller, *Machine Warfare*, 34-36.

52 Perrett, *Blitzkrieg*, 56.

53 Azar Gat, "Hidden Sources of Liddell Hart's Strategic Ideas" *War in History* 3:3 (1996): 295.

54 Azar Gat, "British Influence and the Evolution of the Panzer Arm: Myth or Reality? Part I." *War in History* 4:2 (1997): 150. And John J Mearsheimer, *Liddell Hart and the Weight of History*, Cornell Studies in Security Affairs, (Ithaca: Cornell University Press, 1988), 190-191.

Hart as a primary influence on the ideas Guderian espouses within the book.⁵⁵ This translation of the original German book gave weight to Liddell Hart's own indirect claim to influence provided in his study of strategy which included in depth examination of the 1940 campaign. In his book, *Strategy*, Liddell Hart emphasizes the British origins of German theory, without reference to specific names.⁵⁶ This mention is followed by praise for Guderian and his implementation of these British-originating ideas as Liddell Hart analyzes the campaigns of 1939 and 1940. *Strategy* largely served to provide Liddell Hart with an avenue to prove his theories of warfare with hindsight to the Second World War. Historians since have likewise repeated this claim that Guderian gave Liddell Hart the title of "father of mechanized warfare" by merely accepting at face value the claims of Liddell Hart and Guderian.⁵⁷

Cold War military analysis of the 1940 campaign, rooted primarily in the contemporary threat of the Soviet Union in Europe, would adopt this understanding of Liddell Hart's influence as well. Writing a series of books on the future of warfare between NATO and the Warsaw Pact Simpkin would carry the association of Liddell Hart as ideological originator of the *Blitzkrieg* through several works as he examined the lessons of 1940 in order to postulate how to defeat the Soviets. His work *Tank Warfare*, which as a military theory document is similar to Guderian's *Achtung-Panzer!* and Fuller's *Lectures on F.S.R. III* in that it primarily deals with how to fight a war, includes a historical examination of the German successes of the early Second World War.⁵⁸ This sentiment is likewise repeated in his book *Mechanized Infantry*, where Simpkin considers

55 Guderian, *Panzer Leader*, 20; Also Mearsheimer, *Weight of History*, 164-165

56 Liddell Hart, *Strategy*, 222.

57 Perrett, *Blitzkrieg*, 56.

58 Simpkin, *Tank Warfare*, 34.

the role of modern mechanized infantry in a potential war with the Soviet Union in the era of atomic weapons.⁵⁹ As well, in 1985 Simpkin published a more radical analysis and proposition to future combat titled *Race to the Swift*, where he carried forward the idea of Liddell Hart's influence on German developments.⁶⁰ Simpkin's carrying forward of Liddell Hart's contribution to German theoretical development was one of necessity rather than academic malfeasance. As Simpkin wrote for military theory his works were not within the realm of academic history, and as such he drew on the existing work of historians in order to provide military analysis of the *Blitzkrieg*, and thus provided another avenue for the historical analysis of this subject to be considered. Simpkin's main contribution to the study of *Blitzkrieg* lays in the focus on contemporary military lessons to be learned, as he provided a fresh lens through which academic historians could consider the evolution of the concept. Simpkin's reliance on a contemporary, professional, relationship to the history of the idea of *Blitzkrieg* can thus be understood as building upon the ideas of the interwar years for their original purpose. Because of this Simpkin argues for a comparative approach to understanding the underlying theories that would be referred to after the Second World War as *Blitzkrieg*, in order to better understand their employment in modern military settings. Further to this, Simpkin's work in understanding Soviet theoretical developments of "Deep Battle" in order to better combat the USSR in the Cold War provides a wider base of understanding through which he interprets German theory and its application in his analysis.⁶¹ Simpkin thus provides a

59 Richard E. Simpkin, *Mechanized Infantry* (London; Washington, D.C.: Brassey's Defence, 1980), 13.

60 Richard E. Simpkin, *Race to the Swift: Thoughts on Twenty-first Century Warfare* (London; Washington, D.C.: Brassey's Defence, 1985), 17.

61 Richard E. Simpkin, and Erickson, John. *Deep Battle: The Brainchild of Marshal Tukhachevskii* (London; Toronto: Brassey's Defence, 1987), 252.

broader comparative element in order to understand the 1940 campaign, though through the lens of military action in the Cold War and not necessarily historical analysis.

In the 1980s, academic trends shifted away from the idea that a few individuals were responsible for the development of the theories which would take German tanks into France in 1940. In 1988, John Mearshimer published a scathing examination of Liddell Hart's relationship to German Generals such as Guderian in the postwar period, creating a shift away from the idea of Liddell Hart as a major influence. Mearshimer's work deals primarily with Liddell Hart inserting himself into the memoirs of German officers through favours and other contributions to them and their families in order to be given credit as an influence to their successful actions in the Second World War.⁶² As such Mearshimer's contribution to the study of interwar tank theory is less direct, as he provides the impetus to examine German theoretical development in more depth without focus on Liddell Hart, and later without focus on the other major postwar name associated with the subject: Guderian. Scholarship which has since followed Mearshimer, such as Corum's study of German armoured doctrine has tended towards treating the idea that German interwar theory development was directly taken or inspired by British developments as a misconception.⁶³ Much of Corum's work in this regard is undertaken in order to correct this misconception.

The emphasis on the originality of German theory development has led historians to reevaluate Guderian's claim to be sole creator of tank theory in Germany. Corum's work, for example, has considered the head of the Reichswehr in its early years, Hans

62 Mearsheimer, *Weight of History*, 190-191.

63 Corum, *Roots of Blitzkrieg*, 137.

von Seeckt, as a much more influential figure in this regard. For Corum, viewing Guderian as the sole originator of German interwar tank theory, fighting against a conservative and reactionary high command staff in order to push revolutionary new ways of war is a complete misconception.⁶⁴ Corum argues that Guderian's writing was limited to only a few articles prior to 1937, that his own contributions are greatly overblown compared to the prolific writings of theorists such as Ernst Volckheim or Ludwig Ritter von Eimannsberger, upon whom Guderian relied heavily.⁶⁵ In this way Corum argues that Guderian built himself up as ideological originator, while blatantly ignoring those from whom he built his ideas in order to better promote himself.⁶⁶ This emphasis on Guderian, especially in the early years of scholarship on the subject, stems primarily from Guderian's own autobiography taken at face value, rather than more detailed research.⁶⁷ Other historians have examined the relationship between British, or even French, theorists and German tank theory development as well. Richard DiNardo, for example concluded there was little if any foreign influence on German developments.⁶⁸ Instead, DiNardo asserts that the methods which Germany employed in 1940 were derived primarily from German experiences in the latter half of the First World War, and were a natural extension of that period.⁶⁹ There is a continuation of thought from the First World War to 1940 for DiNardo, which does not indicate either British influence or even a primacy of Guderian in developing these theories. Others have discussed Ludwig Beck as originator of not only the German tank force, but the methods

64 Ibid.

65 Ibid, 139.

66 Ibid.

67 Ibid, 137.

68 R.L. DiNardo, "German Armour Doctrine: Correcting the Myths." *War in History* 3:4 (1996): 396

69 Ibid, 396-397.

of its employment. In his brief assessment of the development of interwar tank theory in Germany, Simpkin implied Beck, not Guderian, was primarily responsible for the creation and employment of the panzer divisions.⁷⁰ Gat has examined Beck's role, and though he does not discount Beck as a major driving force to the creation and training of the German tank force, he neither brushes aside Guderian.⁷¹ Eimannsberger has also received recent attention among scholars outside of Germany as a major influence on German tank theory development. Eimannsberger was an Austrian general who would later join the German army.⁷² A major proponent of the idea of combined arms, Eimannsberger was widely published in German military publications. Citino describes him as the "best-known tank writer in the 1930s" in Germany.⁷³

70 Simpkin, *Race to the Swift*, 29.

71 Azar Gat, "British Influence and the Evolution of the Panzer Arm: Myth or Reality? Part II." *War in History* 4:3 (1997): 317.

72 Citino, *Quest*, 198.

73 *Ibid.*

Chapter Two: Maneuver

Combined Arms as The Future

The higher-level consideration of the employment of tanks comes down to two important elements which must be considered. The first element is the role the tank, and other mechanized arms, can play in a combined arms endeavour, and how tank forces as either independent arms or subjugated to another arm, can operate within it. The idea of combined arms operations, employing various arms of an army such as artillery, infantry, cavalry, etc. in concert in order to facilitate success on the battlefield was something that all combatants of the First World War had come to understand as an important element of modern warfare. This had been made clear by the end of the war through the cooperation between artillery and infantry, and in some cases with tanks and aircraft as well. The second element which must be considered is the role of mobility in the outcome of operations. Here, as will be discussed below, is where the armies of Europe began to differ, both in their experiences in the First World War, and in their conclusions of how to fight a future war.

The German panzer divisions as they were organized in May 1940 were formed as combined arms units based around the tank as their primary striking force. They consisted of four tank battalions, with three infantry battalions, an anti-aircraft battalion, an anti-tank battalion, an armoured reconnaissance battalion, and three artillery battalions, plus other attached units.⁷⁴ As the tank was the primary fighting force of the division, it can be clearly seen that the emphasis in numbers was on the tank units.

⁷⁴ Guderian, *Panzer Leader*, 519.

The combined arms approach employed in 1940 sought to employ this mixture of unit types to best effect against their enemy. Germany certainly managed to place more of these divisions into combat in 1940 than France and Britain, so it is important to consider the origins of the idea of such a unit in order to understand how and why this was the case.

The 1917 battle of Cambrai involved a force of nearly four hundred tanks, attacking with total surprise early on the morning of 20 November.⁷⁵ The battle followed the advance of the British tanks, through the stunned German lines along the first day at an unprecedented speed. Citino has described this first day as the most successful tank attack of the war.⁷⁶ German defenders in many, though not all, objectives of the British advance were unable to resist the advancing tanks and their supporting infantry. Many German units retreated or surrendered, and “a huge hole, six miles wide and three miles deep, was torn” through the German lines in a day.⁷⁷ This was unprecedented in the preceding months and years of the First World War. The exploitation of this hold had been assigned to horse mounted cavalry, however they were unable to act and ultimately failed to exploit the successful penetration.⁷⁸ By the end of November German reinforcements had managed to retake the original German lines by use of similar tactics of surprise but without the use of tanks. The battle of Cambrai is a pivotal moment in the development of British tank operations. It has gone down in history as proving the worth of the tank in a massed attack, operating in a combined arms fashion with infantry, artillery, and aircraft. However, unlike the later German panzer divisions, the operations

75 Citino, *Armoured Forces*, 18.

76 Citino, *Armoured Forces*, 19.

77 Citino, *Armoured Forces*, 18.

78 Citino, *Armoured Forces*, 20.

at Cambrai were focused on the striking power of the infantry and artillery, with the tank force merely supporting them.⁷⁹ In Britain, the idea of a combined arms force based around the tank formed early in the tank program itself. In his memoirs Fuller relates that the idea of “tank armies” consisting of some five hundred tanks and an array of motorized supporting units including infantry and artillery was proposed as early as 10 December 1917.⁸⁰ Though he does not elaborate much further, he does ascribe this proposal not to himself, but to Sir Eustace H. T. d’Eyncourt, who had been chairman of the Landships Committee, the group which developed the first British tanks.⁸¹ Though this proposal would not bear fruit, the underlying idea of employing tanks as the primary arm, supported by other arms motorized in order to keep pace with the tank would form the basis for Fuller’s Plan 1919. Plan 1919 was the planned operation for the summer of 1919 to defeat Germany and prevent the war being dragged into the 1920s. Though the First World War would come to a close before the end of 1918 and ultimately Plan 1919 would not be employed, it is interesting to consider in how it outlined the role of supporting arms. First, the plan called for the employment of more than five thousand tanks over a front of only 80 kilometres, broken up into three primary groups built around the capability of the tanks: breaking force, disorganizing force, and pursuing force.⁸² The breaking force would include the main infantry attack, supported by artillery and aircraft, and rely on large numbers of tanks in order to break the German lines.⁸³ While this

79 J.P. Harris, *Men, Ideas, and Tanks: British Military Thought and Armoured Forces, 1903-1939* (Manchester: Manchester University Press, 1995), 124.

80 J. F. C. Fuller, *Memoirs of an Unconventional Soldier* (London: Ivor Nicholson and Watson Limited, 1936), 318.

81 Ibid, 318. And J.F.C. Fuller, *Tanks in the Great War: 1914-1918* (Athens: Alpha Editions, 2019), 23.

82 Fuller, *Memoirs*, 334.

83 Ibid, 338.

certainly constitutes a combined arms force, it does not necessarily mean one using the tank as its primary arm. For this we must look to the disorganizing force, which Fuller outlines as operating on the mobility of new medium tanks. In Fuller's description, the disorganizing force would operate as "Armoured Independent Cavalry", and conduct deep attacks on German communications and command centres after the breaking force opened the German line. In order to accomplish this, the disorganizing force requires supporting arms in engineers, signals, infantry, artillery, and even supply all provided with their own motorized transport capable of keeping up with the new medium tanks.⁸⁴ This force would never be more than a paper example as the war ended before it could be constructed and employed, but it shows a serious application of a tank-centric combined arms force at the end of the First World War. This idea would not be seriously considered again in Britain until the mid 1920s with the creation of the Experimental Mechanized Force.

In 1927 the British Army established an Experimental Mechanized Force for the purposes of trialling the roles and capabilities of such a force in modern warfare. Though the formation of this force was limited by a shortage of vehicles, both armoured and unarmoured, the force was established along the following lines: a reconnaissance battalion, a tank battalion, a machine gun battalion, three batteries of artillery, and attached companies of engineers and signals troops.⁸⁵ This unit lacked motorized infantry support, but did carry other arms motorized to keep up with the tank force. One of the original proposals for the experimental force, however, did include three motorized

84 Ibid.

85 Gifford Le Q. Martel, *In The Wake of The Tank: The First fifteen Years of Mechanisation in The British Army* (Uckfield: The Naval and Military Press Ltd., 2018.), 147-148.

infantry battalions, providing a fully mechanized force though not a tank-centric one.⁸⁶ This experimental force ran for 1927 and 1928 and provided the British Army with valuable lessons on the role of the tank in modern combined arms. Ultimately the British Army would conclude that the experimental force proved the need for an armoured brigade that would contain many of its supporting arms but which could be attached to an infantry division with artillery to provide a mobile striking force.⁸⁷ This of course does not follow the established tank-centric force we would ultimately see in Britain by 1939, however that was not the only lesson of the force. In 1934 a “mobile division” was proposed following the lessons of the experimental force and built around a brigade of tanks, a motorized cavalry brigade, three battalions of motorized infantry, and other motorized arms such as artillery.⁸⁸ Instead the 1st Tank Brigade would be permanently established in 1934, employing radios and mobility for their shock value.⁸⁹ The Experimental Mechanized Force and later 1st Tank Brigade can thus be considered the direct ancestors to the combined arms armoured divisions that would be formed later.⁹⁰ Ultimately this force structure would not be immediately adopted, but it does provide perspective in the lessons taken from the British experimental mechanized trials. It would not be until 1938 that a proper combined arms unit with tanks as the primary arm would be established in Britain.⁹¹ This force, developed from the tank brigade established

86 Harris, *Men*, 212.

87 Martel, *In The Wake of The Tank*, 154.

88 Alaric Searle, *Armoured Warfare: A Military, Political, and Global History* (London; New York: Bloomsbury Academic, 2017), 44.

89 Perrett, *Blitzkrieg*, 56.

90 Ibid, 57.

91 Citino, *Armoured Forces*, 48.

following the experimental mechanized trials, would in 1939 be redesigned as an “Armoured Division”, the first in the British Army.⁹²

The French experience with tank-centric combined arms units would differ significantly from either the German or British experiences. Though the French tank force would come out of the First World War with similar experiences as the British regarding the massed use of tanks and their employment as the primary arm of an armed force, they would ultimately not retain their independence or carry these lessons forward. The French tank attack at Soissons in 1918 carried with it several similarities to the British attack at Cambrai a year earlier. First, it involved a combined arms attack with tanks leading infantry and cooperating with aircraft and artillery.⁹³ Second, it struck an undeniable blow against the German Army with its shock and surprise.⁹⁴ Third, it was an infantry-centric operation just like Cambrai.⁹⁵ This action would not, however, provide the impetus for the salvation of the French tank force as an independent arm, and it would be subsumed under infantry control after the war.⁹⁶

In 1932, the first proper combined arms unit based on the tank to be seriously considered by the French Army was field tested in order to determine its validity.⁹⁷ This was not the first time the idea was proposed, however. Estienne had proposed large, combined arms units at least as early as 1920, and although ultimately unsuccessful in gaining support for this idea, he was very vocal about it until his retirement.⁹⁸ Estienne

92 Ibid.

93 Tim Gale, *French Tanks of the Great War: Development, Tactics, and Operations* (Barnsley: Pen and Sword Books, 2016), 129.

94 Ibid, 146.

95 Ibid, 129.

96 Ibid, 215.

97 Doughty, *The Seeds of Disaster*, 169.

98 Ibid, 167.

was instrumental in the creation of the French tank force during the First World War, an association that would earn him the nickname “the father of the tank”.⁹⁹ He would hold the position of inspector of the tank force through much of the 1920s, though his influence would wane following the First World War. Estienne’s influence can be seen as waning as early as 1922 when despite his protests the French army tank arm was subsumed into the infantry branch as a dependent arm, rather than the independent arm he had pushed for.¹⁰⁰ This idea would come up again a few years later in 1927, and be proposed to the French Army High Command, though not seriously considered.¹⁰¹ None of these proposals would spur any serious consideration. Doughty has argued that part of the reason the idea of large combined arms formations was not seriously considered by the French Army at the time came down to the lack of sufficient medium tanks which could be employed by such a formation, while the light tanks of the infantry support units were the most numerous of the French Army.¹⁰² The light tanks were destined to support the infantry units in their operations. As Doughty points out, the infantry remained the primary branch of the attack in the French Army throughout the interwar period, and as such taking tanks assigned to support the infantry in order to create a dedicated combined arms unit was not considered a good use of resources in the French Army High Command.¹⁰³ In 1932, however, the idea went as far as field tests, which would ultimately

99 Jackson, *Fall of France*, 22.

100 Tim Gale, *The French Army’s Tank Force and Armoured Warfare in the Great War: The Artillerie Speciale* (New York: Routledge, 2016), 217.

101 Doughty, *The Seeds of Disaster*, 169.

102 Ibid, 167-168.

103 Ibid, 168.

reinforce the supporting role of the tank to the infantry in the eyes of the French Army High Command.¹⁰⁴

Though the 1932 field tests were a failure in the eyes of the French Army, they did not deter further examination of the concept of large, combined arms units. In 1934, de Gaulle published his book *Vers l'Armée de Métier* in which he outlined his idea for a professional combined arms force to be built around the tank as its primary arm. De Gaulle's fully professional force comprised six "divisions of the line" and would form the mobile backbone of the French Army. Each division would comprise one brigade each of tanks, motorized infantry, and motorized artillery, and have at its disposal some 500 tanks.¹⁰⁵ These divisions would not replace the masses of conscripts that made up the French army but would instead serve as a quick reaction force to allow time for French reserves to be called up. The mobility afforded by the tank, and mechanized supporting arms, provided the option to conduct offensive strikes in the earliest hours of a potential war when the enemy would not be prepared for them.¹⁰⁶ De Gaulle based the method of operation on what he saw as the "great cavalry of olden days"¹⁰⁷ in that these independent forces could conduct unexpected, sudden and violent blows, returning the idea of surprise to the French Army.¹⁰⁸ De Gaulle's ideas would ultimately be rejected by the French Army, not on the soundness of his ideas regarding combined arms and massed tank employment, but on his insistence in the use of a professionally manned force.¹⁰⁹ For the

104 Ibid, 169.

105 Charles de Gaulle, *The Army of The Future* (London: Hutchinson & Co, 1940), 88-89.

106 Ibid, 113-114, 117.

107 Ibid, 112.

108 Ibid, 119.

109 Eugenia C. Kiesling, "Chapter 14, Military Doctrine and Planning in the Interwar Era," in *The Cambridge History of War, Volume 4: War and the Modern World*, eds., Roger Chickering, Dennis Showalter, Hans van de Ven (Cambridge: Cambridge University Press, 2012), 341.

French Army, at the time built upon a system of reservists and conscripts on short contract, the idea of a professional force in addition to the main conscript force created tension and the idea of the formation of a politically dangerous elite within the army.

The French Army would finally create large, combined arms formations, based on the capabilities of the tank, starting in 1935 with the cavalry *Division légère mécanique*, or DLM.¹¹⁰ The DLM is controversial in terms of the study of armoured warfare in that, as Kiesling puts it, it mirrors the composition and capability of the German panzer divisions of 1940, but are often not considered as similar when approached by historians.¹¹¹ The DLM would come into existence mere months before the first three German panzer divisions, though it would not be until 1940 that a real French armoured division was formed.¹¹²

The formation of the first German panzer divisions caused a stir in French Army High Command and a new examination of the concept for the French Army. In 1936 Gamelin ordered a study to be conducted on the creation and employment of armoured divisions for the French Army.¹¹³ Proper armoured divisions in the French Army would not be formed along the lines proposed earlier by de Gaulle or Estienne, but rather much more limited and tied to a supporting role for the infantry on a grand scale as the DCR. The DCR, proposed initially with one demi-brigade each of light tanks, medium tanks, and motorized infantry, plus motorized supporting forces, were intended to operate in support of larger infantry based formations such as corps or armies, by employing their

110 Doughty, *The Seeds of Disaster*, 177.

111 Kiesling, "Doctrine", 342.

112 Robert M. Citino, *The Path to Blitzkrieg: Doctrine and Training in the German Army, 1920-1939* (Boulder: Lynne Rienner Publishers Inc., 1999), 231. And Doughty, *The Seeds of Disaster*, 173.

113 Kiesling, "Doctrine", 343.

mobility and mass in support of the main infantry effort.¹¹⁴ In this way they would be laid down along the lines stipulated in the failed 1932 trials, and the subsequent and also failed 1933 trials which convinced the French Army High Command not to pursue large combined arms formations initially.¹¹⁵ The hasty nature of their organization and the lack of proper support elements within the French Army for these divisions weighed considerable problems upon them, however. These new divisions lacked support equipment such as transporters and anti-tank guns, and when they were formed, their commanders were poorly trained and understood little about how to properly employ their forces, with possibly the exception of de Gaulle commanding the 4th DCR, as he held practical experience in the employment of armoured forces.¹¹⁶

Germany was not among the most prominent proponents of independent tank forces coming out of the First World War. Though German ideas behind combined arms forces would be in place as early as the First World War itself, and officially adopted early on by the postwar Reichswehr, the force would still be based on the infantry, not the tank.¹¹⁷ The emphasis on independent mobile forces would be placed primarily on cavalry, as German experiences in the East had taught them the value of independently operating combined arms groups built around the highly mobile cavalry.¹¹⁸ This would be seen as so crucial that the Reichswehr would ignore restrictions on cavalry units imposed by the Versailles treaty, doubling the size and capability of their cavalry units and adding a wide array of highly mobile, motorized supporting forces such as infantry, artillery, and

114 Doughty, *The Seeds of Disaster*, 173-174.

115 Ibid, 174.

116 Kiesling, "Doctrine", 343.

117 Searle, *Armoured Warfare*, 41.

118 Corum, *Roots of Blitzkrieg*, 47.

signals units.¹¹⁹ For the Reichswehr, forbidden from possessing tanks at the time, cavalry was the way of the future, and the future of the cavalry was “all arms light divisions for independent operations.”¹²⁰ However, it is not likely the German army stuck with the combined arms cavalry concept because of the perceived merits of the cavalry. In the early 1920s German officers observing French and British exercises concluded that mixing horses with mechanized units was unlikely to be a successful approach to future war.¹²¹ It is from this combined arms cavalry focus that the interwar German army would build its successful tank force, with the emphasis on mobility and the benefits of mechanization to that emphasis being established with the means available to Germany under the Versailles Treaty.

By the 1930s any pretense of following the Versailles treaty limitations had been abandoned, and Germany was pursuing a tank development program. With this program came reexamination of the capability of the tank, and its role in combined arms. In analyzing the British tank attack at Cambrai in the late 1930s, the German army came to the conclusion that tanks, though useful as the main force, should not be employed without mechanized supporting forces.¹²² In reevaluating Cambrai, the German army concluded that the ultimate failure of the British tanks in that battle lay not with the tanks, but with British high command, which did not properly support the tank force in order to achieve victory.¹²³ It is at this point that the tank begins to replace the cavalry as a

119 Ibid, 46.

120 Ibid, 32.

121 Searle, *Armoured Warfare*, 41.

122 Alaric Searle “The Battle of Cambrai: Reactions, Commemoration and Symbolism, 1917-1942” In *Genesis, Employment, Aftermath: First World War Tanks and the New Warfare, 1900-1945*, ed., Alaric Searle (Solihull, Helion & Company, 2015), 234.

123 Ibid, 235.

decisive mobile arm. Eimannsberger's analysis of tank warfare in 1934 would emphasize this mobile role and replacement, arguing that the flow of battle in a tank-based army would be faster and thus provide more rapid decisive victory if properly employed.¹²⁴ An attack with tanks, operating as a combined arms unit, would employ shock and surprise in order to attain victory faster than a traditional infantry and artillery-based attack, in much the same way cavalry could achieve such surprise. Eimannsberger was well versed in Fuller's ideas at this time, though he was critical of many and sought instead to apply the lessons of the First World War in the East to the technology of the West.¹²⁵ By 1936 the official German army manual for the use of tanks would include these ideals, though still as a supporting force to the infantry.¹²⁶ In this manual, cooperation with aircraft and the employment of masses of tanks on a narrow front to force a decision in battle were also discussed, much as would be undertaken by the German army a few years later in 1940. This approach closer to combined arms as would be seen in 1940 was not emphasized as heavily as support of infantry operations, though the seeds of combined arms are there.

The importance of Mobility in a war of Maneuver

One of the primary reasons Fuller believed the tank represented a revolution in warfare was due to the mobility it afforded. For Fuller, because the tank could move across country virtually unimpeded, it brought land combat more in line with naval combat. Tanks would allow men protected by armour to fire from a moving vehicle,

124 Ludwig Ritter von Eimannsberger, *Der Kampfwagenkrieg*, 2nd Edn (Munchen/Berlin: J.F.Lehmanns Verlag, 1938), 189.

125 Searle, *Armoured Warfare*, 37.

126 Ibid, 41.

while manoeuvring in any direction bound by roads.¹²⁷ This allowed the tank attack, which would be conducted through surprise by movement, to have greater impact on the battlefield than any other arm before it. For Fuller, the speed of movement was not important, but rather the creation of unexpected situations through the ability to move counter to what the enemy expects.¹²⁸ For Fuller this mobility is fundamental to the tank, and permeates every facet of his writings on military theory.

The French army came out of the First World War with an understanding of mobility in warfare quite different from that of the German Army. Whereas German officers learned the value of mobility from actions on the Eastern Front, French experiences were dictated by the most important six letter word of the war for the French army: Verdun. The battle at Verdun became what Citino calls “a symbol of French will, a living, breathing manifestation of the French soul.”¹²⁹ It is possible to argue that the experiences at Verdun for the French army demonstrated the superiority of defensive warfare, and thus led the French army to sit behind its fortified defensive Maginot line in 1940.¹³⁰ This simplistic argument ignores the vital lesson the French army put into practice throughout the interwar years, that firepower is the most important aspect of battle.¹³¹ And while Verdun was important for the German army as well, Citino describes the German operations of 1940 as an “anti-Verdun.” For example, they could draw on experiences the French army could not, or would not.¹³² For French and British officers

127 Fuller, *Memoirs*, 323.

128 Ibid, 327.

129 Robert M. Citino, *Quest for Decisive Victory: From Stalemate to Blitzkrieg in Europe, 1899-1940* (Lawrence: University Press of Kansas, 2002), 165.

130 Colonel Igors Rajevs, "The French Army in the Interwar Period," *Baltic Security & Defence Review* 11:2 (2009): 193.

131 Ibid.

132 Citino, *Quest*, 182.

fighting the First World War the experiences were more static at the operational level unlike the more operationally mobile Eastern Front experiences of their German counterparts.¹³³

The French methodical battle approach, which they employed in 1940, was not intended to involve sitting in static positions and waiting for the enemy to attack. While the French army considered firepower to be the greatest tool for victory in battle, mobility was not ignored. Rather mobility was essential for victory as the relatively static initial battle, methodically planned and executed to maximize firepower, must transition to a mobile offensive or it would be unable to decisively defeat the enemy force.¹³⁴ The French army was aware of this, and it was reflected in their doctrine and training manuals of the time. Further to this, mobility was key to initiating the methodical battle, as the French army heavily invested in mechanization of its troops in the interwar period. In order to effectively counter a predicted German advance through Belgium, the French army concluded it must be able to rapidly move troops, weapons, and supplies into Belgium.¹³⁵ This is not the emphasis of an army stuck in the past and wishing to fight from within static fortresses, and as can be seen differs little superficially from the 1940 German approach of rapid movement of troops and weapons. Fundamentally, however, the French army intended to employ mobility in order to fight a war of position, not of maneuver.¹³⁶ French forces would employ mobility primarily to attain a position from

133 Corum, *Roots of Blitzkrieg*, 8.

134 Eugenia C. Kiesling, "If It Ain't Broke, Don't Fix It': French Military Doctrine Between the World Wars," *War in History* 3:2 (1996): 215.

135 Ibid, 216.

136 Simpkin, *Race to the Swift*, 20.

which to withstand German forces. Mobility was only a means to an end, not the goal itself.

Where the French army differs from the German army in doctrine of mobility is in the role and employment of the tank within this framework. French troops, rapidly advancing into Belgium in order to initiate a carefully planned methodical battle, would require tank support during their rapid advance.¹³⁷ This led the French army to employ, as part of the cavalry, tanks in highly mobile units. The role of these tanks in enhancing the mobility of French troops must be considered, despite their difference in final role to similar German forces of 1940. Useful in order to get to the position wherein the army would conduct its carefully planned battle, once the battle had begun the tanks posed a problem for the French army. Experiments in the 1930s left the French army with the conclusion that the higher mobility of tanks on the battlefield left them vulnerable to outstripping the infantry they were there to support.¹³⁸ Tanks, then devoid of the infantry they were supposed to aid, were left to either slow down their mobility and become easier targets for enemy anti-tank weapons and artillery, or drive around pointlessly as they waited for the infantry to catch up.¹³⁹ Further to this, because every aspect of the battle was to be carefully planned, there was no room for initiative on the part of French officers. Tank units could not exploit local successes even without their infantry, nor could they alter the plan to fit the tactical situation.¹⁴⁰ For these reasons the French army, though recognizing and embracing the value of mobility in achieving victory, did not

137 Kiesling, "Doctrine", 342.

138 Kiesling, "If it Ain't Broke," 217-218.

139 Ibid, 218.

140 Rajevs, "French Army", 194.

place emphasis on the tank as the weapon to bring about victory through mobility in the same way that the German army did.

That the French Army did not embrace mobility through the tank as doctrine does not mean that it was neither proposed nor considered. De Gaulle's 1934 book *Vers l'Armée de Metier* caused substantial uproar in French military and political circles, and had at its core a proposal for highly mobile tank-based forces to conduct war via maneuver, not position. De Gaulle recognized that in order to be effective as a fighting force, tanks must not be bogged down in dealing with fortified enemy forces unless it was essential to the restoration of mobility.¹⁴¹ Instead, these impediments to the mobility of the tank forces were to be dealt with by supporting forces such as infantry, and bypassed by the tanks where needed in their advance to their ultimate objectives in the enemy rear areas. This reality came from the same experiments the French army had just conducted with tanks, but whereas the army had concluded that battlefield mobility of tanks was a liability, de Gaulle had concluded that it was the greatest asset. This approach is so similar to the ultimate German employment of tanks in 1940, particularly among the rapidly advancing German tank divisions, that Robert Citino has described it as "the seeds of *Blitzkrieg*."¹⁴² This is of course no coincidence, Fuller himself gives de Gaulle credit for Guderian's ideas alongside his own influence.¹⁴³ Guderian as well cites de Gaulle's work on armoured warfare in his own work *Achtung-Panzer!* alongside a

141 De Gaulle, *The Army of the Future*, 125.

142 Citino, *Armoured Forces*, 59.

143 Fuller, *Conduct*, 255.

number of other works discussed in this paper.¹⁴⁴ As Fuller's influence can be seen deep in de Gaulle's proposal, this claim however is no surprise coming from Fuller himself.¹⁴⁵

General Estienne, father of the French tank force himself, would likewise push for the usefulness of the tank's mobility until his death in 1936.¹⁴⁶ For Estienne, maneuver and firepower together were the keys to victory, and the tank was the instrument of this through its superior mobility.¹⁴⁷ Estienne's influence was lacking by the 1930s however, and ultimately his advocacy was not as successful as even de Gaulle's for greater emphasis on mobility.

In contrast to the lessons the French took from the First World War on mobility, the German army concluded that mobility was the key to future successes. This is not surprising as many of the German generals of the 1940 campaign had spent the First World War on the Eastern front where wider spaces and more open front lines meant maneuver was the primary tool of victory.¹⁴⁸ These are notable as, just like the French experience at Verdun, the German army drew from its successes in the East and compared them to its failures. In 1914, the German 8th Army managed to almost completely destroy a Russian force nearly twice its size through superior mobility by rail to rapidly position and support its artillery force.¹⁴⁹ In 1915, as part of the minor Gorlice offensive the German 11th army spent six weeks advancing at more than six miles a day while fighting Russian forces.¹⁵⁰ These events, set in contrast to the negative experiences of the Western

144 Guderian, *Achtung-Panzer*, 213. Also cited by Guderian are works by Eimannsberger, Martel, and Fuller.

145 Searle, *Armoured Warfare*, 36.

146 Gale, *French Tanks*, 14.

147 M.P.M Finch, "Outre-Mer and Métropole French Officers' Reflections on the Use of the Tank in the 1920s," *War in History* 15:3 (2008), 301.

148 Corum, *Roots of Blitzkrieg*, 7.

149 Ibid.

150 Ibid.

front for the German army, provided German officers analyzing the First World War with a strong lesson in the superiority of mobility and a war of maneuver. As James Corum puts it, “the experience of the eastern front, where well-trained, well-led, and well-equipped Germans had consistently defeated larger enemy forces convinced von Seeckt that numbers were no longer the key to victory,” but maneuver and mobility were now seen as such.¹⁵¹ Von Seeckt, the man James Corum argues is responsible for the German army that would defeat France in 1940, would state after having analyzed these battles, that “the whole future of warfare appears to me to lie in the employment of mobile armies.”¹⁵² Clearly the German army wanted to avoid a repeat of Verdun, or the Somme.

While the German tank force of the First World War was small, and did not operate in the East, there are a few notable examples of mobility through mechanization that are pertinent for later German operations. In late 1916, shortly after the British debuted the tank on the Western front, in operations in Romania a mechanized unit based around an infantry battalion under the command of a Captain Picht undertook a fifty-mile advance in secret, outflanking Romanian defenders with complete surprise. The attack succeeded: Picht’s force overran Romanian forces on the objectives then managed to fend off attacks by numerically superior Romanian forces until relieved by conventional German units. James Corum likens this to the larger scale mechanized maneuvers of the Second World War, some thirty-four years later!¹⁵³ The value of mechanization and the decisiveness of mobility was immediately apparent to German officers according to Corum, who references Friekorps operations with armoured cars in the Baltic region after

151 Ibid, 30.

152 Ibid, 31.

153 Ibid, 8.

the war wherein deep advances as far as forty kilometres occurred using highly mobile combined arms units, as examples of the immediate impact of these lessons.¹⁵⁴ Likewise the postwar Reichswehr placed early and heavy emphasis on armoured cars and tanks, both weapons it was forbidden by the Versailles Treaty, in future operations.¹⁵⁵ These machines would replace the horse mounted cavalry in German use almost completely. These events all show how integral the concept of mobility had become to German officers, and how they took vastly different lessons than their French counterparts from the First World War. German officers viewed the French lessons as inflexible, and were unimpressed with French mechanization maneuvers in the early 1920s.¹⁵⁶ Victory lay not in defeating an equal enemy one for one, but in employment of shock and speed through mobility of the tank.¹⁵⁷ It is this lesson from the First World War that, for many, set Germany apart in the interwar period.

154 Ibid, 124.

155 Ibid, 123.

156 Ibid, 131.

157 Simpkin, *Tank Warfare*, 45.

Chapter Three: Technology

The Role of Radio and Communication in the Tank Battle

Understanding Fuller's Plan 1919 and his later radical ideas on how tanks would revolutionize warfare requires understanding the issue of communication. Radios on tanks were not new, they had been trialled in limited numbers in the First World War. However wireless communication was required for rapidly changing battle situations. For Fuller, the primary target of armoured forces was the command structure of an enemy army. If one could cut off communication from command to troops in the field, Fuller believed that army would be paralyzed.¹⁵⁸ He described it as such: "intimate connection between will and action, and that action without will loses all co-ordination: without an active and directive brain, an army is reduced to a mob."¹⁵⁹ Plan 1919 devoted considerable energy and time to the idea that defeating enemy communications defeated the enemy strategy.¹⁶⁰ He likened this idea to shooting an enemy soldier "through the brain" in that, according to Fuller, it would cause the immediate collapse of the German army, especially if applied at the operational levels from division and corps.¹⁶¹ This was applied to the British Experimental Mechanized Force in 1927-1928 by employing dedicated radio vehicles, though the ultimate conclusion was that messengers on motorcycles were faster and more efficient than radio.¹⁶² In practice during maneuvers the Experimental Mechanized Force found that the rapidly changing nature of high speed

158 Fuller, *Memoirs*, 321.

159 Ibid, 322.

160 Ibid, 323.

161 Ibid, 325.

162 Martel, *In The Wake of The Tank*, 159.

operations with tanks required far greater detail and clarity in messages than could be provided by written orders over signals, and voice radio was still in its infancy. Because of this the Experimental Mechanized Force operated with dedicated messenger officers who could provide a clearer understanding of the force commander's intent. Sir Gifford Le Q. Martel attributes this in his experience with the force as possible due to the peacetime nature of the trials. For Martel, the fact that these maneuvers were done in peacetime, when "bridges and roads cannot be destroyed" meant that couriers would always get through.¹⁶³ In addition to this, due to not taking casualties the constituent units of the force had officers to spare for courier duties and as such the courier method was far more successful in these particular maneuvers. Even so, radios proliferated down to the company level for all formations, and one tank company was trialled with radios in every tank.¹⁶⁴ Despite problematic lessons regarding fast paced communication for tanks in combat conditions it was understood thus that communication, especially the ability to rapidly communicate changing realities of battle, was an important factor of mobile warfare.

In France in 1940 however, tanks were rarely equipped with radios.¹⁶⁵ This lack of radios contrasted with the widespread German use of radios and caused considerable differences in the ability of the French army to react to changing battlefield situations. The German army, with its commanders forward, given tactical freedom to achieve their objectives and supported by radios, were better able to adapt to the rapidly changing realities of battle. French commanders, in contrast, were removed from their front lines

163 Ibid.

164 Ibid.

165 Corum, *Roots of Blitzkrieg*, 108.

by their doctrine, often not trusting the reports that came in of German maneuvers due to the rapid obsolescence of reports in the constantly changing battlefield situation, and thus were stagnant in their ability to command.¹⁶⁶ This was not without debate however. De Gaulle argued in 1934 that radio communication was needed for a mechanized army because such an army required constant communication and updates for flexibility. He said of this aspect of warfare that “there can be no satisfactory liaison without a network of wires, of light-beams and of wireless communication.”¹⁶⁷ De Gaulle explicitly believed that, for battlefield communication “the developments of wireless telegraphy are making all other means of communication obsolete.”¹⁶⁸ It is for this reason that de Gaulle emphasized enemy communications and command facilities as the primary targets for his armoured force.¹⁶⁹ De Gaulle also realized that the mobile battlefield would change rapidly, and determined, as the German army had, that radios were required in every tank in order to allow adaptability.¹⁷⁰ This was because, as Citino puts it, tanks allowed the force to be “freed from dependence on roads,” thereby allowing the force to “choose its point of attack at will, striking unexpectedly to shatter the morale of the enemy.”¹⁷¹ The battle of the future would be too mobile to rely on wired communications or dispatch riders with mail; it would require accurate means of signalling via radio.¹⁷² By using radio the majority of communications could be by spoken word, allowing rapid and simple interpretation, with little room for misunderstanding.¹⁷³ Ultimately de Gaulle’s proposal

166 Shaun A. Burley, "XI. Contrasting Styles of Command: French and German Approaches during the 1940 Campaign." *Defence Studies* 5:1 (2005): 139-140.

167 De Gaulle, *The Army of the Future*, 42.

168 Ibid, 44.

169 Ibid, 132.

170 Ibid, 129.

171 Citino, *Armoured Forces*, 58.

172 De Gaulle, *The Army of the Future*, 128.

173 Ibid, 129.

was not adopted, and General Gamelin did not provide his subordinate officers instructions to adapt to the missions they had, whereas German officers had far greater flexibility in this respect with their superior communication options.¹⁷⁴

While for Germany the number and types of signals units, those employing radios and telephones for communications, were severely limited by the Versailles treaty, their importance was so clearly recognized that the Reichswehr began to actively ignore that part of the treaty as early as 1923.¹⁷⁵ The Reichswehr knew how important communication would be in future wars of mobility, and began to attach mobile radio units to its cavalry units immediately after abandoning the limit set out in the Versailles treaty.¹⁷⁶ Volckheim, in pushing for combined arms units built around the tank, argued that communication was the single greatest tactical problem experienced by German tanks of the First World War.¹⁷⁷ He wrote here from experience, arguing that every tank should be equipped with a radio so that it could communicate with other tanks, or with infantry, artillery, or even aircraft in order to achieve coordinated success and thus decisive victory.¹⁷⁸ From early on the German army tank doctrine development proponents found the idea of armoured units operating without radios in every vehicle simply unthinkable.¹⁷⁹ This would be emphasized heavily upon witnessing French tank maneuvers in 1923, where the most critical assessment of French performance by German officers was the lack of communication capability for individual tanks.¹⁸⁰ It was

174 Burley, "Contrasting Styles", 145.

175 Corum, *Roots of Blitzkrieg*, 45.

176 Ibid, 46.

177 Ibid, 123.

178 Ibid, 129.

179 Robert Citino, "Beyond Fire and Movement: Command, Control and Information in the German Blitzkrieg," *Journal of Strategic Studies*, 27:2 (2004): 337.

180 Corum, *Roots of Blitzkrieg*, 31

clear right away that communication was key to operation of tanks, and 1940 would show how true this was.

Massing Tanks: Essential to Breakthrough

The impact of large numbers of tanks concentrated against a specific target on the capability of a defending army is an important component of the German 1940 campaign. The difference in focus between Germany and France in their concentration of tanks on the battlefield has been seen by historians as one of the major factors in Germany's victory over France in 1940.¹⁸¹ This is not to indicate that the idea was unique to Germany, but rather that for the campaign only Germany employed it successfully, if at all. Instead it should be understood that the role of massed tank forces can be broken down into two main approaches separate from the idea of combined arms units or large independent armoured formations discussed earlier: those focused on a narrow front for breakthrough, and those focused on a wide front. The former must be understood as a traditional element of the German approach to war, rather than a new concept introduced between the First and Second World Wars.¹⁸² The campaign of 1940 was not the first use of massed tanks concentrated on narrow objectives however, nor was it merely the product of traditional German military thought applied to the tank. As will be seen the

181 Searle, *Armoured Warfare*, 61.

182 Citino, *Quest*, xviii.

approach to focused tanks attacks saw considerable debate among the major powers of the interwar period.

In order to understand the impact of massed tank forces in the attack it is essential to go back more than two decades prior to the 1940 campaign, into the last two years of the First World War. For many in the interwar period the British tank attack at Cambrai in November of 1917 formed the basis for understanding and supporting the idea of massed tank forces in combat in order to achieve a breakthrough and ultimately decisive victory. Not only British theorists like Fuller, who was keen to emphasize his role in planning the Cambrai attack after the war, but German, Austrian, and to a lesser extent French and Soviet examinations took careful study of the battle. For the British Army the attack at Cambrai primarily provided proof that surprise could be achieved through the use of tanks in a modern battlefield restricted by artillery, machine guns, and fortifications.¹⁸³ Though this belief in Cambrai as proof of the utility of tanks in massed attack as a weapon of shock was widely held, it was not universally held.¹⁸⁴ Despite the debate, the future of warfare as seen by the British Army immediately following the First World War was heavily shaped by the consequences of the battle of Cambrai being incorporated into training material as early as 1920.¹⁸⁵

The lessons Cambrai provided for the British Army can be distilled down to two main elements. The first element, which has been discussed, is the role of combined arms in a successful campaign, though early British conclusions on the battle were that combined arms operations were a subject far from being mastered. The second element

183 Searle, "Reactions", 227.

184 Ibid, 229.

185 Ibid, 228.

was the employment of tanks on a narrow point of focus, or the decisive point of battle, after attacking a wider front in order to achieve surprise regarding on the exact point of penetration.¹⁸⁶ For both of these elements the overarching feature is surprise. From his early writings on the role of the tank in warfare Fuller argued that surprise was the most important weapon in war.¹⁸⁷ Surprise, for Fuller, attacked not the weapons or fortifications of an army, nor its supplies, but the morale of the soldier. Morale, as he describes it, “is the most precious virtue which a soldier can possess,” and as such is the most important element to victory in battle.¹⁸⁸ For Fuller, and the British Army immediately after the First World War, the most important aspect of surprise was “surprise by novelty of action,” or shock.¹⁸⁹ Shock, directed towards an enemy force command structure would decide a battle more surely than numbers of men or weapons. Though it was ultimately not achieved in the battle of Cambrai, this notion of shock as a decisive element of battle was, for the British, in many ways clearly shown. Fuller’s early proposals on the employment of tanks, for which he uses as proof the attack at Cambrai, see the tank as the primary method of shock, both in the initial attack and breakthrough, and through the exploitation phases of the battle.¹⁹⁰

The German approach to the massed use of tanks in the interwar period consisted of much debate on the usefulness of the idea. For Germany, the experience of the First World War was that of the defender, fighting off the massed use of enemy tanks at battles such as Cambrai or Soissons, and this coloured their analysis of these battles. For

186 Fuller, *Memoirs*, 333.

187 J. F. C. Fuller, *The Reformation of War* (Athens: Alpha Editions, 2020), 165.

188 *Ibid*, 167.

189 Fuller, *Memoirs*, 326.

190 Fuller, *Reformation*, 157-158.

Cambrai in particular, the Germans did not fully understand the lessons to be learned during the war, and this shaped their understanding in the interwar years.¹⁹¹ The initial German views of the battle downplayed the role of shock via the focused employment of tanks in creating an initial success, rather arguing in favour of the German counterattack in the later period of the battle which ultimately led to German victory. This, according to Alaric Searle, may have been motivated by promoting the “stab in the back” myth and downplaying the lack of German focus on tanks in the war as a potential criticism of German military performance.¹⁹² This debate over the analysis of the battle of Cambrai would prove contentious within German military thought throughout the interwar period, with articles as late as 1939 being published in the German General Staff Journal arguing that viewing Cambrai as a German success would lead to the wrong lessons being learned.¹⁹³ The correct lessons, of course, would be the focus of large numbers of tanks in the attack.

Though as early as April 1918 Fuller reported reading German assessments of the battle of Cambrai which focused on the importance of shock and the role of the tank, it would not be until the end of the 1920s that German military theorists openly analyzed the battle in this way.¹⁹⁴ The earliest German thoughts on the employment of tanks, notably by Volckheim, largely ignored the wartime actions of tanks while focusing on the theory.¹⁹⁵ By 1929 however, the official German history of the First World War had shifted focus towards the role of the tank, the shock of the attack, and the conduct of

191 Searle, “Reactions”, 228.

192 Ibid, 232.

193 Ibid, 235.

194 Ibid, 221.

195 Ibid, 232.

battle envisioned by Fuller in its examination of the battle of Cambrai, rather than the German counterattack.¹⁹⁶ This development is important for a number of reasons. First, it shows a clear shift in thinking in Germany towards the lessons of Cambrai. Second, it shows clearly the extent to which Fuller was an influence not only for information on the battle but the lessons to be learned. Third, it opened the debate on what lessons, both correct and incorrect, were and could still be learned from the battle. For Germany, this last point included how the German Army's incorrect analysis of Cambrai may have skewed its expectations of the rest of the war. Despite this shift in open discussion of the impact of Cambrai, German military thinkers immediately following the First World War were well aware of the importance of massed tank attacks in future wars. The first official doctrines on the use of tanks for Germany, published in 1920, emphasized the very same lessons which would later be attributed to Cambrai: large numbers of tanks employed on a wide front, but focusing on narrow points of penetration.¹⁹⁷ The envisioned employment of tanks at this stage was still, however, in support of the infantry. This would be repeated as late as 1936, with tanks being left subordinate to the infantry.¹⁹⁸ By the mid 1930s cooperation with aircraft and other arms would receive more focus.

Though skeptical of the conduct of the battle, Eimannsberger included Cambrai in his analysis of tanks in the First World War. The British objectives for the battle, argued Eimannsberger, were too ambitious, and the British lessons of the battle too weakly adopted.¹⁹⁹ For Eimannsberger, the breakthrough phase of battle with tanks required a wide front in order to succeed in attaining surprise, while focusing on narrow

¹⁹⁶ Ibid, 233.

¹⁹⁷ Corum, *Roots of Blitzkrieg*, 125.

¹⁹⁸ Searle, *Armoured Warfare*, 41.

¹⁹⁹ Eimannsberger, *Kampfwagenkrieg*, 25.

penetrations of an enemy line to actually achieve decision through the exploitation phase.²⁰⁰ This is not unlike the approach to breakthrough by tank proposed by Fuller. Volckheim would echo these conclusions, though by 1939 he would push further to argue that Cambrai had proven that Germany needed tanks, and could have won the war with sufficient numbers of them.²⁰¹ This idea held favour among several German general officers of the First World War in the later 1920s as well.²⁰² Along with Volckheim's more vocal stance by the end of the 1930s, the General Staff Journal of the Wehrmacht had begun publishing analysis of Cambrai with focus on the role of massed tanks and their shock value in achieving a decisive battle.²⁰³ The most well-known German theorist to discuss the role of tanks in the interwar period, Guderian, likewise concluded that the mass employment of tanks at Cambrai and their shock value, were among the most important lessons to learn.²⁰⁴

Tank versus Anti-Tank

An important element of modern tank-centric warfare which dominated much of the thinking on how tanks could be used in the interwar period is the role of anti-tank forces. Anti-tank guns in this context are direct fire artillery that are often towed, but not fully armoured like a tank. In the first half of the twentieth century anti-tank guns were primarily a defensive weapon, towed or pushed into a position and concealed in order to engage tanks. The French army believed the anti-tank gun's capabilities precluded mass

200 Ibid, 188.

201 Searle, "Reactions", 235.

202 Corum, *Roots of Blitzkrieg*, 22.

203 Searle, "Reactions", 234.

204 Heinz Guderian, *Achtung-Panzer! The Development of Tank Warfare*. Trans., Christopher Duffy (London: Orion Books, 1999), 75.

employment of tanks and prevented the kind of operations that Germany would undertake in 1940. In their analysis of the capabilities of anti-tank guns, the French army argued that tanks would never be able to advance in open terrain against anti-tank guns due to the latter's far longer engagement range and high rate of fire.²⁰⁵ For this reason the mass employment of tanks, and large tank formations, was considered unlikely to succeed well into the 1930s. Though this attitude was not universal. De Gaulle for example emphasized that the ability to mass tanks on a narrow objective meant the anti-tank gun was less effective as a deterrent to tank operations, and thus the anti-tank gun emplacement was more likely to be overrun.²⁰⁶ Still, this attitude prevailed.

In contrast to the French attitude towards the anti-tank gun, Germany was perhaps more realistic. Unlike France, Germany had practical experience with anti-tank guns and their employment from using them in the First World War. As a result German assumptions of the capabilities of anti-tank guns were far less ambitious than their French counterparts, and their conclusions favoured the tank's offensive capability more frequently.²⁰⁷ Even with this advantage, the German army concluded from analysis of the First World War that a properly concealed anti-tank gun such as in a town or village had an advantage over tanks when properly employed.²⁰⁸ Key to this is proper employment of the anti-tank gun, with which Germany had substantial experience. A dedicated, organized anti-tank gun practice was organized under Crown Prince Ruprecht in 1918, who began to study and test the best use of these weapons.²⁰⁹ Of interest to the

205 Kiesling, "If it Ain't Broke", 218-219.

206 Ibid, 219.

207 Ibid, 218-219.

208 Searle, "Reactions", 234-235.

209 Ibid, 235.

employment of anti-tank guns by Germany is that, by 1918, the German army had determined that the ideal method of employment was to mount anti-tank guns on trucks so they could move freely about the battlefield.²¹⁰ Giving anti-tank guns mobility would take a leap forward in capability immediately after the First World War as Volckheim would emphatically argue for the use of tanks as the primary anti-tank weapon, instead of anti-tank guns.²¹¹ For Volckheim the primary role of the tank was to destroy other tanks, and once that was done they could conduct operations against targets to aid the infantry, such as machine guns and entrenched infantry, much in the same manner as the primary target for artillery had become enemy artillery and only after it had been neutralized were secondary targets such as fortifications to be engaged.. This idea was based on his own experience with German tanks in the First World War, as he saw the vulnerability of the anti-tank gun as a problem. Eimannsberger would repeat this sentiment in 1934, emphasizing that the tank should act as the primary anti-tank weapon due to its protected mobility.²¹² Further to this, Walter Nehring, who Searle argues was a major influence on Guderian, argued in the 1930s that the growing capability of anti-tank guns did not outpace the growing capability of tanks, and that both were essential for a proper combined arms approach.²¹³ Among the Germans, there is a clear trend toward downplaying the capabilities of the anti-tank gun over the tank as compared to the French. This difference in faith in the capabilities of anti-tank guns led to a clear difference in understanding of the capabilities of the tank in leading the attack, and in conducting a battle via maneuver.

210 Corum, *Roots of Blitzkrieg*, 124.

211 Ibid, 128.

212 Searle, *Armoured Warfare*, 37.

213 Ibid, 38.

Germany's Voracious Appetite for Information: Learning from Abroad

What did German theorists actually know about foreign developments and ideas?

This has been explored by historians ever since the Second World War, both by examining what was published or translated into German, and what German officers themselves participated in. The German army general staff began bi-weekly publishing of foreign works from America, Poland, France, Great Britain, the Soviet Union and others as early as 1925, often with input from Volckheim.²¹⁴ The German army had a voracious appetite for foreign information on the use of tanks and collected every bit of information they could. Translation of press reports on developments and foreign maneuvers and in some cases in-person examination and observation of foreign maneuvers were undertaken enthusiastically.²¹⁵ In 1926 Fuller's *The Reformation of War* was translated into German in a three part series for the general staff, which provided his earliest major examination of the future of warfare with tanks.²¹⁶ Likewise in the early 1920s Fuller's *Tanks in the Great War* was translated into German, and was used as a textbook by the early Reichswehr.²¹⁷ Fuller's memoirs, which included detailed information on his Plan 1919 for use of tanks against Germany in the First World War, was translated into German very quickly after it was published. It is no wonder, then, that Fuller was cited by Guderian and Eimannsberger as a source, and that his influence can be seen in later writings by Volckheim.

214 Corum, *Roots of Blitzkrieg*, 131.

215 Searle, *Armoured Warfare*, 39.

216 Corum, *Roots of Blitzkrieg*, 142.

217 Ibid, 142.

Conclusion

In examining the successes of the German *Blitzkrieg* of 1940, it is useful to remember that Germany did not operate in a vacuum. As can be seen through examination of the various concepts of the use of tanks in the *Blitzkrieg*, it was not unique, nor was it unexpected. It is clear that the German army of 1940 had a stronger grasp of the importance of all these concepts than the British or the French did in execution. This can be clearly seen through the rapid victory Germany attained and the myth that was created in its wake. The German army simply put these concepts into practice better than its opponents, in many cases despite the clear advantage in experimentation and theoretical development those opponents had in developing and implementing those concepts.

As we have seen, the idea of independent tank forces able to operate within combined arms formations was widely experimented with. Combined arms units were the backbone of the 1940 German panzer divisions, with tanks supported by motorized infantry, artillery, and other troops in order to maintain rapid movement. For Germany, France, and Britain, the idea of combined arms stems from the First World War. The British with their experiences at Cambrai ultimately pushed a more integrated approach for Plan 1919. In 1927, a fully mechanized combined arms force was trialled by the British army, leading to the creation of brigade and later division sized units. The positive French experience at Soissons would not be repeated in postwar trials however, and despite strong efforts by theorists such as Estienne and de Gaulle, the French Army believed combined arms was a problematic concept because tanks would get too far

ahead of the infantry. It would not be until 1935 that the French army would create its first combined arms divisions. Shortly afterwards when Germany created its first panzer divisions the French army command reevaluated its tank forces, ultimately creating four armoured divisions that fared poorly in 1940. The German army conversely took its experiences with truck-based arms, cavalry, and the more fluid conditions of warfare on the Eastern front of the First World War and focused on the use of mobile combined arms forces until it could begin preparing for and using tanks again.

A key advantage that the tank has over other arms is the mobility it provides to a protected platform providing high firepower, and this mobility was the subject of much consideration throughout the interwar period. German tank successes are widely known for their mobility, as in the infamous race to the channel in May 1940, which cut off Allied troops in Belgium. But as we see, this mobility was emphasized very early on by Fuller because as he saw it, it allowed the principles of naval combat to be brought onto land. The French conversely learned from their experiences in the First World War, particularly at Verdun, that firepower reigned supreme over mobility. Mobility was important to position troops rapidly, but the battle would be conducted not by maneuver but by methodically planned fire. The high mobility of the tank was seen as a detriment to this battle, rather than an asset. Despite this official line, the idea of mobile armoured forces were heavily promoted throughout the interwar years by French theorists Estienne and de Gaulle, often to deaf ears in the French army high command. Finally, the German army, known for the employment of mobility in the 1940 campaign against France, is shown to have an established history of not only mobile operations but mechanized

mobile operations even in the First World War. Extending these principles forward to 1940 is not really a stretch of the imagination.

The differences in employment of communications, particularly radios, was of vital importance for the results of 1940. Whereas the French army placed very little emphasis on radio communications, the German army understood from the First World War that mobility required efficient communication. De Gaulle understood this as well, though he was unsuccessful in persuading his superiors. Likewise, British army experiments concluded that radios were not useful as other methods of communication in the explicit environment of the peacetime experiments. De Gaulle and the German army were ultimately proven correct in the ability of a mobile force to respond to rapid changes if it could communicate much faster by radio.

We also see the widespread understanding of the utility of massing tanks in the attack, though Britain and France ultimately decided not to follow through on their experiences, despite the protests of thinkers like Fuller and de Gaulle. Germany embraced the concept wholeheartedly, and it paid off in 1940. For the French army, the idea of massed tanks was seen as a problem because it determined that anti-tank guns rendered them useless. The German army, having had experience with anti-tank guns, had a much more realistic vision of what anti-tank guns were actually capable of, and determined mass tank attacks were ideal. This was pushed further into the idea that other tanks, not anti-tank guns, were the best anti-tank weapons.

From examining these aspects of the employment of tanks in battle we can see that German ideas were not unique. In 1940 the German army clearly put these ideas into

practice far more effectively than the French or British, and the results show the price of this. But it is also clear that France and Britain were not only aware of these concepts, they had explored their use themselves. Did the French army fail to stop the German invasion because it was surprised by the way Germany used its tanks? It could not have been, as nothing about the employment of German tanks in 1940 was new to the French army. Indeed, France had played a pioneering role in the development of many of these techniques. The failing in the French army lay not in its inability to look forward enough to develop modern concepts of tank warfare, but in its inability to accurately assess some primary aspects of warfare which dictate the use of tanks. The French army had the same information regarding the capabilities of mechanization the German army did, it just made different judgments based on different experiences.

Bibliography

- Burley, Shaun A. "XI. Contrasting Styles of Command: French and German Approaches during the 1940 Campaign." *Defence Studies* 5:1 (2005): 138-50.
- Carswell, Richard. *The Fall of France in the Second World War: History and Memory*. Cham, Switzerland: Palgrave Macmillan, 2019.
- Citino, Robert M. *Armoured Forces: History and Sourcebook*. Westport, Connecticut: Greenwood Press, 1994.
- Citino, Robert M. *The Path to Blitzkrieg: Doctrine and Training in the German Army, 1920-1939*. Boulder: Lynne Rienner Publishers Inc., 1999.
- Citino, Robert M. *Quest for Decisive Victory: From Stalemate to Blitzkrieg in Europe, 1899-1940*. Lawrence: University Press of Kansas, 2002.
- Citino, Robert M. "Beyond Fire and Movement: Command, Control and Information in the German Blitzkrieg," *Journal of Strategic Studies*, 27:2 (2004): 324-344.
- Cochet, François. "La Cavalerie française à la lumière de la campagne de mai-juin 1940: Compromis et rigidité." *Guerres mondiales et conflits contemporains*, 225:1 (2007): 47-61.
- Cooper, Matthew. *The German Army, 1933-1945: Its Political and Military Failure*. New York: Stein and Day, 1978.
- Corum, James S. *The Roots of Blitzkrieg: Hans Von Seeckt and German Military Reform. Modern War Studies*. Lawrence, Kan.: University Press of Kansas, 1992.
- DiNardo, R.L. "German Armour Doctrine: Correcting the Myths." *War in History* 3:4 (1996): 384-97.
- Doughty, Robert A. *The Breaking Point: Sedan and the Fall of France, 1940*. Hamden, Connecticut: Archon Books, 1990.
- Doughty, Robert A. *The Seeds of Disaster: The Development of French Army Doctrine, 1919-39*. Mechanicsburg, Pennsylvania: Stackpole Books, 2014.
- Eimannsberger, Ludwig Ritter von. *Der Kampfwagenkrieg*. 2nd Edn. Munchen/Berlin: J.F. Lehmanns Verlag, 1938.
- Finch, M.P.M. "Outre-Mer and Métropole French Officers' Reflections on the Use of the Tank in the 1920s." *War in History* 15:3 (2008): 294-313.

- Fuller, J.F.C. *Tanks in the Great War, 1914-1918*. Athens: Alpha Editions, 2019.
- Fuller, J. F. C. *The Reformation of War*. Athens: Alpha Editions, 2020.
- Fuller, J. F. C. *Lectures on F.S.R. III: Operations Between Mechanized Forces*. London: Sifton Praed & Co. Ltd., 1932.
- Fuller, J. F. C. *Memoirs of an Unconventional Soldier*. London: Ivor Nicholson and Watson Limited, 1936.
- Fuller, J. F. C. *Machine Warfare; An Enquiry into the Influences of Mechanics on the Art of War*. London, New York etc.: Hutchinson &, 1942.
- Fuller, J. F. C. *The Conduct of War 1789-1961*. London: Methuen & Co Ltd, 1979.
- Fuller, J. F. C. *The Second World War, 1939-1945: A Strategical and Tactical History*. New York: Duell, Sloan and Pearce, 1954.
- Gale, Tim. *French Tanks of the Great War: Development, Tactics, and Operations*. Barnsley: Pen and Sword Books, 2016.
- Gale, Tim. *The French Army's Tank Force and Armoured Warfare in the Great War: The Artillerie Speciale*. New York: Routledge, 2016.
- Gat, Azar. "Hidden Sources of Liddell Hart's Strategic Ideas" *War in History* 3:3 (1996): 293-308.
- Gat, Azar. "British Influence and the Evolution of the Panzer Arm: Myth or Reality? Part I." *War in History* 4:2 (1997): 150-173.
- Gat, Azar. "British Influence and the Evolution of the Panzer Arm: Myth or Reality? Part II." *War in History* 4:3 (1997): 316-338.
- Gat, Azar. *British Armour Theory and the Rise of the Panzer Arm: Revising the Revisionists*. Hampshire, Palgrave Macmillan, 2000.
- Gaulle, Charles de. *The Army of The Future*. London: Hutchinson & Co, 1940.
- Guderian, Heinz. *Achtung-Panzer! The Development of Tank Warfare*. Translated by Christopher Duffy. London: Orion Books, 1999.
- Guderian, Heinz. *Panzer Leader*. London: Penguin Books, 2000.

- Habeck, Mary R. *Storm of Steel: The Development of Armor Doctrine in Germany and the Soviet Union, 1919-1939*. Ithaca: Cornell University Press, 2003.
- Harris, J.P. "The Myth of Blitzkrieg," *War in History* 2:3 (1995): 335-352.
- Harris, J.P. *Men, Ideas, and Tanks: British Military Thought and Armoured Forces, 1903-1939*. Manchester: Manchester University Press, 1995.
- Jackson, Julian. *The Fall of France: The Nazi Invasion of 1940*. Oxford: Oxford University Press, 2004.
- Kiesling, Eugenia C. "If It Ain't Broke, Don't Fix It': French Military Doctrine Between the World Wars." *War in History* 3:2 (1996): 208-223.
- Kiesling, Eugenia C. "Chapter 14, Military Doctrine and Planning in the Interwar Era," in *The Cambridge History of War, Volume 4: War and the Modern World*, edited by Roger Chickering, Dennis Showalter, Hans van de Ven, 327-351. Cambridge: Cambridge University Press, 2012.
- Liddell Hart, Basil Henry. *The Future of Infantry*. London: Faber & Faber Ltd., 1933.
- Liddell Hart, Basil Henry. *Strategy*. 2nd Rev. ed. New York: Meridian, 1991.
- Luck, Hans von. *Panzer Commander: The Memoirs of Colonel Hans von Luck*. New York: Dell Publishing, 1991.
- Martel, Gifford Le Q.. *In The Wake of The Tank: The First fifteen Years of Mechanisation in The British Army*. Uckfield: The Naval and Military Press Ltd., 2018.
- Mearsheimer, John J. *Liddell Hart and the Weight of History*. Cornell Studies in Security Affairs. Ithaca: Cornell University Press, 1988.
- Mondet, Arlette Estienne. *Le Général J.B.E. Estienne, père des chars: Des chenilles et des ailes*. Paris: L'Harmattan, 2010.
- Perrett, Bryan. *A History of Blitzkrieg*. New York: Stein and Day, 1983.
- Rajevs, Colonel Igrors. "The French Army in the Interwar Period." *Baltic Security & Defence Review* 11:2 (2009): 186-207.
- Ripsman, Norrin M. "The Curious Case of German Rearmament Democracy, Structural Autonomy, and Foreign Security Policy." *Security Studies* 10:2 (2000): 1-48.

- Rommel, Erwin, Liddell Hart, Basil Henry, and Findlay, Paul. *The Rommel Papers*. New York: Harcourt, Brace, 1953.
- Searle, Alaric. *Armoured Warfare: A Military, Political, and Global History*. London; New York: Bloomsbury Academic, 2017.
- Searle, Alaric, ed. *Genesis, Employment, Aftermath: First World War Tanks and the New Warfare, 1900-1945*. Solihull, Helion & Company, 2015.
- Simpkin, Richard E. *Tank Warfare: An Analysis of Soviet and Nato Tank Philosophy*. London; New York: Brassey's; Crane Russak, 1979.
- Simpkin, Richard E. *Mechanized Infantry*. London; Washington, D.C.: Brassey's Defence, 1980.
- Simpkin, Richard E. *Race to the Swift: Thoughts on Twenty-first Century Warfare*. London; Washington, D.C.: Brassey's Defence, 1985.
- Simpkin, Richard E., and Erickson, John. *Deep Battle: The Brainchild of Marshal Tukhachevskii*. 1st ed. London; Toronto: Brassey's Defence, 1987.
- Volckheim, Ernst. *Die Deutschen Kampfwagen im Weltkrieg*. Berlin: E.S. Mittler & Sohn, 1937.