Operation Mapping: Cartography, Intelligence, and the 3rd Battle of Gaza, 1917

Joel Radunzel
Syracuse University

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Abstract

World War I sparked numerous innovations in military cartography. In the Palestine theater as elsewhere, the British and Dominion forces leveraged new technologies, including aerial photography and wireless intercepts, to supplement their use of intelligence to map enemy troop positions. The creation and distribution of these position maps by the 7th Field Survey Company for the 3rd Battle of Gaza in late 1917 represented an innovative process of intelligence-gathering, map production, and knowledge distribution. This thesis not only examines the Egyptian Expeditionary Force (EEF) along with its subordinate intelligence assets and cartographic organizations as a comprehensive mapping system, but also elaborates upon David Woodward's cartographic framework to study the creation of the 7th Field Survey Company's operation maps. Woodward's framework divides the map production process into four phases: information gathering, information processing, document distribution, and document use.

Elements of the EEF were involved in each of these phases during the 3rd Battle of Gaza. Ground reconnaissance, aerial photography, prisoner interrogation, and wireless intercepts contributed to the information gathering phase along with topographic surveys and aerial photogrammetry used to produce the base maps on which Turkish positions were plotted. In the information processing phase intelligence officers, commanders, and draftsmen analyzed, synthesized, and reconciled the gathered information and plotted the results in a series of maps on a nearly daily basis spanning more than a month of increasingly mobile military operations. In the document distribution phase, the EEF chain of command distributed these maps to subordinate headquarters. In the document use phase, these subordinate headquarters used the position maps to plan and conduct operations. This system was cyclical insofar as the operations that these maps helped to facilitate also gathered further information that fed into the next cycle's
product. As the condition of the battlefield and the nature of the operations changed, so too did the value of various modes of intelligence gathering, with varying effects on the accuracy and utility of the position maps.

This study relies on primary materials such as unit war diaries, personal diaries and memoirs, and intelligence records to connect items of intelligence in these documents to changes in the successive position maps. These connections underscore the importance of different types of intelligence during various points of the battle's changing conditions: as conditions on the battlefield became more fluid the EEF began to rely more on single sources of intelligence rather than on a synthesis of multiple sources, with a resulting degradation in accuracy. Even so, the success of the position map technique is apparent in its reintroduction prior to the EEF's final offensive in 1918.
OPERATION MAPPING: CARTOGRAPHY, INTELLIGENCE, AND THE 3RD BATTLE OF GAZA, 1917

By

Joel Radunzel

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Thesis

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Preface
Maps are absolutely vital tools for present-day soldiers conducting military operations. Indeed, one of the first skills learned by new soldiers and officers in the US Army is how to read and navigate with a map (US Army 2009, 3-217 to 3-273). In my experience as an infantry officer in Iraq, Afghanistan, and Haiti, I found myself reaching far more often for my map rather than my rifle. Academically, my experience with the intimacy between maps and military operations, as well as my interest in the British Empire’s World War I Palestine campaign—an interest that began when I was a cadet at West Point—guided me to examine the operation maps produced by the Egyptian Expeditionary Force. As such, this thesis, in which I examine the battle maps of earlier army on another distant and dusty battlefield, held interest that for me that was not just academic, but also professional and personal.

As I conducted my research I felt a soldier-to-soldier connection to the British, Australian, and New Zealander soldiers of the Egyptian Expeditionary Force (EEF) despite the time and technology that separates me from them. I learned quickly that the culture of the profession of arms has changed little past century. My own experience as a soldier in combat, and my connection to these earlier soldiers, felt through the operation maps and the documents that I used to research them, gave me unique insight into this subject, which deepened my understanding of the military cartographic system that created these maps. As I examined these documents, my experience as an officer who has used maps to plan and conduct a broad range of military operations—including counter-insurgency, small scale attacks and defenses, and humanitarian relief—allowed me to better discern how the EEF gathered its information, what information the EEF cartographers considered relevant for their mapping purposes, and how the maps were used by the EEF commanders.
Indeed, the EEF operation maps mirror present-day military maps in both form and content. US Army and NATO doctrine defines an operation map as “A map showing the location of friendly forces. It may indicate predicted movement and location of enemy forces” (US Army 2010, 1-115). This definition accurately describes the form and the content of the EEF operation maps, though it ignores the end use of both the historical and present day incarnations of these products. Based on my research and my experience, I determined that the operation maps were used by military staff not just to record data, but also to plan operations at the operational level of war (see Chapter 1). Both World War I and present-day operation maps are actually rather simple in the selection of information they portray. However, in spite of this (or perhaps because of it) the data and symbols that do appear are often quite nuanced. In the case of the Palestine maps in particular, the content is such that they must be reproduced and viewed in color to be completely understood.¹

While my military experience benefitted my research, the research also helped me to grow as a soldier. Previously I had mostly interacted with maps as a map-user. This project helped me to better understand maps from the perspective of the map-maker, all the more so because I benefitted from the advice, guidance, and example of my distinguished academic advisor, Dr. Mark Monmonier. This expanded comprehension will benefit me in my subsequent staff and command roles in the army, a fact that is particularly important to me; while I cannot say that a map has ever saved my life, I can certainly say that maps have helped me to save the lives of others over the course of my military career, and I expect maps to increase in importance as my own responsibilities expand. Indeed, my next role in that Army after completing a teaching assignment at West Point will be to take charge of an infantry battalion’s staff,

¹ As such, in this thesis I have annotated those figures that cannot be fully understood if reproduced in black and white or grayscale. These figures should be reproduced in color.
including the sections of the headquarters that create and distribute maps to the subordinate commanders and soldiers. As such, this project has been especially fulfilling, because I have been able to both bring my professional experience to bear on my academic project, and to take away from this thesis skills that will benefit myself and my soldiers in the future.
Chapter 1. Introduction and Context

Conflict, for better or for worse, has often provided an impetus for technological, organizational, and procedural advances. World War I, one of the most destructive wars in human history, was no different in this regard. New weapons and processes such as scientific artillery fire, tanks, poison gas, and other technological and procedural advances made their debut during this conflict. The field of cartography also saw significant innovations in response to the new tactical and operational problems created by the conditions and context of World War I battlefields. On the Palestine Front—a relatively minor theater in the context of the broader war—the cartographic austerity of the theater and its remoteness from the central military and mapping systems of the main Western Front prompted the British forces there to develop numerous novel cartographic techniques and products including the use of aerial photography for making highly accurate large-scale maps, as well as the operation maps1 that are the subject of this project.

At first glance, these operation maps were relatively simple cartographic products when compared to other World War I military maps, but a closer look reveals surprising nuance and complexity both in their content and in the processes that created them. They were produced by the 7th Field Survey Company (FSC), the cartographic organization of the Egyptian Expeditionary Force (EEF), which was the name given to the British army in the Palestine theater. The production of this map series occurred during the campaign initiated by the British offensive at the 3rd Battle of Gaza in late October 1917. This campaign ended with the fall of Jerusalem to British forces in mid-December. During this period the 7th FSC printed an edition of the operation maps each day and distributed them to officers within the EEF. These maps

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1 What to call these maps is a more complicated problem than might initially be expected. The maps themselves are marked as “situation” maps, but the 7th Field Survey Company referred to them in their war diary as “operation” maps (7th FSC WD), while Peter Collier used the term “position” maps in his 2008 article (Collier 2008, 1). Peter Chasseaud, another scholar who has studied World War I maps, stated to me that the terms “situation map” and “position map” already denoted other specific map types on the Western front, so I accordingly chose to use the term operation map in this thesis. I also believe this term describes the actual purpose and use of the maps better than the other two.
attempted to distil the tactical, operational, and strategic intelligence arriving at the EEF’s General Headquarters (GHQ) into an easily read operational picture that showed with as much precision and accuracy as possible the deployments each day of both the British units and those of their Turkish opponents. The purpose of these maps was to provide the British command structure with a coherent and unified situational awareness of the battlefield. Furthermore, these maps were thoroughly modern\(^2\) in both their purpose and in the mode of their production, both of which are analogous to the networked digital moving map displays and attendant intelligence systems used by present-day military organizations.

This detailed examination of the operation maps seeks an understanding of how and why the EEF produced them. For this task I have built on the foundation set by other scholars who have studied cartography during this time and in this theater. I have also incorporated the research methodologies suggested by David Woodward (1974) and T.C. Chamberlin (1890). For my data, I collected from numerous archives in the United Kingdom thousands of pages of documents produced by the EEF and its subordinate organizations and also by individuals who participated in the operation mapping process. These all provided a rich set of resources that allowed me to thoroughly understand these maps and the processes that created them. But, before diving in detail into the research methods and data that informed this study, a brief commentary on the historical and cartographic context of the operation maps is necessary.

**Historical Context: The Palestine Campaign and the 3rd Battle of Gaza**

The World War I Palestine campaign grew out of the British Empire’s strategic imperative to protect the Suez Canal and with it the lines of communication to British colonies, possessions, and dominions in the Orient, most notably India. The decision to carry this

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\(^2\) I use the term *modern* in this thesis to differentiate between the scientifically-produced and centrally-regulated maps, which have dominated military cartography since World War I, from the largely un-regulated and non-standardized maps that characterized military cartography before this conflict.
campaign away from the canal and eventually into Palestine and Syria came about through a process that today would be called “mission creep,” in which an initially simple mission becomes self-justifying and self-expanding because of the large amount of resources devoted to accomplishing it. Initially, the British strategy for protecting the Suez Canal involved stationing relatively weak forces along the canal itself to deter Turkish aggression against the waterway, relying mostly on the geographic buffer of the arid Sinai Peninsula to preclude any large-scale Turkish attacks. However, the Turks proved far more capable of crossing the desert terrain than the British had anticipated, launching three large raids against the canal in the first two years of the war. Though these attacks were unsuccessful—only one ever reached the canal itself—they still convinced the British Imperial General Staff that a more forward deployed defense was necessary to eliminate the threat to the waterway (Wavell 1938, 14-19, 23-38).

The Palestine Campaign

Accordingly, the newly named Egyptian Expeditionary Force’s British Territorial troops, under the command of General Sir Archibald Murray, reinforced by strong and well-trained Australian and New Zealand (ANZAC) formations that had been recently evacuated from the disastrous Gallipoli campaign, began a slow and methodical advance across Sinai that matched the pace of the British railroad and water pipeline construction that allowed supplies to flow across the peninsula. In general, British Territorial forces constituted the EEF’s infantry and artillery, while the ANZACs provided most of the force’s large cavalry component. Other allied nations, including France and Italy, also contributed small and largely symbolic formations to the campaign with an eye toward pressing their claims to territory and influence in the region after the war (Pirie-Gordon 1919, 39-46). By early 1917 this combined force had reached the Ottoman Empire’s Palestine frontier at the town of Gaza.

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3 Territorial Forces, or “Territorials,” were and are reserve formations, the British equivalent of the US National Guard.
The EEF’s advance across Sinai was facilitated by an increasing use of aerial photography by the British to create accurate maps of the Sinai desert. This was a necessary undertaking because Sinai to that point remained either un-mapped or at best covered by charts that were insufficient for modern military operations in terms of content, scale, and accuracy (Collier 1994, 100-104). The 7th FSC also used airplanes to create large-scale “town maps” of settlements along the EEF’s lines of advance in Sinai and Palestine (Gavish and Biger 1985, 38-44). In fact, by the time the Palestine campaign reached its conclusion in October 1918 the EEF’s cartographers had mapped a staggering amount of terrain from the air, far more than they had charted by more traditional survey methods such as triangulation (Maule 1919, 28-29). These activities indicated an organizational willingness within the EEF to innovate, at least cartographically, that would become further evident in the production process of the operation maps.

Upon arriving at the Palestine frontier the British forces launched an immediate attack on the Turkish forces defending Gaza in an engagement that came to be known as the 1st Battle of Gaza (26 March 1917). This attack came within figurative inches of succeeding—the British had breached the Turkish line and the Turkish command’s wireless station in Gaza had issued orders to evacuate the town—when the British commanders called off the attack for fear of a counterattack by Turkish reserves arriving from central Palestine. No such reserves were actually en route to the battle, but the British ignorance of the location of the entire Turkish order of battle likely highlighted their need for an intelligence product that would prevent a repeat of this assault’s failure. As it was, the British offensive would stall in front of Gaza until late October (Wavell 1938, 94).

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4 The term order of battle is used to denote what subordinate units compose a particular army or military formation, as well as how these units are hierarchically organized.
This stalemate rankled the British Imperial General Staff, who were concerned about a new combined Turkish and German army assembling in Anatolia. Named the Yilderim (Thunderbolt) Force, these troops, under the command of former German Minister of War and Chief of Staff General Erich von Falkenhayn, were believed to have the potential to threaten British forces either on the Palestine front or on the Mesopotamian front (in what is now modern-day Iraq). The British General Staff pressured General Murray into launching a second, ill-conceived and under-strength attack on the Gaza defenses during 17-19 April 1917. This assault was doomed from the start and—in the worst tradition of World War I frontal attacks—accomplished nothing but the infliction of heavy casualties, particular on the British side. This episode also marked the demise of Murray’s tenure as EEF commander, though his logistical expertise had laid the groundwork for the eventual British triumph in this theater (Wavell 1938, 95-114).  

To replace Murray, the Imperial General Staff chose General Sir Edmund Allenby, who had been the commander of the British Army’s cavalry arm prior to the start of the war and who had competently led both the British Expeditionary Force’s (BEF) cavalry corps in the early days of the war and later the British 3rd Army on the Western Front in France, before being chosen to command the EEF (Wavell 1940, 127-152). Allenby arrived on the Palestine Front in June and immediately breathed new energy into the disheartened troopers of the EEF by moving his own headquarters from Murray’s preferred location in the relative comfort of Cairo to within earshot of the guns in the Gaza defenses. He also requested and received substantial reinforcements of soldiers, artillery, logistics, and airplanes from Britain, which allowed him to reorganize the EEF.

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5 This logistical effort was built on the backs of hundreds of thousands of Egyptian workers who formed the Egyptian Labour Corps. This organization drafted local Egyptians into its ranks and sent them to the front to perform manual labor, carry supplies, and serve the needs of the British army. Many of them were killed alongside the British soldiers, and their contribution to the outcome of the campaign deserves far greater attention then it has received.
into three complete corps—the XXth, XXIst, and Desert Mounted—and to implement a plan to defeat the Turkish defenses that now stretched from Gaza southeast to the crossroads town of Beersheba (Figure 1.1). With these expanded resources, Alleby’s commission from London was to invade Palestine and capture Jerusalem by Christmas 1917 (Meinertzhagen 1960, 219-220).

**Figure 1.1.** The Palestine front as it was in October 1917. The darker brown shaded areas are elevated terrain, and important named features of the front line fortifications are annotated, as are key towns. (This figure is intended to be printed in color)

Of vital importance to the operation maps during the summer of 1917, prior to the 3rd Gaza offensive, was the arrival in Palestine of Major (later Colonel) Richard Meinertzhagen. This highly capable and innovative intelligence officer had already distinguished himself as an information-gatherer in the ongoing operations in German East Africa and would continue to do so as Allenby’s director of Palestine Intelligence on the EEF GHQ staff. Meinertzhagen appears to have been both the driving force and chief advocate behind the production of the operation
maps, and his influence on their final form was clear throughout the course of the ensuing campaign.

Figure 1.2. The first phase of the 3rd Battle of Gaza saw the EEF (red) first launch a flanking attack at the eastern end of the Turkish line (green) around Beersheba with the XX Corps and Desert Mounted Corps (DMC) before launching a frontal attack on Gaza itself with the XXI Corps. (This figure is intended to be printed in color)

The 3rd Battle of Gaza

The British plan for the 3rd Battle of Gaza called for deception and a prolonged artillery bombardment to fix the attention of the Turkish command on the British XXI Corps directly in front of the defenses around Gaza before a strong mixed cavalry and infantry force consisting of the XX Corps and Desert Mounted Corps struck east across the desert to seize Beersheba and its vital water wells and turn the Turkish flank (Figure 1.2). Once sufficient numbers of the Turkish
reserve forces moved east to counter this attack, the XXI Corps would launch a frontal assault on Gaza to breach the Turkish line along the Mediterranean Sea. Ideally, both prongs of the British assault would then advance into the Turkish rear areas, surround and destroy their army, and leave Turkish Palestine defenseless. Though this second part of the offensive was not nearly as successful as the British had hoped, the 3rd Battle of Gaza still represents one of the most successful offensives of World War I in terms of ground gained and casualties inflicted on the enemy.

As it actually unfolded, the campaign initiated by the 3rd Battle of Gaza can be divided into three operational phases that also correspond with three distinct phases in the production and form of the operation maps. The first phase encompassed the beginning of the British bombardment of the Gaza defenses on 28 October, the assault on Beersheba and its dramatic seizure by cavalry charge at dusk on 31 October, and the frontal assault on Gaza itself starting on 2 November (Figure 1.2). While the British attack went generally according to plan, the Turkish army led by the capable German General Friedrich Kress von Kressenstein managed to extract itself from the closing British trap on the night of 6-7 November and withdraw north, initiating the second operational phase of the battle.

This second phase was defined by the British pursuit of the retreating Turkish army across the relatively flat and open coastal plain of Palestine. It lasted until 14 November, when a new front line began to stabilize north of Jaffa along the river Auja and west of Jerusalem (Figure 1.3). The operational situation during this phase was rapidly changing and often chaotic, with both armies frequently losing contact not just with the enemy but even with their own units. British logistical difficulties prevented them from pursuing with their entire army and the Turks
used multiple rear-guard actions to preserve at least some semblance of cohesion in their force despite grievous losses of both soldiers and material.

![Map of the campaign](image)

**Figure 1.3.** The second phase of the campaign saw the British XXI Corps and Desert Mounted Corps, followed later by the XX Corps, pursue the retreating Turkish army northwards after the Turks evacuated their defenses on the night of 6-7 November. (This figure is intended to be printed in color)

With the front stabilized and their logistics improving, the British entered the third phase of the campaign on 15 November with a slow and deliberate eastward advance by the EEF’s two infantry corps into the Judean hills to capture the final objective of the offensive, the holy city of Jerusalem (Figure 1.4). The Turkish army by this point was too weak to counterattack or even to effectively parry the strength of the British attack, and Allenby’s forces entered Jerusalem without major combat on 9 December, effectively ending the campaign. During the course of these operations, the 7th FSC’s operation maps changed with the unique conditions of each of
these three phases, sometimes being more useful and sometimes less, but always notable for the rigidly metronomic consistency of their daily production schedule.

**Cartographic Context: The Operation Maps in World War I Cartography**

The EEF’s operation maps occupied a distinct place within World War I cartography in both graphic style and methods of production. Their scope and content were far broader than the tactically oriented trench maps common to the western front, and their purpose must have been

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6 I use the terms ‘tactical,’ ‘operational,’ and ‘strategic’ in their modern sense as they relate to scale in US and NATO military doctrine. ‘Tactical’ refers to the level of war that involves the specific application of fire and maneuver to defeat enemy forces, the smallest scale of warfare. The ‘operational’ level of warfare encompasses the large-scale maneuver of forces within a theater to bring about victory in a campaign. The strategic level of war involves the application of national resources to achieve national objectives and blends into the realm of geopolitics. While there is significant overlap between each of these levels, I found them to be useful terms for analyzing this military subject (FM 101-5-1).
different as well since the EEF also produced their own detailed trench maps of the Gaza defenses (Hare, “Trench Map”). They seem to have been more closely related to the operationally oriented ‘order-of-battle’ maps produced by Allied forces in France, which graphically broke the front into sectors in an attempt to show which enemy formation was responsible for each respective stretch of frontline trench. However, the 7th FSC operation maps sought greater precision than these maps by attempting to show the specific deployments of discrete enemy formations and not just the general sectors they occupied. The operation maps, which failed to depict more than the most basic physical and cultural terrain features, were also clearly distinct from both the large- and small-scale topographical maps produced by the 7th FSC during this period for navigation, artillery plotting, and tactical planning.

Perhaps the defining characteristic that set these maps apart from other World War I cartography was the fact that they were produced so consistently and frequently over the course of the 3rd Battle of Gaza campaign. Other map series from this conflict generally were produced infrequently or on an as-needed basis. By contrast, the six-week-long daily run of the EEF operation maps from late-October to mid-December 1917—though some of the individual editions suffered from incomplete or inaccurate data—provided at the very least a fascinating window into the thinking of Allenby and his staff during the campaign. Evidence suggests that these maps were a welcomed and effective tool for the EEF commanders and staff officers who used them.

**Research Questions**

In beginning my inquiry into how these maps were produced I chose to approach them as products of the intelligence that they attempted to portray. Why did the operation mapmakers place this Turkish unit symbol here and not there? How did they know to do so? How much
analysis and speculation by the EEF intelligence officers was required to produce these daily maps? These questions eventually boiled down to one overarching research question that guided my initial investigation of these maps: what sources of intelligence are represented by the unit position symbols on each edition of the operation maps? This question was attractive to me because it linked the information-gathering elements of the EEF with the staff officers who analyzed the data and the mapmakers who annotated and printed the maps. However, once my research began I realized the need for a second, complimentary line of inquiry that treated the operation maps as products and sought to determine their purpose and use. My second research question thus asked: what was the purpose of the operation maps, and how were they used during and after the 3rd Gaza campaign? This question, along with the structure provided by David Woodward’s (1974) suggested framework for the study of cartography, allowed me to investigate the operation maps and the organizations that produced and used them as a single unified system. This particularly fruitful and rewarding method of investigation allowed me to paint a far more complete picture of these maps and their role. Before I can present this picture, however, I must devote some words to the foundation on which this project rests: the academic work of other scholars who have studied World War I cartography, the Palestine campaign, and the operation maps themselves.

In Chapter 2 I will relate the three historiographies that are relevant to the operation maps. The first historiography consists of the work of other scholars who have already examined aspects of the operation maps and other cartographic activity conducted by the EEF in World War I. The second is the historical examination of World War I military intelligence, particularly on the Palestine front. The third historiography I will describe deals with the more traditional military history of the Palestine campaign and the interpretations of its conduct and outcome.
With this foundation laid, I will move on in Chapter 3 to describe my research methods and conceptual framework for this project. These were heavily influenced by David Woodward and T.C. Chamberlin, and proved to be particularly effective for my research purposes. In Chapter 4 I will relate how I gathered and organized the archival data for this project and I will also describe the documents I collected, which included the operation maps and other original documents relating to the EEF’s cartography, intelligence-gathering, and tactical operations. Chapter 5 includes my analysis of these documents. This analysis takes the form of a chronological narrative of the operation map production process with my own interpretations—informed by the supporting original documents—of the data present on each edition of this series. Finally, in Chapter 6 I will present my findings and conclusions regarding the operation maps, the EEF cartographic system, and the effectiveness of my research methods.

Throughout this entire thesis I have endeavored to maintain a narrative thread that emphasizes the human dimension of the EEF’s cartographic process. The operation maps were not produced in a vacuum. These maps were a response to operational imperatives and their quality usually reflected the changing operational conditions under which they were created. Even so, their content usually represented a negotiated construction of reality rather than an accurate picture of the facts on the ground. Furthermore, some editions of the operation maps were contested, leading to revisions in both the mapmaking process and the end-product maps. In broad terms, the progressive changes to the style and content of the operations maps indicated not just changing operational conditions, but also a learning process by the officers and soldiers whose job it was to communicate those conditions. As such, this thesis tells the story of soldiers who learned to effectively leverage maps to accomplish their unit’s mission.
Chapter 2. Review of Literature: Three Historiographies

The foundation for this thesis rests on three different areas of scholarship that have examined the World War I Palestine campaign. These scholarly pillars of my research are 1) the military cartography of the Palestine campaign, 2) the history of military intelligence on this front, and 3) the competing narratives of the campaign’s operational military history. In this chapter I will trace the historiographical threads of each of these three topics and how they have influenced my conclusions and methods.

The scholarly record of cartography and military history began almost immediately after the conclusion of the campaign and was often conducted by individuals who had participated in the fighting. Mapmaking on this front has received attention from a small group of cartographic historians who provide a generally consistent narrative. The military history of the campaign contains a much larger body of literature that until recently has not included serious debate. By contrast, the study of British military intelligence began much later, due to the British government’s slowness in opening up their information-gathering records to public scrutiny. This line of examination has proven to be more contentious than the other two fields. My thesis is positioned at the intersection of these three areas, but its direct lineage comes from the history of cartography via Peter Collier’s work on mapmaking on the Palestine front.

Historiography 1: Cartography on the Palestine Front

The most relevant literature to my research examined EEF cartography on the Palestine front. These studies began as early as 1919 with W.J. Maule’s Report on the Work of the 7th Field Survey Company, R.E. and have continued to the present with work by Collier and others. Indeed, Collier’s (2008) initial, cursory description of the 7th FSC operation maps is what drew me to this topic in the first place. Overall, the historiography of Palestine front cartography
reveals that the pioneering British mapmakers introduced novel methods for improving both the form and content of their maps. Examples of their innovation included the operation mapping technique as well as their adoption of aerial photography and photogrammetry.

The paper most immediately relevant to my examination of the EEF’s operation maps was presented by Collier at the 2008 Symposium of the Commission on the History of Cartography. Collier addressed broadly several innovative mapping techniques that emerged during World War I but focused specifically on the 7th FSC operation maps. He contended that the operation maps were distinct from other map types common during the war. He further argued that the operation maps were innovative because of their content and because of the frequency and speed with which they were distributed. Most importantly, Collier called for further research into these maps by noting that “a detailed analysis of the maps, in conjunction with the surviving intelligence files, may yield a better picture of the relative inputs from the different intelligence sources” (Collier 2008, 13). His article echoed an important theme: that EEF cartographers were keen to improve both their cartographic processes and the resulting map products. Collier’s work was foundational to my own research because it led me to a gap in knowledge about these innovative maps.

Major W.J. Maule initiated the study of British cartographic activities in Palestine with his Report on the Work of the 7th Field Survey Company, R.E. in 1919. This report was not only a primary source for my thesis but also framed the academic dialogue about World War I Middle East mapping. Maule, who commanded the 7th FSC, recorded the activities of the various sections of his company and other cartographic organizations within the EEF. His account was far more than a simple reciting of dates and activities, however. He analyzed the effectiveness of the various tactics, techniques, procedures, and technologies that his unit used. While the report
contained large sections of analysis, even the strictly descriptive parts were insightful. For example, Maule compared the number of square kilometers his company mapped using aerial photography with the same area surveyed by triangulation, thus demonstrating how much the British had relied on their flying cartographers. Scattered throughout this document were references to the difficult conditions and scarce resources that prompted the EEF mapmakers to innovate in numerous ways. Maule also provided details about the 7th FSC’s mapmaking equipment and procedures, and about how the company liaised with other intelligence organizations in the EEF. Overall, Maule’s report laid the foundation for the academic dialogue about military mapmaking that followed close on the heels of the end of hostilities in the Middle East in November 1918.

Captain H. Hamshaw Thomas, who was chief photographic officer for the Royal Flying Corps (RFC) in Palestine, elaborated upon Maule’s report with his own “Geographic Reconnaissance by Aerial Photography, with Special Reference to the Work Done on the Palestine Front,” published by the Royal Geographic Society in 1920. Whereas Maule’s report provided a broad overview of the cartographic activities of the EEF, Thomas focused on the specific contributions of aerial photography. Leveraging Maule’s statistics, Thomas explained how the flyers used new technologies to create highly accurate topographic maps for the EEF. His article described many of the techniques used by the EEF’s aerial cartographers and analyzed their relative advantages. He also addressed briefly the role of aerial reconnaissance in gathering the operational intelligence plotted on the operation maps. Although Thomas’s account was a narrow technical analysis of the aerial component of the EEF’s mapping activities, he used it to argue that aerial photography and cartography on the Palestine front evolved independently from its counterpart on the Western front in France.
Both Maule’s and Thomas’s manuscripts addressed the 7th FSC’s position maps only obliquely. Maule described many details about how the operation maps were printed and distributed while Thomas briefly acknowledged the role of aerial photography in gathering the data that the operation maps displayed. Although neither author focused on the operation maps, they described key elements of the EEF cartographic system and demonstrated how this mapmaking organization innovated under austere circumstances. All subsequent scholarship pertaining to the operation maps and the broader cartography of the Palestine front built upon their work.

The next scholars to examine the cartographic dimension of the Palestine campaign were Dov Gavish and Gideon Biger (1985), who published “Innovative Cartography in Palestine, 1917-1918.” Their article recounted how the EEF employed aerial photographs to create town maps and artillery maps—including maps of locations central to the Palestine campaign like Gaza, Beersheba, and Rafa—that were sufficiently detailed for military planning and scientific artillery fires. Gavish and Biger built explicitly upon the work of Thomas to argue that the EEF’s techniques were not only innovative but developed separately from similar techniques on the Western front. Indeed, they argued that the town maps produced on the Palestine front were substantially more refined than similar maps produced in France. As such, this article reinforced the narrative of independent thinking and novel ideas flourishing within the EEF cartographic system. Though their article dealt only obliquely with the operation maps, Gavish and Biger were very much a part of the dialogue about the 7th FSC and the EEF cartographic system.

From Gavish and Biger, the historiography of Palestine Front cartography moves to Peter Collier’s early examination of the EEF’s use of aerial photography to produce highly accurate topographic maps. In his 1994 article “Innovative military mapping using aerial photography in
the First World War: Sinai, Palestine, and Mesopotamia, 1914-1919,” Collier built explicitly upon Maule (1919), Thomas (1920), and Gavish and Biger (1985) to highlight both the importance of the aerial cartographic work in Palestine and its distinctiveness from other theaters. Collier relied especially heavily on Maule’s report to describe many of the techniques employed by the EEF’s fliers and mapmakers to overcome challenges like primitive equipment, hostile environments, scant resources, and operational imperatives. He argued that these conditions produced an environment in the British Middle Eastern commands that was more amenable to novel techniques than traditional cartographic establishments in England and France. Like previous scholars, Collier focused on the systems and processes that created the operation maps. Although he reinforced the broader narrative that the EEF’s cartographers were employing new and innovative techniques—often without the benefit of outside help or insight—to create useful and novel products, his detailed examination of operation maps would wait for his 2008 paper (mentioned earlier in this chapter) (Collier 1994, 101-104). My thesis, by examining the operation maps even more closely, sheds light on a previously overlooked aspect of Palestine front cartography.

**Historiography 2: Military Intelligence on the Palestine Front**

The historiography of military intelligence operations on the Palestine front has generally followed a narrative that emphasizes the contribution of technical intelligence-gathering means over more traditional human sources. This narrative has tended to focus on the act of information-gathering at the expense of analysis and distribution. Scholars who have engaged the history of intelligence in Palestine have been thorough in their research but also generally narrow in their scope. One exception to the narrow view of Palestine front intelligence is the field’s most prodigious scholar, Yigal Sheffy. He provided the most complete overview of the intelligence-
gathering activities of this campaign, in contrast to most other researchers, who focused narrowly on a single technical source of information. Admittedly, the process that created and distributed the operation maps was intimately tied to information-gathering, but it also relied heavily upon analysis and interpretation. Because the operation maps were a vehicle for accumulating large amounts of operational intelligence and communicating findings to people who could use them, my thesis helps to flesh out the historical narrative by analyzing how the gathered intelligence was actually transmitted, analyzed, and used.

Almost all contemporary discussion of Palestine front intelligence supports Sheffy. Scholars who have engaged with Sheffy’s work include Roger Owen (2011), John Ferris (1992), Peter Mead (1983), and Michael Occleshaw (1989). These historians focused on the various methods of intelligence-gathering in the EEF, including wireless intercepts (Ferris), aerial reconnaissance (Mead), and human sources (Sheffy and Occleshaw). Some, particularly Sheffy and Owen, have treated the Palestine campaign as their primary theater for study, while the rest devoted only a portion of their narratives to this geographical area. Although each of these authors argued for the relative importance of the different forms of intelligence gathering, only Sheffy (1998) analyzed carefully how the information, once gathered, was communicated and used by the troops at the front.

Yigal Sheffy’s (2010) article, “British intelligence and the Middle East, 1900–1918: how much do we know?” set the limits for what a scholar can expect to find in the primary documents relating to intelligence in the Palestine campaign. He argued that available archival material limits researchers in three ways: 1) only the products of the intelligence (such as operation maps) are available for study, 2) these products allow informed speculation only about what sources of information they represent, and 3) this speculation allows only partial reconstruction of the
intelligence *processes* involved in the creation of the products (Sheffy 2010, 33). Sheffy noted that many documents relating to wireless and human intelligence operations in the Middle East either remain classified, have been lost at some point over the past century, or simply do not exist because of the nature of intelligence-gathering activity and communication. On the other hand, aerial reconnaissance and routine patrols by units at the front are relatively well-documented in unit war diaries and personal memoirs (Sheffy 2010, 39-44, 49). My thesis fits neatly into Sheffy's structure because I am studying an available intelligence product (the operation maps) and trying to partially reconstruct what organizational systems and sources of information produced them. Although my research confirms Sheffy’s apprehension about the limitations of the archival sources, I found the data were more than sufficient to create an informed reconstruction of the operation mapping system.

Sheffy’s (1998) comprehensive book about military intelligence in Palestine, *British Military Intelligence in the Palestine Campaign, 1914-1918*, is the richest and most relevant work relating to the intelligence historiography of this front. Sheffy charted the course of military intelligence-gathering during the conflict by describing the development of various methods for acquiring data, including wireless intercepts, aerial photography, networks of agents, prisoner interrogations, and ground reconnaissance. He argued that the more technical modes of intelligence gathering, such as wireless intercepts and aircraft reconnaissance, were far more reliable and useful than human agents or accounts from prisoners, which he also discussed in detail. Sheffy minimized the importance of the reconnaissance abilities of the ground forces in the EEF, such as cavalry patrols or personal reconnaissance by officers, who contributed important information to the intelligence picture available to the 7th FSC cartographers. My thesis, by highlighting this human aspect of tactical information-gathering, builds on Sheffy’s
research by emphasizing these overlooked sources. It also compliments Sheffy’s work by reconstructing how the gathered information was analyzed and used.

A more technologically focused study of intelligence-gathering on the Palestine front was John Ferris’s (1992) book *The British Army and Signals Intelligence During the First World War*. Ferris recounted the development of wireless intelligence-gathering from its birth before the war through the increasingly sophisticated techniques for interception, decryption, and analysis that prevailed later. The book largely consists of transcriptions of important or illustrative intercepts from different fronts. Ferris’s analysis made an argument for the prime importance of signals intelligence, particularly in the Middle East. He described how lax encryption procedures on the part of the Turks, along with a higher appreciation for this sort of intelligence by British commanders in the Middle East, amplified the effect of the relatively limited resources that the British could devote to these efforts. Ferris did not address the Palestine front exclusively, nor did he specifically address operation maps or other modes of communicating intelligence. However, the extent of Ferris’s examination underscores the vital role of signals intelligence on the Palestine front. His emphasis on technology and its implication is in agreement with Sheffy (1994) but disputed somewhat by Roger Owen (2011). Also, Ferris presented insufficient analysis for the large amount of data transcribed in his book. As such, Ferris’s research presented an insufficiently detailed description of how the data gathered through wireless intercepts influenced and moved within the EEF.

Another book devoted to a technical means of intelligence gathering was Peter Mead’s (1984) *The Eye in the Air: History of Air Observation and Reconnaissance for the Army, 1785-1945*. Though broad in approach both historically and geographically, Mead brought valuable insight to the study of the development of aerial reconnaissance during World War I by
discussing the specific tactics, limitations, and organizations employed by the Royal Flying Corps (later the Royal Air Force). He addressed the Palestine front only briefly, choosing instead to focus on the larger aerial efforts in France. This shift in emphasis contrasts markedly with the large body of literature—much of it already discussed above—that has highlighted the major contributions of the EFF air component to the campaign. Like other writers, Mead looked largely at information at its point of capture, and did not follow it through the process of compilation, analysis, and communication. Nonetheless, his thorough descriptions of the RFC’s capabilities, tactics, and equipment have shaped the narrative about the contribution of aerial reconnaissance to intelligence-gathering in Palestine. My thesis compliments Mead’s research by describing in detail some of the ways that aerial reconnaissance contributed to the operational intelligence picture on this front.

Michael Occleshaw’s (1989) *Armour Against Fate: British Military Intelligence in the First World War* was a more comprehensive treatment of British military intelligence-gathering. While Occleshaw sought to tell the story of military intelligence on all the British fronts of the war, his emphasis on the Palestine campaign indicated the importance and success of information-gathering there. Occleshaw devoted significant attention to some of the less technical methods for gathering tactical data, namely, trench raids and ground reconnaissance. He also relied very heavily on the diaries of an individual who was central to synthesizing cartography, military intelligence, and military operations in the EEF: the capable and fascinating Colonel Richard Meinertzhagen. Occleshaw’s book was refreshing in its emphasis on the inter-dependence of different forms of intelligence-gathering and also for its focus on human reconnaissance assets. Despite these strengths, it was a broad study that could not provide much detail about any one theater or technique. The operation maps were absent from his discussion,
though still obliquely addressed through his focus on Meinertzhagen, who was instrumental in their production. Overall, Occleshaw has given intelligence on the Palestine front a treatment second only to Sheffy (1998) in its comprehensiveness.

Roger Owen, in a lecture given to the British Society on Middle Eastern Studies in 2011 entitled “British and French Military Intelligence in Syria and Palestine, 1914-1918: Myths and Reality,” critiqued the historiography of this field by noting that the literature suffers from several dubious assumptions. For example, he charged that many scholars assume that the Turkish forces were inept at gathering intelligence and concealing their own activities, and that British intelligence in the Middle East was uniformly superior to that of its opponents. My own research indicates that these criticisms are valid. Owen also noted that the different groups of scholars who studied the Palestine campaign—cartographic historians, intelligence historians, and military historians—often did not read each other's work or publish in journals that scholars with similar interests were likely to read. In sum, he argued that the scholarship about the Palestine campaign—and its intelligence dimension in particular—is disjointed and suffers from inappropriate prejudices. While my thesis may not directly correct the latter concern, it does help to unify some of the inter-disciplinary scholarship about this campaign by treating the entire EEF as a cartographic system that gathered, analyzed, communicated, and used intelligence.

**Historiography 3: Military History of the Palestine Campaign**

A comprehensive historiography of the military history of the Palestine campaign would be a massive undertaking far beyond the scope of this thesis. As such, I have chosen to highlight only a few examples of the large body of literature that has described this conflict.\(^1\) The historical narrative of the Palestine front was defined shortly after the end of the war in the lavishly heroic prose of Harry Pirie-Gordon’s (1919) history of the EEF’s campaign and

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\(^1\) For a more comprehensive listing of military histories of the Palestine campaign that I have referenced, see Appendix A.
somewhat later in Archibald Wavell’s less overt and more academic examination; both likened the conflict to a modern-day crusade.² This triumphal narrative went generally unchallenged until recent decades, when some scholars began to examine the British command’s conduct of the campaign with a more critical eye. In a competing narrative, other recent historical research has focused on telling the stories of the individual soldiers who participated in the campaign. My thesis contributes to the dialogue about the history of the Palestine campaign not by refuting one narrative or the other, but by clarifying what information was available to the British commanders and by unifying this knowledge with a detailed understanding of how information was gathered and transmitted. Furthermore, my thesis reveals how significantly the operation maps shaped the historical perceptions of how this conflict unfolded.

The historical narrative of the Palestine campaign began almost immediately after war’s conclusion with Pirie-Gordon’s (1919) history, *A Brief Record Of The Advance Of The Egyptian Expeditionary Force Under The Command Of General Sir Edmund H. H. Allenby, July 1917 to October 1918*. This work relied on official documents produced by the EEF to tell the chronological story of each of the army’s subordinate units. Similar to a school yearbook, each unit in the EEF was allocated pages that lauded their accomplishments with little criticism or analysis.³ One notable aspect of this book was that it was the first to use copies of the 7th FSC’s operation maps as a visual aid to organize the narrative. These maps in Pirie-Gordon’s book are unmistakably reproductions of the original operation maps, though they have been modified to show slightly more detail, including the locations of British and Turkish airfields and artillery positions. Although Pirie-Gordon set the tone for the romantic narrative that would dominate

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² The first edition of Wavell’s book was published in 1928. I have referenced the third and final edition, published in 1938.
³ Pirie-Gordon’s book was not intended to be an academic history. It was printed by the *Palestine News*, the internal newspaper of the EEF, for distribution as a memento to the participants of the Palestine campaign. However, nearly every subsequent history of the campaign has cited this book as a major source.
histories of this campaign in the coming decades, he was the first to demonstrate the historical value of the operation maps by reproducing them in his literature.

Wavell, a British historian and officer⁴ who served on General Allenby’s staff, penned a more balanced and scholarly history of the campaign. *The Palestine Campaigns* (1938) fostered the romantic narrative by lauding the abilities of Allenby and praising the pluckiness of the EEF’s Turkish and German opponents. Wavell relied upon the operation maps as well to aid his narrative of the campaign, though he approached them with more skepticism than Pirie-Gordon. Wavell was an admirer of Allenby and was also his official biographer (*Allenby: A Study in Greatness*, 1940), and while his research was thorough, it was also presented through the lens of a romantic crusade to reach the Holy Land. Wavell often ignored or explained away mistakes committed by the British side rather than attempting to understand them. Even so, his comprehensive history of the Palestine Front defined the field for future scholarship. While his analysis of the campaign may have been biased, his facts were thorough and reliable.

In more recent years, the historical narrative of Allenby’s Palestine offensives has drawn more critical attention, though his ultimate success relative to other World War I generals is hard to dismiss. These scholars wondered why Allenby was not in fact more successful, given the circumstances. In one example of this more critical approach, Geronimo Nuno published a book in 2012, *Incomplete Victory: General Allenby and Mission Command In Palestine, 1917-1918*, that charged previous historians with perpetuating a “mythology” regarding the narrative of this campaign. Nuno argued that the EEF’s flawed performance in the 3rd Battle of Gaza allowed the Turkish forces to escape to fight another day. He devoted great detail to analyzing the mistakes made by Allenby and the EEF’s commanders, though he was less thorough in explaining why

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⁴ Wavell’s military career was long and distinguished. In World War II he attained the rank of Field Marshal and served as the British commander-in-chief of the North Africa theater against the Germans and then of the India theater fighting the Japanese.
they acted as they did. My research explains the validity of some of Nuno’s assertions by highlighting how some inaccurate editions of the operation maps informed poor decision-making at the EEF GHQ. Nuno also argued that the officers of the EEF were adept at learning from their failures during the campaign, another conclusion that confirms my research.

Finally, another narrative has focused on the experience of ordinary British soldiers on the Palestine front. Exemplars of this theme are David R. Woodward’s (2006) book *Hell in the Holy Land: World War I in the Middle East*, and Edward Woodfin’s (2012) *Camp and Combat on the Sinai and Palestine Front*. Woodward (2006) and Woodfin (2012) recounted the stories of individual soldiers by describing diverse experiences like leave taken in Cairo, training, combat, and the difficulties of desert marches and malaria. While these books and others like them are not directly related to the 7th FSC’s operation maps, such ground-level narratives are important to my thesis because they help to flesh out the actual procedures by which information was gained and communicated within the EEF. In my research I found that such information was vital to understanding how intelligence flowed up the chain of command in the form of raw data and reports and then back down the chain of command as operation maps.

**The Operation Maps in the Context of World War I Cartography**

Existing research indicates that the 7th FSC operation maps were distinct and under-studied products and shows that operational level mapping in general is an overlooked topic within the history of World War I cartography. Mostly, scholarship in this area has consisted of technical studies regarding how the various belligerents surveyed terrain to create more accurate maps. This is certainly true for Gavish and Biger, and to an extent for Collier as well. The surveying for these maps was a strategic activity, but the uses for the resulting products were usually for tactical trench maps and artillery maps. Peter Chasseaud (2013) exemplified this
dichotomy in his book *Mapping the First World War*. This book contained numerous facsimiles of these scientifically surveyed maps and demonstrated the tactical uses to which they were put. Despite the book’s title, Chasseaud wrote very little about the process of mapmaking but chose instead to use the maps as a narrative vehicle to tell a broad military history of the war, limiting the book’s utility for my research. In his other work, Chasseaud continued to emphasize the tactical level of cartography, as exemplified by his 1998 atlas of British trench maps on the Western Front, *Topography of Armageddon*.

Research about operational level mapmaking is conspicuously absent from World War I cartographic scholarship, with the exception of Collier’s (2008) article. Chasseaud’s (2013) book contains some excellent reproductions of both the 7th FSC’s operation maps and similar operational level maps produced by the British on the Western front, but no analysis about how these maps were produced and used. Such analysis would be useful, as the similar “order of battle” or “situation” maps that were produced on the Western front seem to be the products most closely related to the 7th FSC’s operation maps, although even these maps were distinct in content and form from those produced in Palestine (Chasseaud 2013, 107, 170, 182, 229, 240, and 243). My thesis begins to fill this gap in the scholarship by focusing on operational level products and analyzing how they were produced and used. Research into similar products in France would help to round out the field of World War I cartography by ensuring that the maps serving all three levels of war-making received study.

While my thesis is set squarely in the history of cartography, its subject matter also falls at the intersection of two other historical sub-fields: the history of military intelligence and operational military history. The scholars who have studied these intersecting subjects have significantly influenced the direction, structure, and content of my research. The operation maps
were cartographic products, but their symbols represented intelligence gathered from numerous sources. Furthermore, these maps were not simply filed away once they were printed. They influenced the decision-making of high-level commanders in the EEF and thus helped shaped the course of the Palestine campaign. The bearing of these diverse fields upon my thesis convinced me of the need for a conceptual framework that combined these various factors. I found this structure in David Woodward’s (1974) suggested framework for studying the history of cartography, as I will relate in the next chapter.
Chapter 3. Research Methodology: Conceptual Frameworks and Archival Sources

My research for this thesis follows a three-part model, namely, the development of a conceptual framework (Chapter 3), the use of this framework to organize my data-gathering (Chapter 4), and finally the subsequent analysis of those data (Chapter 5). To develop a conceptual model for examining the production, purpose, and use of the EEF’s operation maps I relied heavily on David Woodward’s (1974) framework for the ordering of cartographic history. I used this framework to organize my data, which were gathered from primary documents located in various archives, into a lens appropriate for answering my research questions. I chose to view the entire EEF as a cartographic system along the lines suggested by Woodward in relation to the production of the operation maps. To do this I first searched for archival sources that would allow me to modify Woodward’s framework, making it specific to the structure and function of the EEF organization. Second, using this modification of Woodward’s matrix I searched for further data showing how this cartographic system functioned to produce and use the operation maps. Third, to analyze my data I employed a process of multiple working hypotheses—a concept advanced by Thomas C. Chamberlin in 1890—to try to determine which sources of information prompted EEF intelligence officers to change the locations and designations of enemy units on the operation maps. The sources for each of these steps were largely the same documents within the British National Archives and the Imperial War Museum archives, though I gleaned different information from them for each task.
<table>
<thead>
<tr>
<th>Personnel</th>
<th>Production</th>
<th>Tools</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observer</td>
<td>Observation</td>
<td>Physical and Mental Faculties</td>
<td>Image</td>
</tr>
<tr>
<td>Surveyor</td>
<td>Surveying Data Gathering</td>
<td>Surveying Instruments, Questionnaires, etc.</td>
<td>Data</td>
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<td>Designer</td>
<td>Design</td>
<td>Design Tools</td>
<td>Specifications</td>
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<td>Compilation</td>
<td>Compilation Tools</td>
<td>Worksheet</td>
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<td>Drafting</td>
<td>Drafting Tools</td>
<td>Manuscript</td>
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<td>Engraver</td>
<td>Engraving</td>
<td>Engraving Tools</td>
<td>Plate</td>
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<tr>
<td>Printer</td>
<td>Printing</td>
<td>Presses, etc.</td>
<td>Printed Map</td>
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**Figure 3.1.** David Woodward’s suggested cartographic framework for the study of the history of cartography (Woodward 1974, 103).
<table>
<thead>
<tr>
<th>Information-Gathering</th>
<th>Production</th>
<th></th>
<th>Product</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Personnel</td>
<td>Techniques</td>
<td>Tools</td>
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<td></td>
<td>Intelligence officers</td>
<td>Signal intercepts</td>
<td>Wireless sets</td>
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<td></td>
<td>Aerial and ground patrols</td>
<td>Ground and aerial reconnaissance</td>
<td>Aircraft, cameras, optics</td>
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<td></td>
<td>Interrogators</td>
<td>Prisoner/deserter interrogations</td>
<td>Mental faculties</td>
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<td></td>
<td>Agent networks</td>
<td>Train watching</td>
<td>Communication networks</td>
</tr>
<tr>
<td>Information-Processing</td>
<td>Communication specialists</td>
<td>Situation and intelligence reports</td>
<td>Report formats and communication networks</td>
</tr>
<tr>
<td></td>
<td>Intelligence officers</td>
<td>Multi- and single-source analysis methods</td>
<td>Mental faculties, standardized forms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compilation, drafting, engraving, printing tools</td>
<td>Pre-printed base maps, colored engraving plates</td>
</tr>
<tr>
<td>Document Distribution</td>
<td>Staff officers</td>
<td>Daily intelligence dissemination</td>
<td>Chain of command, subordinate staffs</td>
</tr>
<tr>
<td></td>
<td>7th FSC</td>
<td>Compilation, drafting, engraving, printing</td>
<td>Pre-printed base maps, compilation, drafting, engraving, printing tools</td>
</tr>
<tr>
<td>Document Use</td>
<td>EEF commander, subordinate commanders</td>
<td>Military decision-making process</td>
<td>Tactical doctrine and training</td>
</tr>
<tr>
<td></td>
<td>GHQ and Corps staffs</td>
<td>Enemy capabilities and intentions analysis</td>
<td>Physical and mental faculties</td>
</tr>
</tbody>
</table>

**Figure 3.2.** Woodward’s framework modified to reflect the structure of the EEF cartographic system.
Conceptual Framework: Woodward’s Cartographic System

In developing a conceptual framework to examine the EEF’s operation maps, I chose to employ the matrix suggested by David Woodward for examining cartographic history. In his landmark (1974) article in *The American Cartographer*, Woodward outlined a structure that divides cartographic systems into vertical columns differentiating production elements from their products and into horizontal rows for the different sequential phases of map production. This structure distinguishes between and combines the form and content of maps (Edney 2005, 23). Woodward subdivided the production column to differentiate between the personnel, techniques, and tools employed in each phase of the cartographic system (Figure 3.1). Furthermore, this model is cyclical, both internally and externally, insofar as the product of each phase provides the foundation for the production process of the succeeding phase, and the final map product spurs further information-gathering to begin the whole process anew.

Woodward and his framework have been undeniably influential within the history of cartography, in large part because the framework brings together the study of the map production process and the study of the map as a historical artifact (Edney 2005, 20). As this paper attempts to accomplish both of these tasks in the case of the EEF operation maps, I found this framework well-suited to my research. But despite its wider relevance, a cursory survey of studies that cite Woodward reveals that few scholars have rigorously applied his framework. A notable exception is Lydia Pulsipher’s (1987) article examining a 1673 map of the Caribbean island of Montserrat that uses many parts of the framework, though in general Woodward’s 1974 article is cited for his broader influence on cartographic thought (Edney 2005, 23). Jeremy Crampton in his book *The Political Mapping of Cyberspace* indicates one possible criticism of Woodward’s framework by noting that a focus on the map and its content can ignore how the map was ultimately used, a
criticism echoed by Edney (Crampton 2003, 61; Edney 2005, 20). This criticism is particularly relevant to my research insofar as the end use of the operation maps is an important subject of my inquiry and in some instances might have differed from their originally intended purpose. Even so, the cyclical operation mapping process and its daily feedback that is evidenced in the related records overrides Crampton’s complaints because this cycle allowed me to reconstruct how the operation maps were used. Furthermore, as I will discuss further in my findings, Woodward’s framework is a highly relevant and under-utilized analytical tool for examining the broader cartography conducted by military organizations.

Specific to this project, I found Woodward’s framework to be a valuable tool for focusing my examination of the EEF for several reasons, not least of which was that the EEF contained units that conducted each of the roles in this model. The creation of the operation maps was itself a cyclical process, as the evidence indicates that each day’s map influenced the operations of the following day and therefore the information gathered and plotted on the subsequent maps. However, I felt the need to modify Woodward’s table in content though not in structure to reflect the specific organization, mission, and function of the EEF (Figure 3.2). By examining the organizational charts and rosters of the EEF and its daily GHQ and subordinate unit intelligence summaries and war diaries, I was able to replace the generic elements of the matrix with specific military analogues. I will re-visit the process for creating this framework in greater detail in Chapter 4, but for now suffice it to say that the framework led me to examine processes that I would otherwise have ignored, including—for example—how quickly and by what means gathered information was transmitted from the intelligence-gathering elements of the EEF to the information-processing elements, how the information was analyzed and negotiated at the GHQ
staff level, and by what means the information analysis was transmitted back to the operational units in the form of finished operations maps.

**Archival Sources: Maps, Unit Records, and Personal Papers**

The documents I examined also fall generally into three categories: 1) the operation maps themselves as well as other maps produced by various sub-units of the EEF, 2) unit war diaries and intelligence reports from the EEF General Headquarters (GHQ) and its subordinate units, and 3) the personal diaries, papers, and correspondence of key individuals within the EEF who participated in various ways in the production of the operation maps. The original operation maps and other official unit records from the EEF are located in the War Office collections of the British National Archives at Kew, while the personal papers of individuals connected to this subject are mostly located in the Imperial War Museum archives in London, with some located in various other archives in the United Kingdom. During the data-gathering phase of my research, I found Arn Keeling and John Sandlos’s (2011) article on the use of technology and electronic media to aid and enhance archival research to be particularly helpful given the large volume of documents I needed to examine.

As Keeling and Sandlos suggest, I was able to digitally capture a very large number of relevant documents while in the archives because I had laid the groundwork before ever arriving in the United Kingdom. Using Microsoft Excel, I organized the preliminary targets of my research into tables that could be cross-referenced by location in the EEF order of battle, academic citation, and address within the archives. I also organized folders on my computer to reflect the hierarchy of the EEF’s units and personnel whose documents I would pursue. During my time in the archives, I regularly added the photographs of original documents that had I captured into these folders. Furthermore, I thoroughly prepared my equipment before I arrived,
with the result that my time in the archives was streamlined and my data was thoroughly organized before I departed.

Figure 3.3. The relative land coverage of the four different base maps employed by the EEF cartographers to print the operation maps.

Operation Maps and Other Maps

As stated above, the historical documents relevant to the creation of the EEF operation maps are largely located in two archives in the United Kingdom—the National Archives and the Imperial War Museum archives—with some related personal papers located individually in other collections. I find it useful to divide these documents into three general categories based on the content and function of the manuscripts. The first category contains the original operation maps. A complete series of the original editions of the operation maps is located at the National Archives in Kew in the collections WO 153/1035/2 and WO 153/1035/3, as well as WO
I began my research here by thoroughly examining and photographing each map. This examination by itself yielded several interesting indications about how the maps were both produced and used. Interestingly, I also found original editions of the operation maps in several official unit records and in the private papers of several individuals. This pattern of distribution gave me clues as to the distribution and purpose of the maps.

The EEF cartographers employed four different base line maps at different times during the operation mapping process. The initial base map was a 1:100,000 line map of the area of southern Palestine encompassing the Gaza-Beersheba position (Figure 3.3). The scale and extent of this map was appropriate for the opening phase of the battle and also effective in allowing the British cartographers to mark unit positions without undue crowding or graphic interference. However, by 7 November much of the important activity on the ground was beginning to occur beyond the northern and eastern edges of terrain represented by these maps. To compensate for this fact, the EEF intelligence staff substituted a 1:250,000 scale base map on 9 and 10 November that covered a far greater extent of the Palestine theater and showed somewhat more detail of the physical and cultural terrain. Given that the British could only locate a small number of Turkish units during this time and that the number of British units moving forward in pursuit was limited for logistical reasons, the smaller scale of the map did not seem to present any problems in terms of crowded unit symbols. However, these maps also provided coverage for large areas in the south and east that were irrelevant to the ongoing operations. Accordingly, on 11 November the EEF staff adopted a 1:168,960 scale base map that covered a more appropriate range of terrain and seems to have been a good compromise between scale and coverage. Even so, this base map would only be in service through 14 November, at which point both the form
and function of the operation maps changed with the introduction of a 1:500,000 scale map significantly smaller than each of the previous charts.

The 7th FSC’s 1917 series of operation map can be organized into three distinct groups that correspond to the operational phases of the 3rd Battle of Gaza (see Chapter 1). In the initial assault phase the maps were reasonably complete and accurate because the static operations of the preceding months had allowed the EEF to gather large amounts of intelligence about the Turkish deployments. These editions were printed on the 1:100,000 scale base maps. In the second phase of mobile operations, however, the operation maps were characterized by incompleteness and inaccuracies as the British intelligence officers struggled to gather and synthesize data quickly enough to keep pace with the movements of the opposing forces. These editions encompassed those maps printed on the 1:250,000 scale and 1:168,960 scale base maps. In the third phase, the EEF cartographers attempted to reestablish an organized picture of the front lines using the 1:500,000 scale base map.

The operation maps themselves are interesting both in what they show and in what they omit. In some respects the maps are simplistic in the extreme. The base outline maps for all of the three sets depicted a very selective and limited set of terrain features—towns, major wadis, and the front trace of major fortification systems—and did not depict any relief. Each was annotated along the lower margin, indicating that the map represented the situation as known by GHQ at 6pm on the date of the map’s publication (Figure 3.4) though some interesting exceptions to this timeline exist, including a series of preliminary working maps and one other map depicting the situation at 2am on 13 November instead of 6pm on the previous day. For operational information, the maps showed the known or suspected locations of both Turkish and British cavalry and infantry units at the brigade level as well as the location of division, corps,
and army headquarters. Not depicted were artillery and logistical units, though some symbols appear representing tents and shelters or other indications that large bodies of troops were observed in a particular location. While the symbols employed to depict unit locations were largely standardized, the officers preparing the maps frequently made effective use of attenuation symbols such as question marks and hollow boxes. These officers also cleverly manipulated the traditional box unit symbols to communicate uncertainty or confusion regarding the actual conditions on the ground. In another technique, the EEF cartographers annotated the map margins and some map symbols to indicate either that a unit was known to be in the theater but had not yet been located or to clarify some detail regarding a unit already depicted. I will describe these techniques in detail in Chapter 5.

Figure 3.4. A facsimile of the bottom edge of the 6 November operation map. All of the operation maps were annotated in this way. Note the prominence of the scale, time, and date information, and that the time and date are in red to differentiate the map from other editions (TNA WO 153/1035/2).

Also located in these collections are other small-scale maps covering the terrain of the Palestine Theater from Sinai to Anatolia along with very simple concept maps communicating the British plans for deploying into their assault positions prior to the commencement of the attack. Many of the unit war diaries and intelligence summaries I examined also contained their own maps that communicated information as varied as plans for machine-gun barrages and circuit diagrams for the laying of communications wire. These charts were useful to my research in a complimentary role because they usually depicted information that the operation maps ignored, thereby providing further clues as to the specific purpose of the operation maps.

Taken together, the operation maps form the foundation and core of my investigation into their creation, purpose, and use. Taking into account what the maps depict—and what they do
not—provided me with strong initial indications both about what sources of information informed them and about what the ultimate purpose of these maps was. The changing format of the maps also indicated an evolution of purpose, particularly the shift from the second to the third set of maps that suggested, as Peter Collier (2008) has noted, that they might have taken on more of a historical rather than operational role at this point of the campaign. However, to really understand these maps requires a thorough investigation of other documents—official and personal—that illuminate the processes and people that created and used them.

*Intelligence Summaries and Unit War Diaries*

After examining the original operation maps, I next focused my efforts on the second category of archival documents: the daily intelligence summaries created by the EEF GHQ and its subordinate Corps headquarters, and the unit war diaries kept by every unit in the force, sometimes down to the company level. The relevant EEF GHQ intelligence summaries are located in the National Archives in the collections WO 157/717 (July 1917) through WO 157/722 (December 1917), while most of the unit war diaries are located in the ‘World War I Egypt and Palestine’ portions of the WO 95 collections, except for the war diaries of the Royal Flying Corps units, the records of which reside in the AIR 1/2210/209/26/2 collection. Both of these types of documents—intelligence summaries and war diaries—were sufficiently similar to have been recorded on the same official government form, Army Form C. 2118, which gave the recorder the option of crossing out either ‘WAR DIARY’ or ‘INTELLIGENCE SUMMARY’ at the top to designate which role the form is serving. These forms consisted of columns to the left of the page for the entry of the place, date, and time of the record, a large space for its substance, and another column on the right edge of the page for further remarks (Figure 3.5). These forms,

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1 The military unit hierarchy of both the EEF and the Turkish army, from largest to smallest, was: army (or force), corps, division, regiment (or brigade), battalion (or squadron), company (or troop).
usually filled out in neat cursive script using pencils, provided a vehicle for intelligence officers and unit recorders to efficiently organize and record information about daily events.

![War Diary and Intelligence Summary]

Figure 3.5. British Army Form C.2118. This form was used by staff officers to record intelligence summaries and war diaries (note the interchangeable titles at top). This particular facsimile also shows an example of the hand-drawn identification tables used by the EEF intelligence officers to organize their data and analysis (TNA WO 157/720).

Of these two kinds of documents, the EEF’s intelligence summaries were the most immediately connected to the operation maps. EEF GHQ intelligence staff produced these summaries daily, as did the subordinate headquarters of XX Corps, XXI Corps, and Desert Mounted Corps. These headquarters frequently shared intelligence, though which direction the information flowed was not always clear from the records. These summaries represent a compilation of intelligence about enemy forces and terrain gathered from various sources and these sources could be either within the EEF or external to it. The entries in the intelligence summaries contained information about enemy units as far from the Palestine front as the Balkan
and the Caucasus fronts, though the focus was on subjects of more immediate importance to southern Palestine.

The most useful entries in these summaries proved to be the standardized identification tables that appeared regularly, particularly in the GHQ summaries (Figure 3.5). These (usually hand-drawn) tables displayed newly-arrived information about enemy units that had been located or otherwise identified, noting the unit’s designation, the effective date of the report identifying the unit, and—crucially—the source of the information, along with other details pertinent to the subject unit. More common entries, however, took the form of a daily narrative that described observations made by elements within the EEF. The subjects of these observations included a wide variety of topics, including fresh work sighted on enemy fortifications, tallies of enemy tents and shelters (T&S in short hand), and direct observation of or contact with enemy troops. The sources for these reports were sometime stated explicitly, but more often needed to be deduced from the type of information they provided. Overall, these intelligence summaries served my research in the same way they originally served the EEF command: as a one-stop clearing house for data about enemy positions and movements. Both of the formats—identification tables and daily narratives—often linked directly to unit positions and identifications on the daily operation maps.

While the intelligence summaries provided me with data on what the EEF intelligence staff knew and when they knew it, the unit war diaries provided data on how the force gained much of this information. These diaries—daily logs of the unit activities from the corps down to the company level—were produced in narrative form with greater detail generally recorded by larger formations. War diary entries at the corps level sometimes ran several typed pages for a single day, while entries for a typical infantry battalion or signal company were often composed
of a single line of text describing several days’ activity. The details within the diaries also varied depending on what type of formation they recorded; infantry and cavalry units typically marked down significant troop movement or when and where they had made contact with enemy forces, while signal companies usually listed friendly units with which they could communicate and how many miles of telegraph cable they had laid. Also present in these documents—usually as appendices—were typed summaries of operations, statistics on enemy equipment and readiness, copies of daily orders and operation orders, and various maps illustrating concepts relevant to ongoing and planned activities. Taken together, these war diaries provide insight into the information-gathering and document-distribution stages of the cartographic framework by recording many of the incidents—operations, patrols, enemy contact, desertions, raids—that produced the information that appeared in the intelligence summaries and eventually on the operation maps.

**Personal Papers**

The third category of archival sources I examined were the personal papers of individuals who were directly or indirectly involved in the operation map production/product system. This category included the collections left by commanders and staff officers who served in the EEF. I selected which collections to pursue based on three separate searches. First, I searched for the records of individuals who had been cited by other scholars who have written about the operation maps. This search was by far the most fruitful and yielded the most relevant collections. Second, using the rosters of EEF officers and their positions in Pirie-Gordon’s *A Brief Record of the Advance of the Egyptian Expeditionary Force* as a guide, I searched in the Imperial War Museum (IWM) archives for papers of individuals who served in the EEF GHQ or subordinate Corps GHQs during the relevant time period. These individuals would likely have participated in
some way in the operation map production process. This search produced only a few further
records and these were not particularly fruitful in their content. Third, I searched both the IWM
archives and published literature for individuals who could have been tangentially related to the
operation maps, either in the various modes of information gathering or in the maps’ use,
including pilots, artillery officers, and other people with more narrow technical or tactical roles
within the EEF. This line of inquiry produced several interesting collections that provided insight
into the details of how various organizations within the EEF functioned and interacted with
others. Overall, while the volume of data I gathered from all three of these inquiries was small
compared to the official records located in the National Archives, the relevance of specific pieces
of information contained in these papers proved to be vital to my understanding of this subject
and to the conclusions I have drawn in this thesis. In the following paragraphs I will discuss the
role several of the most relevant collections played in my research and argument.

No examination of any subject related to intelligence in the EEF would be complete
without relying in some way on the diaries of Major (later Colonel) Richard Meinertzhagen. A
capable, innovative, and free-thinking officer of impressive initiative, Meinertzhagen served in
an intelligence role with British forces in East Africa and France prior to joining the EEF
intelligence staff in May, 1917. One of three General Staff Officers, 2nd Grade (I) assigned to
Allenby’s staff, he would develop and execute one of the more innovative and personally
audacious deception operations of World War I when, prior to the 3rd Battle of Gaza, he filled a
knapsack with false plans for a British frontal assault on the Gaza defenses, along with other
items to make the knapsack appear authentic, and arranged for himself to be pursued by a
Turkish patrol. This enemy patrol in due course captured the knapsack (but not Meinertzhagen).
This coup helped to shift the Turkish command’s attention away from the location of the real
initial assault on Beersheba. More relevant to this project, however, was Meinertzhagen’s direct involvement in the operation mapping process as noted both in his personal diaries and in the records of the 7th FSC (Meinertzhagen 1960, 225; Maule 1919, 6). Additionally, as Peter Collier noted, Meinertzhagen himself must have believed these maps were important, as he included a complete copy of them in his diaries and personal papers, which now reside at Rhodes House at Oxford University (Collier 2008, 11). Meinertzhagen published portions of his personal diaries as several books, with his *Army Diary* (1960) containing the entries relevant to this project. In addition to his direct role in the operation mapping process, a disagreement regarding these maps between Meinertzhagen and his supervisor, Guy Dawnay, which is recorded in Meinertzhagen’s diary, provides key insights to the internal workings of the EEF intelligence staff as well as clues to the operation maps’ purpose and use. I will return to this specific incident in detail in Chapter 4.

In recent years several scholars have called into question the veracity of portions of Meinertzhagen’s diaries, noting that some details do not match other corresponding records and other passages appear to have been revised at later dates (Collier 2008, 11). I noted some of these inconsistencies in my own project, but I was also able to verify the details relevant to my research through numerous other sources. Additionally, I would note that whatever inconsistencies may be present in his diaries, Meinertzhagen was undeniably an individual of impressive intelligence and ability, as evidenced both by his performance during the war and by praise from his contemporaries. As such, I have treated his papers as key and reliable parts of my research, though I did devote extra effort to triangulate passages important to my argument.

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2 Meinertzhagen later discovered that the Turkish officers in the opposing army had been skeptical of his ruse, but the German officers had believed the false information was in fact true and convinced their Turkish counterparts to act accordingly (Meinertzhagen 1917, Vol. 20, 38).
The papers of Brigadier General Guy P. Dawnay are of similar importance to those of Meinertzhagen. Dawnay, in his role as Brigadier General, General Staff (BGGS), was the direct supervisor of the GHQ staff officers who processed the intelligence that appears as graphics on the operation maps. While his papers do not contain any direct references to these maps, they do provide insight into the internal workings of Allenby’s staff. Interestingly as well, Dawnay’s papers, located in the IWM archives, contain original copies of the operation maps, indicating that he too considered them to be important in some way. Additionally, Dawnay’s diaries recorded his personal relationship with the commander of the British XX Corps, Major General Sir (later Lord) Philip Chetwode. These diary entries provided evidence corroborating some of the conclusions I have drawn from Meinertzhagen’s papers about the role of the operation maps within the EEF command.

Besides these two key collections, several others provided helpful data about the operations maps, their relevant intelligence, and GHQ and Corps headquarters functions. These included the papers of the already-mentioned Lord Chetwode, as well as the collections of Major General Sir Arthur Lynden-Bell, Chief of Staff of the EEF until September, 1917, and Captain Gerard Clauson, who helped coordinate British wireless intelligence activities across the Middle East, all of which are located in the IWM archives. Furthermore, the papers of Major General Sir Steuart Hare, commander of the British 54th Division, and Major V.H. Bailey, an artillery officer and adjutant, also located in the IWM archives, provided data regarding how the EEF both gathered and transmitted raw information to the GHQ. Aces and Kings (1936), the thoroughly enjoyable published first-hand account of the Royal Flying Corps in Palestine by Australian flier

3 The BGGS served as the GHQ’s chief of staff, though in the case of an organization as large as the EEF this position was subordinate to an officially designated chief of staff of higher rank. In the case of the EEF, Allenby’s chief of staff was Major General L.J Bols. The role of both the BGGS and chief of staff was to manage that staff and ensure that they were operating according to the commander’s intent.
L.W. Sutherland, also provided important information in the form of a narrative account of the RFC’s photo processing and communication systems.

Even so, many of the individuals who played key roles in the Palestine campaign and who would have had a direct hand in one aspect or another of the operation map system, including Allenby, his chief of staff Major General L.J. Bols, and various other commanders and staff officers, left behind collections that contain only sparse information or failed to leave any papers at all. Despite these gaps in the historical record, the original operations maps and the EEF’s intelligence summaries and war diaries provided the muscle for the story of operation maps, and these personal accounts that are present provided the texture and very often the vital connective tissue, helping me to piece together not just the dry theoretical concepts of how the EEF was supposed to have functioned, but also the rich human story of how it actually did.

**Analyzing the Data Using Multiple Hypotheses**

Having organized the EEF into a cartographic system according to Woodward’s framework and having used this lens to gather my data, I next analyzed these data by further using Woodward’s model in conjunction with Chamberlin’s (1890) concept of multiple working hypotheses to explore how this cartographic system functioned to produce each of the individual operation maps. Chamberlin, a giant of American geology, argued that complex problems could be explored more efficiently if researchers checked their data against multiple well-defined models rather than against a single hypothesis. To apply this method to my own research I searched relevant primary documents for evidence of why a particular Turkish or British unit symbol appeared, moved, or disappeared on each consecutive edition of the maps. I then checked the information’s content and source against one of six well-defined but not mutually-exclusive explanations. This allowed me to rapidly and efficiently deduce the reasons for many of the
changes that appeared on the consecutive maps and to make high-confidence guesses on most of the rest.

As scholars in other fields have noted, the multiple-hypotheses method is not without drawbacks and detractors. Ned A. Dochtermann and Stephen H. Jenkins argue in an article in *Behavioral Ecology and Sociobiology* that this method can sometimes lead to delays in accepting a single, well-founded and supported explanation (Dochterman and Jenkins 2011, 38-39). Naomi Oreskes argued in her book *The Rejection of Continental Drift: Theory and Method in American Earth Science* that such a delay occurred when US scientists were slow to accept the theories of Alfred Wegener (Oreskes 1999, 69, 308). The same concern arose in my own research as some unit moves on the operation maps seemed to beg a quick acceptance of a simple and well-documented explanation in lieu of a search that checked every hypothesis before coming to a conclusion. In these cases I accepted the initial explanation but did not consider it final, instead remaining open to future revisions of my conclusion. Dochtermann and Jenkins also cautioned against treating complimentary hypotheses exclusively as alternatives to each other (Dochterman and Jenkins 2011, 40). This was a relevant consideration for my method, as each of my hypotheses could be complimentary to any of the others, and vice versa. In fact, particularly during the early stages of 3rd Gaza, EEF intelligence officers usually plotted unit positions based on intelligence from a combination of information sources rather than a from single report. Therefore, I did not treat any of my hypotheses as mutually exclusive but considered them to be complimentary.

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4 Oreskes argued that geologists in the US in the early 20th century, including Chamberlin, were overly invested in their established competing geomorphic hypotheses and were slow to adapt their thinking to incorporate new forms of data that that were incompatible with these theories but that supported Alfred Wegener’s Theory of Continental Drift. In short, the presence of so many competing theories drowned out, for a while, the best supported theory.
In applying Chamberlin’s concept to this project I began with six parallel hypotheses for how each unit was both located and identified. These hypotheses postulated that the symbols on the operations maps represented units located and/or identified by one or a combination of 1) ground reconnaissance and contact, 2) prisoner and deserter statements, 3) aerial reconnaissance, 4) signals intercepts, 5) agent networks, and 6) a combination of any of the previous (Figure 3.6).

In determining what sources of information the symbols on the map represented, I found that the data located in the archival documents I examined were much less ambiguous on this subject than I had initially expected, allowing me to demonstrate direct links between specific information-gathering events and changes to the operation maps with high confidence. This approach allowed me to pursue each of the different explanations simultaneously and did not require me to settle on any single or mutually exclusive conclusions as to the sources of the map changes.

<table>
<thead>
<tr>
<th>Multiple Hypotheses - What Information Sources Are Represented by Updates to the Operation Maps</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ground Reconnaissance and/or contact</td>
</tr>
<tr>
<td>2. Prisoner/Deserter Statements</td>
</tr>
<tr>
<td>3. Aerial Reconnaissance and/or Photography</td>
</tr>
<tr>
<td>4. Signals Intercepts</td>
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<tr>
<td>5. Agent Networks</td>
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<tr>
<td>6. Combination</td>
</tr>
</tbody>
</table>

Figure 3.6. My six working hypotheses for the sources of intelligence represented by the map symbols on the 7th FSC operation maps.

A word here seems appropriate about the two complimentary types of information about units that the operation maps represented, namely their location and their identity. The parallel tasks of locating a unit—finding signs that a large body of troops and materiel were present at a specific location—and identifying a unit—gaining knowledge of its specific designation and place within the order of battle—generally fell to different information-gathering elements
within the EEF. The units conducting these tasks also changed with the proximity of the target unit to the front. For example, aerial reconnaissance and photography was highly useful in locating units—both friendly and enemy—particularly in the area near the front lines. However, this intelligence platform was nearly useless in identifying these same formations in the absence of information gathered from other sources. Similarly, agent networks could identify new enemy formations entering the theater, but the information they provided was generally too slow in arriving or too general to provide an accurate location of the target unit at the front. I therefore grouped the EEF’s information gathering organs into four categories based on their relative usefulness in locating or identifying units, and also by the scale—near or far from the front—at which they operated best (Figure 3.7). One fact that this table clearly illuminates is the importance of signal intercepts to all four quadrants of this intelligence gathering matrix.

<table>
<thead>
<tr>
<th>Locate</th>
<th>Near</th>
<th>Far</th>
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<tr>
<td></td>
<td>Signal Intercepts</td>
<td>Signal Intercepts</td>
</tr>
<tr>
<td></td>
<td>Prisoners/Deserters</td>
<td>Aerial Reconnaissance</td>
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<td></td>
<td>Contact</td>
<td>Agent Networks</td>
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<table>
<thead>
<tr>
<th>Identify</th>
<th>Near</th>
<th>Far</th>
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<tbody>
<tr>
<td></td>
<td>Signal Intercepts</td>
<td>Signal Intercepts</td>
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<tr>
<td></td>
<td>Prisoners/Deserters</td>
<td>Agent Networks</td>
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<td></td>
<td>Contact</td>
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</tbody>
</table>

**Figure 3.4:** Table showing the type of information and scale at which the various sources of intelligence excelled.

This matrix is not without its drawbacks. For one, the units of scale (near and far) are ambiguous and apply differently to different information-gathering methods. The ‘near’ scale to an airplane conducting reconnaissance just behind the front may still be ‘far’ to a cavalry patrol attempting to observe the same location. In general, however, I defined ‘near’ to refer to the front itself and the rear areas of immediate impact on the front, while ‘far’ designates the units and
areas that would take days or weeks to influence the battle. Interestingly, the Royal Flying Corps (RFC), in organizing its reconnaissance missions, observed a similar division of scale, naming them ‘tactical’ (near) or ‘strategical’ (far) missions, and assigning different squadrons to specialize in each. Another drawback is that this table cannot by itself decipher the source of a certain piece of information, insofar as most of the intelligence sources appear in more than one quadrant.

Even so, this simple matrix helped to focus my investigation on the information-gatherers most likely to have provided the data leading to specific updates to unit locations on the operation maps. Some sources of information, particularly signal intercepts and statements provided by prisoners and deserters, were valuable across both scale and role. Additionally, some location changes appear to have been the result of intelligence reports from multiple sources, while others appear to have been the result of informed deduction or even guesswork. Some changes generated controversy between the intelligence officers responsible for the data represented on the maps. The usefulness of this matrix lies in how it allowed me to initially eliminate certain hypotheses about the sources of particular updates. For example, aerial reconnaissance would never be source of information identifying an enemy unit. Similarly, contact could not be the source of information for anything in the far scale as it required physical interaction between friendly and enemy elements. Overall, I applied these multiple hypotheses to explore and explain the progression of unit symbols across the 7th FSC’s operation maps by using the Woodward’s framework as a lens, as I will describe more fully in Chapter 5.

Summary of Sources and Methods

The conceptual framework, research methods, and sources I employed for this thesis allowed me to gain a thorough understanding of how the EEF cartographic system gathered,
analyzed, and communicated information to create the operation maps of October, November, and December 1917. This in turn allowed me to make educated deductions about why these maps were created and how they were used. David Woodward’s cartographic framework was particularly useful as a tool for examining the self-contained cartographic system that any large military organization represents. This applicability of Woodward’s framework to broader studies of military cartography is a finding that I will return to in greater detail in my concluding chapter. Chamberlin’s multiple hypotheses method also proved appropriate given the clearly-defined and possibly complimentary explanations that existed for the positions of unit symbols on the operations maps. The data I collected at the National Archives in Kew, the Imperial War Museum in London, and elsewhere, proved far richer and more relevant to my project than I had dared to hope, often allowing me to track a piece of information from its source, through its various modes of transmission and analysis, onto the operation map, and thence to influence further operations and information gathering. The following chapters describing my data collection and analysis will illustrate my reason for this stated enthusiasm.
Chapter 4. Using Woodward’s Framework to Gather and Analyze Data

In this chapter I will describe in detail how I used the Woodward cartographic framework as a lens to analyze how the EEF as a system both produced and used the 7th FSC operation maps. To do this, I will first relate how I used archival material to modify Woodward’s generic model to reflect the specific structure of the EEF as a cartographic system. This initial analysis yielded interesting findings, both anticipated and unanticipated, and allowed me to answer one of my two research question: what was the purpose and use of the operation maps? My subsequent analysis of the operation maps in Chapter 5 then applies this modified framework in conjunction with Chamberlin’s multiple working hypotheses concept to answer my initial research question: what sources of intelligence do the various operation maps represent? In this chapter I will move through each sequential phase of Woodward’s framework and describe how I replaced his generic elements with the specific personnel, techniques, tools, and products of the EEF cartographic system.

Altering Woodward’s Framework

As I related in Chapter 3, Woodward’s matrix depicted a generic system that occurs in four phases. The framework addressed both the production process and the resulting products of each of these phases. In the following section I will demonstrate how I used archival sources to replace the generic elements in each phase of Woodward’s framework with specific EEF analogues. In this process I relied on the scholarship of others who have written about cartography and intelligence in the EEF—particularly Collier, Sheffy, and Occleshaw—as well the same primary sources I subsequently employed to analyze the operation maps. This initial step of my analysis produced some interesting findings, not the least of which relates to the applicability of the Woodward framework to studying the history of military cartography.
Information-Gathering

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Figure 4.1: Information-gathering phase of Woodward’s cartographic framework modified to reflect specific elements of the EEF.

I began by examining how the EEF gathered the raw data that eventually became the estimates of friendly and enemy unit positions depicted on the operation maps. As John Keegan described in his book, *Intelligence in War*, the scope and value of military reconnaissance prior to World War I has been restricted by how far a person could see and how far and fast a courier could carry information once it had been gained (Keegan 2003, 5). Previously, military forces had been limited to sending scouts—usually cavalry—to within line of sight of an enemy force, sometimes resulting in combat or ‘contact.’ These scouts would then return and report their observations. These activities, which I collectively term ‘ground reconnaissance and contact,’ were supplemented by information gleaned from enemy prisoners and deserters and by intelligence provided by spies. The relatively small amount of useful information within the line of sight of a scout or spy as well as the slow rate at which these observations could be carried by a messenger precluded near-real-time estimates of enemy dispositions such as those that
appeared on the operation maps and limited the utility of the information in general (Keegan 2003, 5-6).¹

By contrast, technological advances in the areas of communication and transportation prior to the outbreak of World War I combined to revolutionize how military organizations gathered information. The telegraph, and later—and of greater significance for information-gathering—the radio, allowed information to be transmitted rapidly over long distances. These new media of communication opened new possibilities for intercepting messages. The range at which these messages could be intercepted (hundreds of miles in the case of radio) began to bring near-real-time intelligence within the grasp of military headquarters. In the realm of transportation, the proliferation of motor vehicles, and in particular aircraft, increased the speed at which scouts could travel and the scope of what they could see. Thus, signal intercepts or signals intelligence (SIGINT) and aerial reconnaissance joined the more traditional methods of intelligence-gathering and increased the scope of what a military force could see (Keegan 2003, 102; Occleshaw 1989, 55-60).

Additionally, the nature of World War I land combat—a conflict characterized by siege warfare on a massive scale—in many cases altered the utility of traditional methods of reconnaissance. On a static front as existed before Gaza and Beersheba in late 1917, the value of information gleaned from prisoners and deserters, patrols, and even from an officer with a view of the enemy fortifications, increased because the information was less likely to change in the time it took to transmit the data to headquarters. However, the normal constraints on these forms of reconnaissance quickly reasserted themselves once the Gaza battle became more mobile (Occleshaw 1989, 79-92; Sheffy 2004, 148).

¹ Interestingly, Keegan divides military intelligence gathering into a 5-phase operation that roughly mirrors the Woodward framework. His five phases are 1) Acquisition, 2) Delivery, 3) Acceptance, 4) Interpretation, and 5) Implementation (Keegan 2003, 6).
From this broad survey of military information-gathering during World War I, I drew both my specific techniques of production in the first phase of Woodward’s framework and each of my six working hypotheses as to the sources of intelligence represented by the unit symbols on the operation maps. These two lists are the same and consist of 1) signal intercepts, 2) aerial reconnaissance, 3) ground reconnaissance and contact, 4) prisoner and deserter interrogations, and 5) agent networks (my sixth hypothesis being a combination of two or more of these). Below I will describe in detail each of these information-gathering functions within the EEF system and the organizations that performed them. I will also describe their resultant products and how all of this fits into my modified version of Woodward’s cartographic framework.

**Signal Intercepts**

The interception of Turkish and German electronic signals, specifically radio and telegraph messages, was of prime importance to the EEF information-gathering effort, so much so that radio intercepts were denoted by the code phrase “an absolutely reliable source” in intelligence summaries and other documents. This phrase was intended to conceal the source from spies and to highlight the fidelity of the information it provided.\(^2\) As others have already noted, messages on both sides of the conflict would have been enciphered or encoded under ideal circumstances (Occleshaw 1989, 110-114).\(^3\) These codes and ciphers were routinely compromised, making the messages encrypted with these systems readable by the enemy. The British in particular were successful in cracking nearly every Turkish code and cipher, a fact that

\(^2\) British officers used specific terms to denote and conceal wireless intercepts in their records during the course of the Palestine campaign. Intelligence summaries first referred to wireless intercepts as originating from “Agent X” or “Agent Y.” In the weeks leading up to Gaza offensive the term of choice was “an absolutely reliable source.” As the battle progressed the British intelligence summaries adopted the passive voice to denote wireless intercepts, using the preface of “there are indications that...” or “it is reported that...” before relating the content of an intercept. These terms indicated the importance the British placed on information gathered from wireless intercepts and their desire to conceal their reliance on this source from the enemy. However, these attempts appear somewhat ham-fisted as the contents of intercepted messages could realistically only come from wireless intercepts (Sheffy 2004, 252).

\(^3\) Ciphers are the transposition of letters, numbers, or symbols for the purpose of encryption whereas codes rely on books available to the sender and recipient of preselected definitions for letter or number groups (Sheffy 2004, 228).
yielded a great deal of valuable intelligence to Allenby and his force (Ferris 1992, 11). Additionally, encoding or enciphering wireless or telegraph messages could be a time-consuming and tedious process. Thus, many messages—particularly ones of tactical or immediate importance—were sent ‘in the clear,’ without any sort of encryption. This meant that any unintended recipient could read the message. Much of the most tactically relevant information would have been sent and intercepted ‘in the clear’ (Occleshaw 1989, 112-13).

By late 1917 the EEF was well-served by a robust wireless intercept service with intercepting stations located in Cairo (with its receiver atop the Great Pyramid), Cyprus, and near the EEF GHQ at Bir Salem. These stations had the added ability—recently invented—to conduct direction-finding (D/F) operations. This meant that they could determine a line of bearing to the source of the transmission they were intercepting and these, when cross-referenced with intercepts from other stations, could begin to triangulate the location of the transmitter. These intercepting stations were augmented by the three wireless stations of the EEF Corps GHQs, by the station serving the Palestine Brigade RFC squadrons, and by Royal Navy ships in the Mediterranean and Red Seas. These were all further supplemented by the wider British and Entente wireless interception network stretching across the Mediterranean, the Balkans, and Mesopotamia. The interception effort for the EEF was coordinated from 1916 onwards by Captain Hugh Lefroy, who was responsible for the entire Middle East area. He was joined, starting on the eve of 3rd Gaza, by Captain Gerard Clauson, who coordinated the cryptanalysis of the various intercepted messages (Sheffy 2004, 223-25, 230).

Unfortunately, Lefroy either did not leave useful records of his activities or those records were suppressed by the British government in an effort to conceal the critical value of this

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4 One code the British were never able to crack was the so-called “Yilderim code” used by the Turkish army’s Yilderim Force, a reserve army whose ultimate destination—Mesopotamia or Palestine—was of great interest to British intelligence during the Gaza offensive (Sheffy 2004, 229).
intelligence source. Clauson did leave papers, but his records address mostly the mathematical cracking of successive Turkish and German codes and ciphers and revealed little about the tactical or operational value of the intercepts themselves. Additionally, many of the intercepted messages have either been lost or suppressed (Ferris 1992, 254). This means, for the purpose of this project, the only useable records of these intercepted messages were their end result: entries in the EEF GHQ Intelligence summaries and enemy unit positions on the operation maps. These indirect records revealed both the unique capabilities of this information-gathering medium and also some of its limitations.

Unlike other intelligence platforms, wireless intercepts could reveal both the location and identity of enemy units far from the front. They could also reveal much about the quality and size of these units in the form of intercepted reports sent by unit commanders. Furthermore, wireless intercepts could even reveal enemy intentions when a headquarters transmitted plans or orders to its subordinate formations. All of these kinds of data appeared in the EEF intelligence summaries, sometimes explicitly identified as coming from ‘an absolutely reliable source’ and at other times identifiable simply by the type of information recorded, as when the summary noted an enemy wireless station opening or closing in a certain location (see GHQ IS 3/10/17 and 24/10/17 for examples). Other entries indicated that Turkish units down to a relatively low level (corps, or possibly division) appear to have used wireless sets to communicate and thus revealed information about both their location and identity (see map “Enemy W/T Stations in Syria and Palestine” in GHQ IS 4/10/17). These entries are frequent and often appear to be the sole source for unit positions on some of the operation maps. Thus, signal intelligence officers and the wireless intercept infrastructure of the EEF formed an important component of the information gathering process in my modified cartographic framework.
Tapping into enemy telegraph lines was another method for intercepting enemy signals, though more difficult and of much more limited scope and utility than wireless signals. Field telephone lines—ever-present along the front to allow communication between units—could be tapped either by attaching a cable directly to a line above-ground or, in the case of buried cables, by listening through an electromagnetic coil placed against the ground to use the earth as a transmitter (Sheffy 2004, 245-46). While these techniques were common on the Western Front, the evidence in Palestine is far less certain. Some entries in the EEF intelligence diaries contain information that could very easily have been gathered from this source, but by and large this method of interception seems to have been relatively little employed by the EEF. However, because it was a source available to the EEF system, it could not be ignored; I included this method under the broader ‘signals intercept’ term.

The value of signal intercepts changed during the course of 3rd Gaza and its aftermath based on the nature of the operations conducted by both armies and the terrain in which they were operating. As Sheffy notes, wireless intercepts allowed the British forces to correctly identify the headquarters of nearly every Turkish and German unit on the Gaza-Beersheba front line from early 1917 through the opening days of the battle (Sheffy 2004, 222). However, once the campaign entered its far more fluid pursuit phase, signal intercepts degraded significantly in quality. This seems to have been amplified by the fact that wireless intercepts were often the only source of information that EEF GHQ could reliably obtain during mobile operations (Sheffy 2004, 242). The operation maps reveal many of the limitations of information received under these circumstances. These limitations included large gaps in knowledge about Turkish unit locations, misidentified Turkish units, and warnings on the maps about formations that never even entered Palestine (see operation maps of 3/11/17, 13/11/17, and others). However, wireless
intercepts do appear to have continuously provided information through all three phases of the battle whereas other sources sometimes dried up completely. Thus, while signal intercepts may not have been exactly ‘absolutely reliable,’ they were at least consistently available and could often provide the qualitative data about the enemy that other sources could not. They therefore deserve a prime place in the information gathering phase of the EEF cartographic system.

*Aerial Reconnaissance*

By World War I, aircraft had, like electronic communications, emerged as a completely new and revolutionary vehicle by which to gather information by relieving much of the usual difficulty endured by earth-bound observers. A pilot and an observer in an airplane, because of increased speed and the advantage of altitude, could gather more information far more quickly than their terrestrial counterparts. By late 1917 the EEF was effectively positioned to benefit from these advantages in the coming campaign. EEF pilots, who had already begun to pioneer the use of aerial photography for accurate map-making, would now test the value of airplanes in providing up-to-date tactical and operational intelligence on a rapidly changing battlefield (Collier 1994, 100). The relevant intelligence summaries and war diaries illustrated both the advantages and limitations of this mode of information-gathering, demonstrating that this was not only the main—but often-times sole—source of information influencing the depiction of units on some editions of the operation maps.

By October 1917 the Royal Flying Corps in Palestine was effectively organized and well-equipped for its reconnaissance tasks. The RFC command on the front, the Palestine Brigade, had recently been reinforced to a strength of two wings each consisting of two squadrons. The 40th (Army) Wing, with No. 111 Squadron and No. 67 Squadron (previously No. 1 Australian

5 A squadron usually contained twelve aircraft, but this number varied wildly depending on combat losses, maintenance, reinforcements, and any number of other factors.
squadron), was responsible for conducting ‘strategical’ or ‘far’ reconnaissance for the entire EEF. The 5th (Corps) Wing supported the EEF’s two infantry corps with ‘tactical’ or ‘near’ reconnaissance mission conducted by No. 113 and No. 14 Squadrons (Sheffy 2004, 279). These units had been recently equipped with modern aircraft that allowed them to overcome the disadvantage during the previous months of having to evade superior German aircraft. These new machines allowed British observers to patrol the skies over the front with near impunity and prevented the German and Turkish pilots from gathering similar information about British positions and movements (Cutlack 1923, 48).

Both strategical and tactical missions usually flew twice daily with flights taking off in the early morning and early afternoon, weather-permitting (Cutlack 1923, 77; GHQ IS 15/11/17). Since stationary bodies of troops could easily evade aerial observation, both kinds of reconnaissance missions attempted to locate secondary evidence that ground forces were present in an area. Strategical missions typically covered the areas far behind the battle line, often as far as Jerusalem in the weeks leading up to the start of the offensive. These missions tried to locate troops and supply lines as they neared the front by focusing on railroad lines and transportation hubs. Tactical reconnaissance missions, by contrast, observed the front itself along with its immediate rear areas, reporting on moving groups of enemy soldiers, camps, fortifications, and railroad sidings. In addition, the tactical reconnaissance squadrons continued to provide photographic support to the 7th FSC’s topographical mapping efforts (Cutlack 2009, 70).

The information these missions provided possessed advantages and disadvantages relative to other intelligence sources. They could observe enemy positions much farther from the front lines than ground reconnaissance missions could, and because the target of aerial reconnaissance could be directed and did not require enemy units to transmit a message or
perform some other act first, they could be used at will to verify reports obtained from other sources. On the other hand, aerial reconnaissance was unable to identify enemy units in the absence of other information because an airplane could never fly close enough to an enemy unit to see patches on uniforms or question its soldiers. Additionally stationary bodies of troops could hide themselves quite effectively from aerial observation with minimal effort even in open terrain by using local vegetation or even simply remaining still, which fact often seems to have caused gaps in or misinterpretation of data (Sheffy 2004, 283).

Thus, aerial reconnaissance faced pitfalls similar to those that hampered wireless intelligence-gathering. The information these missions provided, while nearly always available, was often woefully incomplete and in many cases misleading, particularly when observations were used to determine enemy intentions. An example of such a misinterpretation occurred when the GHQ predicted incorrectly that Turkish forces would evacuate Jerusalem in mid-November based on aerial observations of troops moving north along the Shechem road (GHQ IS 18/11/17). Despite these shortcomings, the flexibility and near-constant availability of aerial reconnaissance made it an indispensable information-gathering tool for the EEF, so much so that this source more than any other was responsible for the addition of unit symbols to the operation maps based on single reports or observations. As such, aerial reconnaissance was clearly a primary and vital information-gathering component of the EEF cartographic system.6

Ground Reconnaissance and Contact

Historically the most traditional method of military reconnaissance was to send a ground force within close proximity of the enemy to observe and then report its observations, and so

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6 One other component of aerial reconnaissance was No. 49 Balloon squadron, which arrived on the Palestine front prior to the opening of the Gaza offensive. Observers in tethered balloons could observe Turkish trenches and rear areas with more persistence than heavier-than-air craft, but were more vulnerable to weather and enemy fire. These appear to have been used more for artillery-direction than for information-gathering in Palestine (Collett 1917).
much the better if this force could seize a prisoner for questioning or capture important enemy documents. Though this age-old method of intelligence-gathering was vital during World War I, and remains so to the present, the unique conditions of the Great War amplified the utility of some techniques of ground reconnaissance and marginalized others. The large-scale siege warfare that occurred on every major front of the war also typified both the beginning and end of the 3rd Gaza campaign. This context provided advantageous conditions for small-scale raids to gather intelligence and seize prisoners. Also, a static front allowed commanders and staff officers—who were normally dependent on patrols to act as their eyes—to find a particularly good vantage point within their own lines from which to personally observe the enemy’s trenches.

On the other hand, large systems of trenches limited traditional cavalry or infantry reconnaissance patrols by restricting their mobility and by hiding the targets of their reconnaissance. Finally, large combat operations, both offensive and defensive, always generated a great deal of information about enemy units’ location and identification. Perhaps no more concrete evidence of the presence of enemy troops exists than incoming fire, and dead or captured enemy soldiers provide the surest verification of their identity (Occleshaw 1989, 79-80). Notably, the relative values of each of these techniques would shift significantly in the second phase of the Gaza campaign, when operations became far more fluid and mobile than the norm in this war.

Since the most basic technique of ground reconnaissance is the patrol, I will begin by describing how patrols functioned within the EEF system. Along stretches of the front where the opposing fortifications were in close proximity—most notably before Gaza—both armies sent patrols into the ‘no-man’s-land’ between the lines. These patrols could consist of work parties to
improve or repair wire entanglements or clear fields of fire, small listening posts to give early
warning of an enemy attack, squads sent out to observe a particular feature in the enemy’s line,
or counter-patrols to interfere with enemy efforts. All of these operated almost exclusively at
night, as in daylight the soldiers performing these tasked would have been exposed to fire from
the trenches. These missions would frequently encounter enemy patrols conducting similar tasks
or observe enemy fortifications from close range, providing clues as to how heavily held a
particular stretch of front might be or the locations of key weapons along the line (see “Tank
Redoubt” in 52nd Division WD 24/7/17).

Further east from Gaza, where the British and Turkish lines were increasingly distant
from each other, the techniques for reconnaissance became less routine and more formalized,
consisting of large patrols of cavalry that could move with relative freedom in areas between the
lines. Assisting this mobility was the fact that many portions of the front between Gaza and
Beersheba were lightly held by both sides. The EEF was a cavalry heavy force, with three of its
ten divisions (the Australian, ANZAC, and Yeomanry Mounted Divisions) and one of its three
corps (the Desert Mounted Corps) composed almost entirely of mounted troops, in addition to
the cavalry squadrons automatically assigned to each of the infantry divisions. In a time when
motorized transport was relatively scarce and lacked effective cross-country mobility, these
horse soldiers provided the primary means for conducting mobile long-range ground
reconnaissance. The EEF war diaries and intelligence summaries in the weeks and months
leading up to the Gaza offensive revealed a lively tempo of skirmishes between patrols from EEF
cavalry units and their Turkish counterparts along the eastern part of the front towards
Beersheba, and EEF cavalry patrols were frequently sent out to gain specific information about
topics ranging from the location of wells to the extent of Turkish fortifications at a particular section of front (AMD WD 27/10/17; ANZAC WD 13/12/17).

Both the EEF war diaries and numerous personal collections, including those of Major V.H. Bailey and Lord Philip Chetwode, recounted a third form of patrolling conducted by the EEF during this time: officer reconnaissance. Indirectly, this form of patrol may have been the most important with respect to how the operation maps were eventually employed. As the plans for the 3rd Gaza offensive became finalized, commanders in the EEF mandated that their subordinate officers conduct direct reconnaissance of the terrain across which their units would move and operate (Chetwode, “Notes on Future Actions and Organization of XXth Corps”). In the Gaza sector these patrols seem to have typically taken the form of observations of no-man’s-land from friendly trenches, while in the more open Hareira and Beersheba sectors mounted groups of officers escorted by cavalry were actually able to move across the terrain through which they would later lead their units (Bailey, 5/3/17). These patrols helped provide commanders and staff officers with healthy background knowledge about both the physical terrain and enemy positions that would later supplement the rather sparse information communicated by the operation maps. This provided some clues not just about how the EEF gathered information, but also about how it used the operation maps.

Each of these forms of patrolling was subject to the limitations that have always afflicted ground reconnaissance. First, their field of view was limited by what they could see from ground level. Intervening hills, vegetation, and buildings, even relatively small ones, could hide surprisingly large bodies of troops from direct observation. Second, the information that these patrols collected usually needed to be carried back to a headquarters where it could be

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7 EEF staff officers were trained to create terrain sketches, perspective views of the Turkish lines from various points in the British lines with inset maps showing the scope of the terrain presented. Some excellent examples of these exist in the 52nd Division War Diary and elsewhere (Bailey, 7/3/17).
transmitted up the chain of command. This was not a major disadvantage during the static, set-piece phase of the campaign, when the lines were more or less stable and forms of communication were both robust and redundant. However, when the battle entered the more mobile pursuit phase, the communication bottleneck became significantly more pronounced (161st Infantry Brigade WD 2/11/17).

Routine patrolling tied closely into another, more violent form of ground reconnaissance: the raid. Contrary to popular conceptions about siege combat in World War I, the front lines of trench fortifications were surprisingly vulnerable to attack in many places, particularly at night. Both the British and Turkish forces launched raids into each other’s trenches in the months prior to the start of the Gaza offensive, though the British seem to have been more active in this regard. In contrast to simple patrolling, commanders usually sent out raids to accomplish a specific mission, sometimes to destroy a particular fortification or weapon or to kill enemy troops occupying the opposite trench and disrupt their plans. One goal of almost every one of these attacks, however, was to capture prisoners who could later be interrogated, a process which I will cover in greater detail in a subsequent section. Suffice it to say, these raids were a common information-gathering tactic, often on a surprisingly large scale (Meinertzhagen 1917, Volume 20 11/6/17).

Meinertzhagen implies in his diary that he took part in a large and successful raid on a Turkish fortification along the coast called “Sea Post” by the British (see Figure 1.1 in Chapter 1) and the war diaries of British battalions, divisions, and corps contain frequent accounts of raids—always launched at night—ranging in size from a single squad of perhaps ten soldiers to battalion-sized attacks that required extensive planning and generated large numbers of casualties. The direct information these raids generated was usually vague and impressionistic, as
in whether an enemy trench was strongly held or not, but the indirect intelligence they created in
the form of prisoners who could be interrogated—as I will relate later—was often accurate,
extensive, and specific, and directly relatable to details that appeared on the operation maps (XXI
IS 11/9/17 through 11/11/17). Because of this, they deserve a place as an information-gathering
method in my modified Woodward matrix.

The final method that ground forces in the EEF used to gather information was large-

scale combat operations. These operations involved whole divisions or corps attacking to seize
terrain or destroy enemy forces. Unlike patrols and raids, the mission of the large units
conducting these operations was not to gather intelligence but instead to move the campaign
forward operationally and strategically by gaining advantages over the enemy. Despite this lack
of focus on intelligence, active operations generated large amounts of data simply from the fact
that these movements were the best way to make contact with the enemy (read: draw fire) and to
maintain that contact through combat. Combat generated casualties, and enemy dead and
prisoners, as already discussed, were a major source of tactical information for the EEF. The
flow of this information to the GHQ was constrained, however, by the need to transmit it by code
through wireless, heliograph, or signal flags or to entrust a written note—usually a few jotted
sentences on a standardized dispatch book—to a courier who would then need to make his way
across country to deliver his message to higher headquarters. Thus the amount of information
gathered versus the amount actually transmitted appears to have been rather small and limited in
scope (see XX IS 1/11/17 through 30/11/17 for example).

The intelligence summaries and war diaries from the first phase of the Gaza offensive
showed that as the British forces attacked they generated a flood of information from units
engaging the Turks in combat. Some of the information confirmed what the GHQ already knew,
some was new information, and some was erroneous. Conversely, the information available to the staff officers populating the operation maps slowed to a trickle when the British forces lost contact with much of the Turkish army after the Turks withdrew from the Gaza-Beersheba line, as illustrated by the near total disappearance of Turkish units from the maps in the middle part of November (operation maps 7/11/17 to 8/11/17 and 10/11/17 to 11/11/17). This illustrated not only the importance to intelligence-gathering of large-scale active operations that maintained contact with the enemy, but also the central role of all forms of ground reconnaissance as these larger operations would have been composed of smaller patrols, raids, and attacks. Therefore, active operations and ground reconnaissance in general were an important component of the modified Woodward framework that could locate and in some cases identify Turkish units.

*Rough View-Shed Analysis for British Units*

Another method I employed to determine what intelligence could have been gathered by ground reconnaissance was a rough view-shed analysis of the Palestine front. To conduct this analysis, I took digital scans of the 7th FSC’s operation maps and superimposed them first on a digital elevation model of modern-day Israel (available for free from the Cyprus Bibliographic Archive of Earth Science, or “CYBAES,” http://www.cybaes.org) and then onto digital scans of several modern-day topographical maps of Israel. I registered these maps to each other by choosing several prominent terrain features, including the towns of Gaza, Beersheba, Hebron, and the city of Jerusalem, along with several major wadis and the Palestinian coastline. I then rubber-sheeted the maps so that these features aligned tolerably well. The terrain features on these maps did not correlate perfectly—likely due to different projections cast by the different maps—but I was able to bring them close enough for the purposes of this project.
The purple shaded areas represent the rough field of view of the British units. The approximate horizontal distance for these figures is twenty-five miles. These figures are intended to be printed in color.

Next, using Adobe Illustrator I traced the positions of the British and Turkish forces for each day’s edition of the operation maps onto the CYBAES digital elevation model. I then surrounded each symbol with an eleven-mile\(^8\) buffer representing an ideal field of view given perfectly flat terrain and clear atmospheric visibility. Next, I traced a more realistic field of view

\(^8\) Based on my personal experience and training.
for each unit given the obstructions of intervening or rough terrain that would have blocked the view of someone observing from eye level (Figure 4.2). Once I had completed this, I double-checked the realistic view-sheds by over-laying them onto the scans of the modern topographic maps to ensure I had not misinterpreted the relief and shadow terrain portrayed by the CYBAES map (Figure 4.3). I then created a more easily readable map of the major terrain features by portraying them as brown area symbols on a lighter brown background representing level terrain, and also adding intuitive symbols for other terrain features such as water obstacles, roads, railroads, and towns. The result was the final form of my own maps that allows someone to see the relative positions of the opposing armies and their relations to key terrain features on the battlefield, and also what the British forces likely could and could not see due to the terrain (Figure 4.4).

This analysis was fruitful in that it revealed some interesting details that were not readily available from studying the 7th FSC’s operation maps. For example, in several cases the Turkish army used low hills and ridges to screen their local reserve battalions from British view, meaning that these units needed to be located by means other than direct observation. This view-shed analysis also made me aware of a systematic technique that the EEF cartographers used to communicate uncertainty; whenever a Turkish unit retreated out of sight from contact with a British unit, the mapmakers subsequently represented this unit’s estimated position using a hollow box rectangular symbol instead of the normal solid rectangle. In addition, this analysis aided my research into the EEF’s information processing because it revealed not just which Turkish units were within the EEF’s view-shed, but also which British had lost communication with higher headquarters. Because much of the EEF’s messages were transmitted by line-of-sight
methods, knowing that a British unit could not quickly communicate what it saw was an important and enlightening piece of information.

*Prisoners and Deserters*

Within the EEF information-gathering system one of the most fruitful sources of operational intelligence was statements made by enemy soldiers who had either been captured by raiding, patrolling, or active operations, or who crossed from their units into the British lines willingly as deserters. As I have already related how ground reconnaissance tended to generate enemy prisoners for questioning, I will in this section focus first on Turkish deserters and then on the actual statements that both the prisoners and deserters gave to their British interrogators. The information these soldiers provided to the EEF was usually of immediate value in both locating and identifying the Turkish units in close proximity to the front, though they occasionally provided information relating to distant theaters of the war, often with surprising accuracy. In addition, there seems to have been some sharing of information gleaned from these interviews between the various Allied fronts in the Middle East, as reports of deserter and prisoner statements from the Caucasus, Balkan, and Mesopotamian fronts were frequent entries in the EEF intelligence summaries.

Deserters crossing the lines were a frequent occurrence during the long period of static siege warfare that settled over southern Palestine between the 1st and 3rd battles of Gaza. The number and quality of deserters varied based on what Turkish unit was in the line, the rank or intelligence of the deserter, and the general mood and morale in the Turkish lines (see GHQ IS 23/9/17, 29/9/17, 2/10/17). The Ottoman Empire was a multi-ethnic and multi-national entity, and its army reflected this. Divisions tended to be raised from particular locations or ethnicities. Thus one division—the 26th, for example—might be composed of ethnic Greeks and Armenians,
who often identified more with the cause of the British than with their own commanders (Erickson 2007, 2; GHQ IS 4/10/17). The proximity of the opposing lines was also a factor. Generally if the trenches were relatively close together, as they were in the Gaza sector, then deserters could cross over relatively easily, whereas in areas where the lines were distant from each other—the Sheria-Hareira sector for example—a defecting soldier would have to travel a long way to reach the safety of enemy lines.9

The value of information that deserters and prisoners provided depended on the position, knowledge, and intelligence of the individual, as well as on the skill of the interrogator conducting the interview. The EEF intelligence summaries condensed the information provided from this source periodically both in the aforementioned identification tables and in another set of weekly hand-drawn tables that summarized the number, unit, and rank of deserters who had crossed. These entries in the intelligence summaries revealed a hierarchy of value assigned to different sorts of prisoners and deserters. The statements of officers appear to have been the most trusted because they usually gave the highest quality and greatest breadth of information. Just below this strata came the non-commissioned officer and “intelligent deserter” category, who also seem to have garnered trust from the British staff officers. Next came the private soldiers, usually designated simply as “deserter” or “prisoner” in the intelligence summaries. These were the most frequent type of source, and could often give surprisingly detailed and complete reports. Finally came the “unreliable deserter” whose statement was related but with the qualification that it should be viewed with skepticism (see GHQ IS 8/10/17 and 17/10/17 for examples of each).

The skill of the interrogator could also play a role in the quality of information extracted

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9 British signal intercepts frequently recorded the concerns of Turkish commanders about the numbers of deserters leaving their formations. Their solutions ranged from exhortations to patriotism and duty to threats of mass punishment and severe consequences for the officers of units with particularly poor statistics. Nor was this a problem of the Turkish side exclusively; while few if any British, Australian, or New Zealand soldiers went over to the Turks during the conflict, a desertion of an Indian soldier, particularly a Muslim soldier from modern-day Pakistan, was not an un-heard-of occurrence (GHQ IS 17/10/17).
from the enemy soldier. In his diary Meinertzhagen, for example, described his differing methods for interrogating Turkish soldiers in contrast to captured Germans and Austrians. Using the wrong method could cause the soldier to stop talking or alternately to try to tell the interrogator what the prisoner believed he wanted to hear rather than the truth, neither of which would be helpful in gaining accurate intelligence (Meinertzhagen 1960, 220, 226). 10

One of the advantages of prisoner and deserter intelligence was that it could provide comparatively large amounts of timely data about the location, identification, and quality of units in the line and just behind it. Even a relatively junior deserter could—and frequently did—point out the location of his own regiment in the opposite trenches, identify the units to the flanks and rear of his own, provide commentary on the unit’s strength and quality of supplies and morale, and pass along gossip from the rest of the army. Officers could provide an even greater scope of information, and usually with greater accuracy (GHQ IS 27/8/17 and 4/11/17 for example). 11

Another advantage was that, since the interviews appear to have been conducted at the various unit headquarters of the EEF, the information they produced was available almost immediately to those subordinate commanders. The disadvantages, however, were that the statements were often inaccurate or based on hearsay, and that—with the exception of raids launched to seize prisoners—this source was dependant on the decision of an enemy soldier to desert and provide information and thus could not be focused by the EEF intelligence staff on a particular problem or location. Even so, the EEF’s intelligence summaries devote a great deal of text to

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10 From Meinertzhagen’s diary entry for 15 August 1917: “When a prisoner is captured he is frightened, he does not know what is going to happen to him, what sort of treatment he may get, in fact the...Turks expected physical ill treatment if not death. They would be most anxious to please and answer questions which after about twenty-four hours’ captivity, a good meal and a night’s sleep they would refuse to answer. I impressed this method on all Intelligence officers and the results were striking. Most German officers refused to talk at all, very few did. Most Turkish officers would talk within a few hours of capture, but once they had recovered from shock they would become obstinately silent or would excel themselves by lying.” His entry on 3 January 1918 noted “I have seen many interrogations of prisoners carried out in a rough, bullying manner. It does not pay. It might do so with an Arab or an Egyptian, but not with a German” (Meinertzhagen 1960, 220, 226).

11 In at least one exceptional case the commander of a Turkish battalion defected and provided detailed information about his own unit as well as his entire brigade and division. Such a high ranking desertion was an intelligence disaster for the Turks (GHQ IS 1/9/17).
summarizing the information gained this way, illustrating its importance within the EEF information-gathering system. The versatility of these statements for information-gathering—they could provide location, qualitative, and quantitative data—made them a central technique in the EEF’s cartographic framework.

Agent Networks

The final information-gathering entity that I included in my modified framework is the role played by intelligence agents—spies—and their networks behind enemy lines. In the case of the EEF and the Palestine front, this category essentially consisted of only one network, the famous Nili organization composed of a group of Palestinian Jews, many of them from the Aaronsohn family, who provided data to the British until their operation was compromised and brutally crushed by the Turks. The story of this organization has been told elsewhere (see Sheffy 2004) and is beyond the scope of this thesis. What I am concerned with is the type and quality of information that they provided to the EEF in the context of the operation maps. Here the records are ambiguous. Sheffy has described that one method the Nili organization employed was train watching at railroad junctions in Palestine. Members of the group would sell food to the soldiers at the station and try through conversation to gain information regarding the transiting unit’s identity and destination (Sheffy 2004, 159-66).

As Sheffy has also noted, the information gained—though usually precise, accurate, and well-respected by British intelligence—tended to be of little tactical value for two reasons. First, as the information was gathered relatively far from the front lines, it was rarely of immediate relevance to ongoing operations. Second, the reports from this network and other agents had to follow a long and circuitous route to make it into the hands of British officers (Sheffy 2004, 160). Thus, the intelligence was often out of date before it could be effectively acted upon. Even
so, information from this network appears in many of the EEF intelligence summaries prior to the Gaza offensive listed as coming from “a very reliable source” or simply from “an agent” (as opposed to the “absolutely reliable source” of wireless intercepts) and provided information about new Turkish units arriving to the Palestine theater that could then be located and identified by other means once they neared the front lines (GHQ IS 16/9/17). While these agent reports were slow in arriving and sometimes incorrect, what mattered for this project and for the maps is that EEF intelligence officers lent these observations enough credence at the time to incorporate them into the Turkish order of battle being tracked by the operation maps, making this another important source for the EEF information-gathering system.

*The Product: Raw Intelligence*

The products of the information-gathering phase of the EEF cartographic system were myriad: intercepted messages, aerial photographs, patrol reports, reports from subordinate units, transcripts of prisoner and deserter interrogations, and agent reports from behind the lines. These pieces of raw data fed into the daily intelligence summaries compiled by staff officers at the EEF GHQ. As I have already stated, these daily compilations of information that were available to the EEF intelligence staff are the most obvious link between the gathered information and the operation maps. How these summaries were compiled was an act of information-processing, as were the decisions at lower levels of the EEF hierarchy about what information to transmit to GHQ, and I will discuss these processes in the next section. The individual pieces of information gathered by the various intelligence organs of the EEF acted as a bridge between the information-gathering and information-processing phases of a modified cartographic framework.
In this section I will discuss the portions of the EEF cartographic system that processed the raw data produced during the information-gathering phase. The process largely took place after the raw data had reached the EEF GHQ and was mostly conducted by the British staff intelligence officers who tracked the Turkish order of battle and decided where to plot Turkish units on the operation maps. However, another aspect of information-processing occurred simultaneously to the information-gathering phase at lower levels in the EEF hierarchy. This ground-level analysis included the value judgments made by low-ranking soldiers, officers, pilots, and signalmen about what raw data to observe, record, and transmit to higher headquarters. These decisions effectively filtered the information before it ever arrived at GHQ. Another filter was the structural limitations of transmitting information through the communication technology available to the EEF in 1917. In this section I will examine these two processes—the communication process within the EEF and the intelligence staff’s analysis process—and then relate these to the resultant product within the EEF cartographic framework.


Signal Units

The techniques and tools these various entities in the EEF system employed to process the information about Turkish unit positions varied depending on who was doing the processing. I will start by relating the limitations with which subordinate EEF units had to contend to transmit their observations to higher headquarters. EEF formations contained units whose sole function was to maintain communications with the rest of the force. Each of the EEF’s three corps contained a dedicated signal company. Additionally, each of the cavalry divisions within the Desert Mounted Corps contained their own signal squadron, a fact that likely reflected the expectation that the cavalry would move more quickly across terrain and thus require heavier signal support to maintain communications. These communication organizations all left war diaries that are little more than weekly or daily notes recording with whom they were in communication and by what means. Despite the sparse text in these war diaries, they reveal a great deal about how the EEF communicated and thus the limitations on what information could efficiently be transmitted. Additionally, the operations orders preserved in the war diaries of many of the combat formations often contain explicit instructions about how tactical information was to be relayed as well as comments about the effectiveness and drawback of various communications media (XXI WD, “XXI Corps Order No. 11”).

As a modern military force in 1917, the EEF possessed redundant means to maintain contact with its units during combat operations. The primary means of communications was the cable telegraph supplemented by the cable telephone. These were most reliable when the front was stationary and the signal companies and squadrons could lay and bury their cables between
predictable headquarters locations (54 Division Signal Company, 11/24/17). When operations became more mobile, all of the signal units’ war diaries began a monotonous record of the daily reeling and unreeling of miles of cable in an attempt to keep pace with their advancing units. Thus, cable communication was frequently lost during the pursuit phase of the Gaza campaign as signal units worked to push their cable heads forward to the front (ANZAC MD Signal Troop, 1-30/11/17). Furthermore, the need to employ Morse code in the case of the telegraph constricted the amount of information that could pass through this medium. This restriction was common to every form of communication available to the EEF at this point except telephones and couriers (AMD Signal Squadron, 8/11/17). However, cables were generally secure from enemy interception and interference except when very close to the front lines and the British signal companies and troops seem to have been tirelessly adept at rapidly moving their cable infrastructure forward to quickly reestablish contact between headquarters and units.

Wireless was another form of communication available to the EEF signal units. Called ‘radio telegraph’ because—like its cable telegraph counterpart—it was restricted to sending and receiving electrical dots and dashes, the transmitters and receivers were generally concentrated at corps-level headquarters and above, which limited their ability to maintain contact with smaller formations (AMD Signal Squadron, 8/11/17). Also, the range of the radio transmission was limited by terrain features and the curvature of the earth. Since the signals emitted by these wireless sets were omni-directional, they could easily be intercepted by the Turks and deciphered or simply translated if the message had been sent ‘in the clear,’ a common mistake of individuals

Prior to the start of the Gaza offensive the EEF’s signal companies buried 827 miles of cable in the Gaza sector to prevent them from being cut by artillery fire during the battle. These measures were very effective, with only three cables being cut by enemy fire during the operation (“Report on Signal Communications 3rd Battle of Gaza” 54 Division Signal Company WD 24/11/17).

To aid in this labor, one signal unit invented a cable reeling machine that could be mounted on a Ford motor lorry that could reel and unreel cable far more quickly than by hand. A diagram of this machine worthy of a patent office is contained in the war diary of the Desert Mounted Corps Signal Company.

Often the British were able to use captured Turkish cable as they advanced their communication nodes during the offensive (XX Signal Coy WD, 3/11/17).

Radio voice communication—called ‘radio telephone’—would not be available until later in the war.
attempting to quickly send important tactical information (Occleshaw 1989, 136). On the positive side, radio telegraph sets—often mounted on wagons for mobility—required relatively little infrastructure to operate when compared to cabled communications, and the amount of information this medium could handle was no more restricted (Sheffy 2004, 173).

During mobile operations when cable telegraphy was impractical, the primary means of communication between units below the corps level was visual signals. These usually took the form of heliographs during the day and signal lamps at night (AMD Signal Squadron WD, 31/10/17). A heliograph was a visual telegraph that used mirrors to reflect sunlight towards a distant point. This beam could be interrupted by shutters or by tilting the mirror to communicate using dots and dashes. Signal lamps used a similar concept with the difference that the device provided its own light source in the form of an oil lamp. These devices were distributed at least down to the brigade level and perhaps lower in the EEF hierarchy, making them the most common means after the cable telegraph for transmitting messages over a distance, though the night-time signal lamps seem to have been rather ineffective (54 Div. Signal Company, 24/11/17). 16 As they were directional, visually transmitted messages were relatively secure from enemy interception, though they faced the same data throughput constraints as other forms of telegraphy.

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16 On at least one occasion the Australian Mounted Division Signal Squadron recorded that it could receive signal lamp messages over the visual horizon by reading the reflected flashes off of low clouds. The same entry expressed concern, however, that if they received the messages this way, so could the Turks, particularly since the messages, usually very secure, were sent “in the clear” (AMD Signal Squadron, 9/11/17).
The final form of communication I will discuss is the use of couriers to carry messages and documents across the battlefield. This is the form of communication that armies prior to the middle of the 19th century relied upon almost exclusively. The British Army provided its forces with small dispatch books (Army Form C.2123) containing alternating pages of paper and carbon paper that allowed officers to jot down a message, which could be quickly torn off and handed to a courier, leaving behind a carbon copy in the notebook (Figure 4.6).

Many of these dispatches have been compiled in several unit war diaries in the EEF. These records reveal that messages sent this way usually did not contain any more detailed information than could be transmitted by telegraph (see XX WD Appendix 4 for examples). This form of communication was also much slower than the other methods I have discussed, and could also be more tenuous, as couriers could be killed or—more commonly—become lost en route to the message’s addressee.\(^{17}\) Despite their limitations, messages sent via

\(^{17}\) The EEF put great effort into ensuring the effectiveness of its courier system including assigning GHQ liaison officers with each formation to send regular position and situation reports, outlining principles to follow for couriers and the officers dispatching them, and outfitting signal units with special equipment like motorcycles to speed couriers on their way (“Tactics of Mounted Troops” in ANZAC WD; 3 ALHB 22/11/17).
courier possessed one major advantage over the other forms of communication available to the EEF: throughput. Whole documents could be entrusted to a courier including—as I will discuss later in relation to the operation maps themselves—maps, which before the age of digital communications could only be transmitted by being physically carried from one place to another. One new tool that the British employed to increase the speed of their messengers was a technology only recently arrived on the battlefield: motorcycles. Numerous entries in signal company diaries include praise for these machines and suggestions about how they should be distributed throughout the force (3rd ALHB WD 22/11/17). Even so, communication by courier was slow even under safe circumstances, and slower during combat operations.

I include the communications infrastructure of the EEF in the information-processing phase of my modified cartographic framework because the constraints that this infrastructure imposed on the flow of information forced low-rank individuals within the EEF hierarchy to conduct their own analysis of the information they had gathered before transmitting it to their higher headquarters. This fact led to an apparent filtering of the information available to the officers at GHQ who were responsible for annotating the daily operation maps. A message could potentially have been filtered more than once if it passed through multiple subordinate headquarters along its path to GHQ. The effect of this appears to be that basic information like the location and identification of enemy units was more accurately represented on the operation maps than was more complicated data such as the strength, morale, or capabilities of a particular unit. Such qualitative intelligence required a greater amount of information to be transmitted across the EEF’s constricted communication conduits. This fact was evident in several of the operation maps that depicted very weak Turkish units with (in retrospect) inappropriately large symbols (see later in this chapter). Thus, low-ranking individuals in the EEF could influence the
data that appeared on the operation maps produced at GHQ by their own decisions about what
information was important enough to send quickly and what could wait. This fact in itself
highlights the value of viewing the whole EEF as a cartographic system.

Staff Analysis

Once the filtered raw data arrived at the GHQ it underwent a more traditional form of
analysis at the hands of the staff officers whose role it was to organize the information and
present an accurate picture of the battlefield to the General Officer Commanding (GOC), General
Allenby, and his subordinate commanders and staff. This analysis connected the raw data to the
operation maps by stripping away what the relevant officers considered to be extraneous facts
and by reconciling conflicting reports to present what the staff officers believed was the true
situation on the battlefield. This process was not without conflict, as Meinertzhagen related in his
diaries and as I will discuss below, and such disagreements provided insight into not just who
performed the analysis, but also how they performed it. Thus, this staff analysis process was an
important component of the EEF cartographic system’s information-processing phase and an
important factor in understanding how the operations maps were produced and used.

I first will discuss the structure of the EEF intelligence staff before analyzing its function.
Sheffy has already mapped out the structure of the EEF intelligence staff, and Guy Dawnay’s
papers included a thorough roster of the GHQ staff as it was in December 1917, at the end of the
Gaza offensive. To reconstruct the staff’s organization I have relied heavily upon Sheffy’s
(2004) book about intelligence in this theater. My contribution to this is simply to add
individual’s names to the organizational positions that Sheffy had already worked out. As the
EEF intelligence staff was a large and complex organization, I intentionally ignore elements that
did not participate directly in the production of the operation maps.
The central figure in this portion of the staff was Richard Meinertzhagen, who oversaw Palestine intelligence. His direct subordinates were the *Ia* (order of battle) officer Captain A.S.G. Musgrave; the *Ic* (topographic officer) whose duties appear to have been shared by Musgrave and the commander of the 7th FSC, Major Maule; and the Corps of Guides and Interpreters, which assisted in interrogating prisoners and deserters. Meinertzhagen also coordinated the intelligence sent to GHQ by the RFC and the Royal Navy Air Service (RNAS) (Figure 4.7). Captain Musgrave, as the *Ia*, would have been responsible for analyzing incoming intelligence to the GHQ and keeping a running track of all enemy units in the Palestine theater, while the *Ic* role would likely have added to this analysis the cartographic tools provided by the mapping activities of the 7th FSC, including the base line maps on which the Turkish positions were eventually plotted. Meinertzhagen, in turn, answered to his direct superior and BGGS of the EEF, Guy Dawnay, who interacted directly with Allenby and his Chief of Staff, Major General L.J. Bols (Sheffy 2004, Chart 5; Dawnay 1917, 5-6).
Figure 4.8. Facsimile example of a working copy of the 31 October operation map showing the situation around Beersheba at 1305 hours.

Figure 4.9. Facsimile of the 6 pm final copy of the 31 October operation map showing the situation around Beersheba. Note that the location of British positions is nearly identical on both maps and that Turkish unit symbols are absent from the working copy. The horizontal distance of these figures is approximately fifteen miles. These figures are intended to be printed in color.

Dawnay, Meinertzhagen, the 7th FSC War Diary, and the operation maps all provide valuable clues regarding the function of the intelligence staff’s analysis of information relating to Turkish positions. Interestingly, Guy Dawnay’s typed staff roster contained a hand-written note
reading simply “maps” next to Musgrave’s name, indicating that Musgrave was the officer responsible for annotating the Turkish positions on the operation maps. Two entries in the 7th FSC War diary that stated that an officer outside of the survey company was responsible for annotating “military information” on their maps reinforce this conclusion (7th FSC WD, 21/4/17). While the actual drafting of the operation maps was a function of the next cartographic phase, several of these maps contain clues about how the intelligence staff resolved enemy positions from the raw data available to them.

While the operations maps were generally printed once per day and annotated as representing the “Situation as known at GHQ at 6 pm” on the appropriate date, the maps for 31 October, when the attack on Beersheba began, departed from this norm. On this date the operation maps held by the National Archives contain editions annotated for “dawn to 0900,” “0930,” and “1305” in addition to the regular 6pm map. These supplementary maps differed from the polished 6pm map in that they were obviously drawn in contrast to the published maps and they depicted only British unit positions, omitting completely any Turkish unit symbols. This type of map occurred again in the operation map series on 1 and 2 November (0600 and 0800 respectively) and on 6 November (0800 and 1430) as the battle was transitioning into the mobile pursuit phase. These working copies of the operation maps are evidence of a staff officer, probably Musgrave, using the maps as an analytical tool to try to make sense of the large amount of data arriving at GHQ. The fact that these maps only depicted British positions suggests a process by which the intelligence staff first plotted the positions of friendly units from whom they were receiving information and then used this plot as a framework to locate Turkish positions on the final polished map. Thus, the process would look something like this: dispatches

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18 The 7th FSC war diary records that a Lieutenant Shairpe was responsible for annotating “military information” on maps in the entry for 21 April 1917. However, since this name does not appear on Dawnay’s roster from December 1917, I believe that his role was taken over by Musgrave some time during the intervening period.
and cables arrived at GHQ and were passed to the intelligence staff, which would then plot the positions of the friendly units, then analyze the data about enemy troops in relation to these friendly positions, and finally reach a consensus as to the location, identity, and strength of the Turkish units. These enemy positions would then be plotted in relation to the known British positions (Figures 4.8 and 4.9).

Meinertzhagen’s diary also indicated that the above analysis was subject to review by the chain of command all the way up to Allenby. Meinertzhagen related in his diary entry of 2 November that Dawnay ordered him to withdraw that day’s operation map because it was misleading (Meinertzhagen 1917, Volume 20 2/11/17). He then stated on 4 November that Dawnay “realized his mistake in not crediting the intelligence on the 2nd” and that “Allenby [was] also convinced” before writing on 6 November that “Dawnay again refused to believe” the intelligence analysis of Meinertzhagen’s group (Meinertzhagen 1917, Vol. 20 46-48). I will delve into greater detail about this specific conflict when I discuss how the operation maps were used, as this incident is vital in understanding many aspects of the operation maps. For now, I want to point out that these entries indicate an analytical process by which Meinertzhagen and his subordinate officers would use the line maps provided by the 7th FSC in conjunction with the raw data arriving at GHQ to develop what they believed was an accurate picture of the battlefield. They would then present their analysis to Dawnay—and perhaps also Allenby—for approval before distributing this analysis more widely.

While the product of the information-processing phase of the EEF cartographic system would naturally seem to be the operation maps, these are more properly the product of the document-distribution phase. In my modified framework, the products of the second-phase analysis were primarily the intelligence summaries that the GHQ intelligence staff compiled
daily and also the working maps that the staff used to organize and eventually publish the final polished maps. These two types of documents were products of an on-going cyclical process of information analysis and reconciliation that attempted to organize the raw data received by the GHQ into a coherent and useful picture of the battlefield. These two products directly informed the physical manifestation of this picture—the operation maps—during the process of document-distribution in the next phase, which I will discuss below.

**Document-Distribution**

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<tr>
<th>Document Distribution</th>
<th>Production</th>
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<td></td>
<td>Personnel</td>
<td>Techniques</td>
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<tr>
<td>Staff officers</td>
<td></td>
<td>Daily intelligence dissemination</td>
</tr>
<tr>
<td>7th FSC</td>
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<td>Compilation, drafting, engraving, printing</td>
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**Figure 4.10**: Document-distribution phase of Woodward’s cartographic framework modified to reflect specific elements of the EEF.

In my modification of Woodward’s framework, the document-distribution phase encompasses the drafting and dissemination of the final-product operation maps. I divided this process into two parts: the first part was the drafting and printing of the polished operation maps, which was a combined effort between specific individuals on the EEF intelligence staff and the draftsmen of the 7th FSC; the second part was the distribution of these large maps to the EEF GHQ and its subordinate headquarters, where they were used for planning and general situational awareness. The pattern of distribution for the operation maps was an important factor in determining how the maps were used in the final phase, emphasizing this phase’s importance to the entire framework. The end products of this phase were the operation maps.
Drafting the Operation Maps

The drafting of the operation maps was a collaboration between the intelligence staff at EEF GHQ and the draftsmen of the 7th FSC. The evidence for this exists in the 7th FSC war diary, Maule’s (1919) report, Meinertzhagen’s diaries, and finally in an annotation on the crude binding of the operation maps stored at the National Archives. I will first outline what the drafting process looked like, then present my evidence. Prior to the start of the campaign, the 7th FSC had printed dozens of copies of the line maps that were the base for the operation maps. Some of these stockpiled maps were given to GHQ; there an intelligence officer—probably Musgrave by the start of the Gaza campaign—added known positions of British units throughout each day and then, after analyzing the intelligence available at the time, drew the location and identification of the Turkish units in the field. The map was returned to the 7th FSC at 4pm for the finishing process. There, two draftsmen created a colored plate each for the British (red) and Turkish (green) unit symbols and used these to overprint colored layers onto the base line maps.19 Meinertzhagen stated proudly that his staff delivered their working drafts to the 7th FSC at 4pm each day and that the finished maps were ready by 6pm (Maule 1919, 16; Meinertzhagen 1960, 225).

As Collier (2008) noted, we know the identity of one of the two draftsmen from the 7th FSC, an Indian by the name of C. Malama, because of the hand-written note on the worn cover of the WO 153/1041 collection of maps in the National Archives that reads “Mr. C. Malama belonged to the Survey Coy, GHQ, EEF, during the period covered by the maps, & was one of the 2 draftsmen responsible for drawing the colored plates representing the two Armies on each night,” along with a note that Mr. Malama himself had deposited this collection of maps with the

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19 For the minute details about how this finishing process was conducted, including the chemical compounds and types of ink used, see Maule (1919).
Historical Section (Military Branch) of the British Army. Furthermore, the 7th FSC war diary recorded the number of operation maps printed each day by these two draftsmen, though the identity of the second draftsman appears to be lost to history. Once the finished map copies were printed they were either returned to GHQ for distribution or distributed directly from the 7th FSC to the map’s various recipients, though the former scenario is more likely (Meinertzhagen 1960, 224).

The paucity of information regarding these two draftsmen is unfortunate, given their importance as the individuals who physically created the operation maps. However, some speculation on their background is possible from contextual evidence. Matthew Edney described in his (1997) book, *Mapping an Empire: The Geographical Construction of British India, 1765-1843*, how the British Survey of India had grudgingly created a European-style surveying and mapmaking tradition within the Indian population to aid their mapping of the sub-continent (Edney 1997, 244, 307). Furthermore, the British Middle Eastern commands in World War I, particular in Mesopotamia but also in Palestine, relied heavily on Indian troops and resources. This reliance extended to individuals with technical skills, like surveyors and draftsmen, who were in short supply everywhere (Collier 1994, 101). Based on this context, we can assume that Mr. Malama and his colleague were scientifically trained technicians from the British Government of India, who had been provided to the EEF to assist in their cartographic activities. Further research into the Indian influence on the British mapping of the Middle East would certainly be enlightening.

I failed to locate any records of how the physical act of distributing the maps was conducted, but I believe sufficient evidence exists for me to speculate intelligently. The operation maps were large documents, with dimensions roughly a yard by a yard and a half,
which at a time before the electronic transmission of images could not have been easily transported in any way other than by vehicle. I have already mentioned how motorcycles were used by couriers in the EEF, but I believe the maps themselves are too large to make this vehicle practical. The surviving maps show no signs of being rolled up (though they probably were) and what folding they have undergone appears to have been done to make them fit into archival storage rather than to make them easy to transport. Instead, because both Meinertzhagen and Dawnay recorded their easy access to automobiles, I believe these vehicles were probably how the maps travelled from the 7th FSC to the various headquarters (Dawnay to his wife, 10/12/17). All but one edition of the operation maps presented the situation as known at GHQ as of 6pm of the relevant date. This, along with the note on the cover of the National Archives collection about Mr. Malama and his colleague drafting the maps each night, demonstrated that the maps were printed between 4 and 6pm, and then distributed during the night so they would be available for whatever use they were destined while the information on them was still current.

The EEF distributed the maps more widely than the 7th FSC and GHQ, however. Three sources provide information about who the intended recipients were. First, besides the complete series of original maps located at the National Archives, which likely remained in the possession of the 7th FSC, I located other original copies in the papers of Guy Dawnay, the XXth Corps commander Lord Philip Chetwode, Richard Meinertzhagen (unsurprisingly), and in the XXth Corps War Diary. This broad scattering of original operation map editions indicates that the maps were distributed at least down to corps headquarters. Second, the number of copies printed, as the 7th FSC war diary records, (fifteen or sixteen on most days) suggests that the maps were distributed down to division level, assuming that each headquarters received only one map. Furthermore, Meinertzhagen wrote in his diary that the maps were distributed to corps and
division commanders (Meinertzhagen 1960, 224). Dispatches located in Dawnay’s papers record that copies of the operation maps—likely the later, 1:500,000 scale reprints—were sent to the Chief of the Imperial General Staff (CIGS) in London along with General Allenby’s report on the progress of the campaign (Dawnay, “Note on Operations on the Palestine Front for C.I.G.S. and D.M.O., 17/11/17).

The products of the document-distribution phase were the operation maps, which were the vehicle for disseminating the geographic knowledge produced by the information-gathering and information-processing phases. While the mechanics of this phase seem rather simple, they are vital to the understanding not only how these maps were created from the inputs of the preceding phases, but also how they were ultimately used in the next phase of the EEF cartographic system. In my next section I will show that how the maps were produced as well as to whom they were distributed provides evidence about their purpose and end-use, and that both their purpose and use changed over the course of the campaign.

**Document-Use**

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**Figure 4.11.** Document-use phase of Woodward’s cartographic framework modified to reflect specific elements of the EEF.

The fourth and final phase of the EEF cartographic framework—document-use—is directly relevant to my second research question regarding the purpose and use of the operation.

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20 This note appears on page 224 of Meinertzhagen’s (1960) published *Army Diary*, though not in his original diary located at Rhodes House at Oxford University.
I relied upon several sources to determine how the maps were used by individuals in the EEF. First, the pattern of the printing and distribution of the maps, which I have already discussed, provided some clues as to how they were used during the campaign. Also, the conflict recorded in Meinertzhagen’s diary between himself and Dawnay concerning the content of the 2 November map gave more clues. Finally, Dawnay’s own papers and his copies of the dispatches sent by the EEF GHQ to the CIGS in London indicated an evolving purpose for the maps that was also indicated by their changing format. Finally, the information that the maps present or omit is one of the strongest indicators of their purpose. All of these sources indicate that the maps were an important operational level planning tool for the EEF and its subordinate corps headquarters in the opening phases of the Gaza offensive, but as the campaign reached its successful conclusion their purpose shifted towards recording for history the accomplishments of the EEF in Palestine. The products of this phase—namely, the operations orders issued and military operations conducted by the EEF after the start of the Gaza offensive—completed the cycle of this cartographic system by setting the conditions for the force to gather further information on each successive day.

The pattern of printing and distribution for the operation maps recorded in the 7th FSC war diary was the first indication of their purpose. While the number of copies printed was high during the opening days of the offensive around Gaza and Beersheba—between 30 and 90 copies each day from 28 October through 8 November—the number of sheets slowed to a trickle of fifteen or sixteen per day for the remainder of the offensive (7th FSC WD, 31/11/17 through 22/12/17). Ninety copies would have been enough to give a copy to every brigade in the EEF, though such a broad distribution seems unlikely. A more realistic explanation is that 7th FSC produced a surge of maps at the beginning of the battle when time and resources were abundant,
but had to economize once the constraints imposed by offensive operations began to show (Dawnay to his wife, 29/11/17). The fifteen copies of the maps printed in a normal day would have been enough to send one copy to each of the ten division and three corps headquarters in the EEF, with the remaining two maps being held at GHQ and at the 7th FSC.21

What does this pattern indicate about the purpose of the maps? Except for the opening days of the offensive, when the 7th FSC printed between 30 and 90 operation maps, the limited number of copies of each day’s edition would have restricted the distribution of the documents to large formation headquarters. This indicates that these maps were intended to be used by headquarters staffs of divisions or corps to make operational level decisions, and not by brigades or smaller units for tactical level decision-making. This information on who was using the maps is important because division-level and larger headquarters possessed groups of staff officers whose role it was to plan large-scale operations and issue operation orders to their subordinate headquarters.

As to how these maps were used, the Meinertzhagen-Dawnay disagreement over the 2 November operation map gave insight into their purpose. First, some background is necessary: the most capable corps commander in the EEF was Major General Chetwode, commander of XX Corps—the infantry force sent to attack Beersheba on the east flank. However, as Dawnay recorded, some misgivings about Chetwode’s decision-making processes existed, including that he often responded too strongly to perceived enemy movements instead of executing his own planned operations and forcing the enemy to respond to his force’s maneuvers (Dawnay to his wife, 3/11/17; Meinertzhagen 1960, 220). As the British attack on Beersheba developed, the German commander of the Turkish forces on the Gaza-Beersheba line, General Kress von

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21 Meinertzhagen states in his Army Diary that 25 copies of the maps were printed each day, a figure that does not match the 7th FSC’s official records (Meinertzhagen 1960, 225).
Kressenstein, responded in a manner the British had not anticipated. British planning foresaw von Kressenstein either moving his reserve divisions (the 7th, 19th, and 26th Divisions) from their positions north of the front directly to the Beersheba area, or alternately keeping them close to Gaza to repulse a strong frontal attack there. Instead, von Kressenstein moved his reserves to the extreme east end of the front, into rough country to the north-east of Beersheba, in an attempt to draw the British right flank into a slow and fruitless fight there. Such a distraction would have prevented the British from decisively attacking the Turkish forces still holding the center of the line in the Sheria-Hareira sector (Dawnay to un-named recipient, November ’17).

Dawnay and Meinertzhagen even disagreed regarding whether this Turkish maneuver was a blunder. Dawnay viewed von Kressenstein’s actions as a brilliant move and perhaps his only hope in stalling the British offensive (Dawnay to his wife, 12/11/17). This reflected Dawnay’s doubts about Chetwode, whose responsibility it was to both deal with the additional Turkish forces on his flank and continue the offensive from the recently-captured town of Beersheba northwestward to smash the center of the Turkish defenses. Meinertzhagen, on the other hand, viewed the Turkish movement to the flank as a blunder because it prevented them from reinforcing their forces in the center where the next British blow would fall (Meinertzhagen 1917, Vol. 20 46). Where both men agreed was in the actions they believed that Chetwode needed to take with his corps; he needed to continue his advance on the Sheria-Hareira sector with as much force as possible, leaving as few troops as prudent to cover the Turkish units to the north and north-east of Beersheba. Though Dawnay himself did not record any disagreement with Meinertzhagen over the operation maps, the editions of 2–4 November—as well as Dawnay’s own reservations about Chetwode—both bore out Meinertzhagen’s account and
provided unique and valuable insight into how the operation maps were used both by the EEF GHQ and by the subordinate corps headquarters.

The operation map of 2 November was the subject of Meinertzhagen’s alleged disagreement with Dawnay. This map depicted the Turkish 19th and 26th Divisions having moved from their initial locations—in reserve near Beit Hanun and Hareira (see Figure 1.1), respectively—to new locations north and northwest of Beersheba. The map depicted both of these formations with large rectangular symbols covering a broad front, indicating units of some strength (right side, Figure 4.12). This reflected Meinertzhagen’s—and likely his subordinate staff’s—view of this maneuver as being a blunder by von Kressenstein because the symbols emphasize this particular Turkish movement and by comparison minimize the strength of the defenses in the Turkish center (left, Figure 4.12).

But according to Meinertzhagen, Dawnay “refused to credit” the intelligence represented by this map and ordered it withdrawn (Meinertzhagen 1917, Vol. 20 46). This order reflected Dawnay’s view that the flank maneuver by the Turks was particularly dangerous because it might prompt Chetwode to commit too much of his force to fruitless fighting north of Beersheba and thus stall his vital attack on the center of the Turkish line, with the result that the entire British offensive might bog down in indecision. The operation map of 3 November showed the Turkish 19th and 26th Divisions back at their original reserve locations, though the uncertainty of their actual position was indicated by the use of hollow rectangle symbols rather than the usual solid blocks, in addition to question marks (attenuation symbols) next to the units, as well as arrows and text stating that “Part or all of this Div. may have moved southeastward” (upper left corner, Figure 4.13). The 4 November map then returned the symbol for the 19th Division

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22 Interestingly, the later reprint of this map in the 1:500,000 format reduced the size of the symbols representing these divisions, bringing the maps into closer accord with reality.
back to its probable true location northeast of Beersheba, corroborating Meinertzhagen’s account of Dawnay’s having disputed the 2 November map (Figure 4.12), thereby forcing Meinertzhagen and his staff to revise the unit positions for the 3 November edition (Figure 4.13), then accepting Meinertzhagen’s analysis of the situation on 4 November (Figure 4.14) (Meinertzhagen 1917, Vol. 20 48).

Figure 4.12. Facsimile showing the 2 November operation map’s depiction of the situation on the Beersheba flank. Note the large symbols used to denote the Turkish 26th and 19th Divisions.
Figure 4.13. Facsimile showing the 3 November operation map’s depiction of the situation on the Beersheba flank. Note the 19th and 26th Divisions denoted by hollow boxes at their original positions further west with dashed lines and question marks marking where the staff believed they had moved.

Figure 4.14. Facsimile showing the 4 November operation map’s depiction of the situation on the Beersheba flank. The 19th Division was returned to the Beersheba flank, where it had likely been since 2 November, but was now represented by a more appropriately sized symbol. The horizontal distance of these three figures is approximately twenty-five miles. These three figures are intended to be printed in color.
This episode speaks directly to how the maps were used and to their importance in the EEF’s decision-making process. Far from simply being graphical rosters of British and Turkish unit positions, these maps allowed the British commanders to gauge at a glance the weight of Turkish forces arrayed against various points of their own lines and to make decisions about how to array their own forces in response. In present-day U.S. military terminology, these pre-planned alternatives for dealing with predicted or unanticipated enemy actions are called ‘decision points’ and are graphically represented on operational planning maps (US Army 2004, 1-45). The 7th FSC’s operation maps were an early form of this sort of military decision-making in which a headquarters staff attempts to predict the different courses of action the enemy force might take and then presents pre-planned and simplified alternatives to the commander about how to deal with the situation. In this case, Allenby and Chetwode needed to decide how to respond to von Kressenstein’s unexpected movement to the far eastern flank of the line, and the dispute indicated that the map’s content was central to their decision-making process, as I will elaborate below.

Meinertzhagen knew that the operation maps would be an important factor in decisions about the course of the campaign and he attempted to use them to convince his superiors to stay the course and continue the attack towards Hareira and Sheria in the center of the Turkish line. Dawnay, knowing Chetwode’s competent—but in this case counter-productive—tendency to “meet troops with troops,” and also realizing Allenby’s tendency to trust his subordinates and allow them to run their units without undue interference, feared that the 2 November map would lead Chetwode to divert too many of his troops away from the central assault. He therefore intervened to alter the maps being sent to Chetwode so that the bulk of the Turkish reserves on 3 November appeared to be arrayed northwest of XX Corps rather than to the northeast. Ironically,
both Meinertzhagen and Dawnay wanted the same outcome: for Chetwode to continue his attack northwest with minimal diversion of forces. Their disagreement about the operation maps indicated that both men believed these documents were an influential part of their commanders’ decision-making process, and also revealed the role the maps played at the EEF GHQ and corps headquarters level of operational planning.

The product of these decisions and of this phase in general were the operation orders that turned the EEF and corps commanders’ choices into actions by their troops. The war diaries of all the major units in the EEF contain copies of these operation orders. While none of the orders that I have found referred to the operation maps directly, the influence of the maps on how campaign developed is clear. After the war, when the typically humble Allenby was receiving accolades for the success of his campaign, he gave credit to the role of intelligence in his decisions. These decisions took the form of orders issued to his troops, and much of the intelligence was communicated by the operation maps (Sheffy 2004, xvi). These maps, as an efficient and effective medium to simplify and communicate the diverse information available to the staff officers of the EEF, prompted Allenby and his corps commanders to move their forces in one direction or another in response to enemy maneuvers. These new operations, in turn, completed the cycle of the cartographic framework by moving the British forces into contact once again with Turkish forces (or not) and thus gathering further information that needed to be processed, distributed, and ultimately used.

Thus, with my alteration of the Woodward cartographic framework now complete and one of my research questions—what was the purpose of the operation maps?—answered, I am ready to move on in the following chapter to my second research question: what sources of information do each of the successive editions of the operation maps represent? Woodward’s
framework provides me with an effective lens through which to analyze the maps and to try to choose from among my multiple hypotheses as to the relative influence of each of the various information-gathering entities within the EEF cartographic system.
Chapter 5. Operation Map Analysis

In this chapter I present my evidence relating to my initial research question: what sources of intelligence did each of the operation maps represent? In Chapter 4 I created a conceptual framework for attacking this question by modifying David Woodward’s framework to reflect the specific cartographic structure of the EEF. This allowed me to determine the specific processes used by elements of the EEF to gather and process information and to distribute this information using the operation maps. I identified six general sources of information in this structure: signal intercepts, aerial reconnaissance, ground reconnaissance and contact, prisoner and deserter statements, and agent networks, or a combination of these. These six sources represent the six working hypotheses I used to analyze the migrating unit symbols on the operation maps. As I described in the preceding chapter, the processes by which these sources gathered and transferred information provided considerable evidence about the information the operation maps could (and could not) have provided.

I will present my analysis of each map in chronological order because my research indicated that the information depicted on the operation maps built upon itself insofar as one day’s events often determined the symbols on the next day’s map. This chronological structure also fits the three-phase progression of the battle, namely, the initial set-piece stage, the mobile pursuit phase, and the reestablishment of the front in central Palestine. These operational phase transitions corresponded to changes in how the operation maps were produced and used. As I will show, the operation maps were most complete, accurate, and operationally useful in the early set-piece stage of the battle, when the situation was relatively well-known, and later on briefly as a tool to reestablish a coherent picture of the operational situation during the third phase, when the front was being reestablished. In the intervening period the maps provided an
often frustrating record of confusion and guesswork, while those editions produced at the very end of the campaign, in late November and early December, were intended to be historical artifacts rather than operational tools.¹

![Map](image)

**Figure 5.1.** Overview of the theater of operations in which the 3rd Battle of Gaza campaign was fought including major towns, roads, railroads, and water features. The darker brown areas represent elevated or rough terrain. (This figure is intended to be printed in color)

¹ For a comprehensive table of my results regarding the most probable hypothesis for the sources of information locating and identifying each Turkish unit on each edition of the operation maps, see Appendix B.
Phase 1: Set-Piece Assaults and Cartographic Frustration, 28 October to 6 November

The first phase of the Gaza-Beersheba offensive, which lasted from 28 October until 6 November, represented a period during which the battlefield was well-known and the enemy situation was reasonably clear. These conditions were ideal for how the EEF leadership used the maps, namely as decision-making aids that discerned the enemy order of battle and its deployment. During these operationally stable periods the drafters of the operation maps could rely on redundant sources of information to check their analysis against reasonably sure baselines. But as the battle developed the number of units involved increased, the maps indicated that the cartographic process broke down because information became scarce, uncertain, and contradictory. These conditions forced the EEF staff to plot Turkish positions based on flimsy evidence that often originated from single sources, which frustrated their efforts to present a clear and accurate interpretation of the battlefield. As such, the maps for these days demonstrated both the strengths and limitations of operation mapping.

The Multi-Source Baseline: 28 October

The operation maps’ first edition, which was printed on the evening of 28 October and depicted the situation as known by the EEF GHQ as of 6 pm on that day, represented the accumulation of intelligence-gathering activity by the EEF since the end of the 2nd Battle of Gaza in April 1917. The static nature of the front during this time and the proximity of the opposing armies allowed both sides to use multiple sources of information to develop a thorough and accurate picture of the location and identification of their opponent’s units. For the first several days of the 3rd Battle of Gaza, this map served as a reliable baseline with which the EEF intelligence staff could adjust the positions of both the Turkish forces and their own. As such, this map was particularly important and I will describe it in detail by noting where the
information for each of the map’s unit symbols originated. I will start at the north-west end of the front line around Gaza and move south-east through the central Hareira-Sheria sector, before ending at the Beersheba flank (see Figure 5.2). This progression divides the front into three distinct sections just as the EEF intelligence summaries did.

![Figure 5.2. Detailed overview of the initial front line running between Gaza and Beersheba with important points on the line annotated. (This figure is intended to be printed in color)](image)

**The Gaza Sector**

At the start of the battle the British knew the positions of their own forces with great accuracy due to the robustness and redundancy of their communications (see for example XXI Signal Coy WD, “Diagram of Communications, XXIst Corps”). Musgrave and Meinertzhagen apparently didn’t even see the need to differentiate the symbols depicting the British XXI Corps units arrayed against Gaza, which was the most congested portion of the front. They decided instead to represent these units with unlabeled red blocks (lower left in figure 5.3). The Turkish
units around Gaza, consisting of—from west to east in the front line—the 53rd and 3rd Divisions, and in reserve the 7th and 19th Divisions under the direction of the Turkish XXII Corps, were depicted in greater detail.

Figure 5.3. Facsimile of a portion of the 28 October operation map showing the Gaza sector of the front. The horizontal distance of this figure is approximately ten miles. (This figure is intended to be printed in color)

The symbol for the headquarters of the Turkish XXII Corps on the 28 October map was located atop the ridge and in the orchard groves north of the town of Gaza (Figure 5.3). The

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2 For complete reproductions of each day’s operation map, see Appendix D.
presence of this corps on the Palestine front had been confirmed by a deserter in August, and this fact was corroborated by signal intercepts from the Turkish wireless station at Gaza and from the Turkish headquarters in the ensuing months (GHQ IS, 10/8/17; GHQ IS, “Map of enemy W/T stations in Syria and Palestine corrected to 4/10/17” in). The XXII Corps headquarters would have been housed in bunkers or dugouts and thus hidden from British RFC tactical reconnaissance missions. Moreover, my rough analysis of the topography (see Chapter 4) indicates that its location was secure from direct observation by British units south of Gaza as well as from ships off the coast. Therefore, the most convincing hypothesis for the source of information about the location and identification of this headquarters was a combination of deserter statements and signal intercepts.

The 53rd Division on the 28 October map was shown occupying the trenches at the far west end of the line, with its 161st Regiment anchoring the flank on the shoreline at Sea Post and the 163rd Regiment farther inland at Rafa Redoubt (Figures 5.2 and 5.3). This division’s 79th Regiment was depicted in reserve in the orchards north of Gaza (lower left of Figure 5.3). The 53rd Division’s presence on the Palestine front had been established by statements from a deserter who crossed the lines from Ali Muntar ridge on 30 July. The division’s position was confirmed shortly thereafter by other means, probably wireless interception, though the record was ambiguous on this score (GHQ IS, 30/7/17 and 17/8/17). The date of this division’s final deployment into the line prior to the start of the battle and the position of its regiments on 28 October was learned from several soldiers, who had deserted the 163rd Regiment as well as from others who had left the 7th Division’s 134th Regiment. These deserters had crossed over on 21 October and revealed that the 53rd had relieved the 24th Division in the trenches along the coast. They also stated that the 24th Division (I will discuss this unit more fully below) had in turn
moved south-east and relieved the 7th Division in the central sector (GHQ IS 21/10/17). Other deserters arriving at the British lines identified the 161st Regiment during the second week of October (GHQ IS 13/10/17). No specific sources were recorded for the location of the 79th Regiment, but its location—protected from direct observation from both ground and air reconnaissance—indicated that its position was probably pointed out by deserters from one of its sister regiments. The presence of troops in the Turkish trenches between the coast and Rafa Redoubt was confirmed by constant observation and patrolling from the opposite British fortifications, though this does not appear to have contributed to the identification of the Turkish units. Therefore, deserter statements were the most plausible source of information leading to the depiction of the 53rd Division and its subordinate regiments on the 28 October operation map.

Southeast of the 53rd Division, the Turkish 3rd Division was shown occupying the elaborate fortifications crowning Umbrella Hill and Ali Muntar ridge south of Gaza. Its 138th, 31st, and 32nd Regiments were in the line from northwest to southeast, respectively, with battalions in reserve in the orchards and cactus groves atop the hill (bottom center of Figure 5.3). Like the 53rd, the 3rd Division was identified on the Gaza front in July 1917 and confirmed—probably by wireless, though the intelligence summary failed to specify the source—in August (GHQ IS, 30/7/17 and 17/8/17). This division entered the front line in early September and immediately began hemorrhaging a steady stream of deserters, several of whom were described as either “reliable” or “intelligent.” These deserters identified the location of each of the 3rd Division’s regiments to the nearby British (various GHQ IS from 17/9/17 through 27/10/17). Given that these units occupied the most elaborate fortifications along the Turkish line, they would have been rather difficult to identify either by ground or aerial reconnaissance. Therefore,
the best explanation for their location and location on the 28 October map is the statements from these deserters.

The Turkish 7th Division was depicted several miles north of Gaza by a single large block symbol with attached text noting the number of its battalions and identity of its regiments (top right of Figure 5.3). This division was known to be in reserve due to statements by deserters from the 53rd Division, which it had been relieved in the line by the previously displaced 24th Division (GHQ IS, 21/10/17). The 7th Division’s presence in the Gaza sector was first detected in mid-July 1917, when a British raid on the Sea Post fortification captured prisoners who revealed their unit’s identity (GHQ IS, 18/7/17). Thereafter, a trickle of deserters from each of the division’s three regiments allowed the British to track the 7th’s movement to posts farther east in the Turkish line and from thence into reserve positions farther north along the coast (various GHQ IS from 18/7/17 to 21/10/17). However, these statements were insufficient to provide a precise location for the division on the 28 October map. These location data came from RFC aerial reconnaissance missions that devoted great effort before the start of the offensive to counting tents and shelters (T&S) behind the Turkish lines as indicators of the presence of large bodies of troops (GHQ IS, 22/9/17). Even so, these aerial missions were unable to identify units solely by the presence of tents. Thus, the likely sources of information for the location and identification of the Turkish 7th Division on the 28 October map appears to have been a combination of deserter statements and aerial reconnaissance.

The second division held in reserve by the Turks—the 19th—was the most recent arrival to the Palestine front of any of the Turkish formations. Like the 7th Division, the 19th was depicted by a single large block symbol with associated descriptive text in the vicinity of Beit Hanun, northeast of Gaza (center of Figure 5.3). How the British tracked this illustrated the value
of wireless intercepts and agents reports to the British information-gathering effort. The first mention of the 19th Division in the EEF intelligence summaries was an entry indicating that the unit was in Aleppo in Syria at the end of August (GHQ IS, 25/8/17). A second “usually reliable” agent reported the division’s subordinate regiments at the railroad junction of Rayak (in present-day Lebanon) on 20 October (GHQ IS, 20/10/17). This second report illustrated the slowness with which such information reached the EEF, insofar as the British had already used wireless intercepts to track the transit of each of the 19th Division’s subordinate units through Rayak between 23 September and 11 October (GHQ IS, 24/10/17). Having confirmed the arrival of this unit to the theater, the British needed only to pinpoint its location on the front. This was accomplished on 25 October, when an RFC mission sighted 220 new tents near Beit Hanun (GHQ IS, 26/10/17). That mission report provided the evidence that Meinertzhagen’s officers used to plot the location of the 19th Division. This case illustrates how the British used multiple methods to follow an enemy unit’s progress into the theater and then employed their own intelligence-gathering means to pinpoint its location on the front. The dominant sources in this instance were signal intercepts and aerial reconnaissance, supplemented by agent networks.
Moving southeast along the front lines brings us next to the central portion of the Turkish front, called the “Hareira-Sheria sector” or simply the “Hareira sector” in the British records.

This portion of the front was the responsibility of the Turkish XX Corps—consisting of the 54th, 26th, 16th, and 24th Divisions—with its headquarters in Sheria\(^3\) (Figure 5.2). This corps’ existence was confirmed by the same deserter who identified each of the other two Turkish corps

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\(^3\) British maps and intelligence documents were inconsistent in their naming conventions, which reflected the difficulty in translating foreign names into English. For example, Beersheba was referred to variously as Beersheba, Beersaba, Bar Saba, Saba, and Tel el Saba in GHQ intelligence summaries. As a convention, I chose to refer to place names by their most common and simplest form in the British documents, which sometime contradicted the names shown on the operation maps, as in the case of Sheria vs. Tel el Sheria in Figure 5.4.
on the Palestine front in August 1917 (GHQ IS, 10/8/17). However, like the other corps- and army-level headquarters, this one’s location and identity were continually tracked by the transmissions from its wireless set (GHQ IS, “Map of enemy W/T stations in Syria and Palestine corrected to 4/10/17”). Therefore, the best explanation for the location and identification of this headquarters on the 28 October map was signal intercepts and deserter statements.

In the northwest of the Hareira sector the Turkish 54th Division was shown on 28 October deployed in and around Tank Redoubt with two of its regiments—the 164th and 165th—in the trenches and one—the 19th—in reserve (upper left of Figure 5.4). A trickle of deserters had heralded this division’s arrival at the front in August, though far fewer crossed over from this unit than from the divisions in the Gaza sector, where the opposing lines were closer to each other. This information was corroborated by RFC missions that noted large increases in the number of tents in the Hareira-Sheria area (GHQ IS, 2/8/17 and 6/8/17). In October, deserters’ statements allowed the British intelligence staff to track the normal rotation of the 54th Division’s regiments between the trenches and their reserve camp behind the Tank Redoubt hill (represented by three small green squares in the upper left of Figure 5.4). This camp presented an interesting analytical case, as my own rough field-of-view analysis indicated that this reserve position was hidden from direct observation by British ground elements. Whereas the front-line redoubts could be observed from the British trenches, this reserve camp needed to be located by aerial reconnaissance. This aerial pinpointing occurred initially in August, though the identity of the units occupying the reserve camp on 28 October was learned from deserter statements prior to the beginning of the assault (GHQ IS 26/10/17). These data indicated that deserter statements

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4 A redoubt was a strongpoint in the defensive lines characterized by elaborate fortifications that held relatively large numbers of troops and machineguns. These redoubts were linked together by more lightly-held intervening stretches of trenches. Tank Redoubt was so named because a British tank had been knocked out there in the course of the failed British attack known as the 2nd Battle of Gaza. This tank had been incorporated into the Turkish defenses after the British withdrew, reportedly being used as a wardroom for Turkish battalion officers.
and aerial reconnaissance were the most likely sources for the 54th Division’s symbols on the 28 October operation map.

Southeast of the 54th Division, the 26th Division on the 28 October map occupied the Atawineh and Hairpin Redoubts with its 58th and 76th regiments, respectively, and with its 59th and 78th regiments in reserve north of Sheria (center-left and center of Figure 5.4). The 26th—due to particularly poor morale and large numbers of deserters—may have been (from the British perspective) the best documented unit in the Turkish army. Initially, wireless intercepts (“Agent Y”) and prisoners taken from other divisions in July allowed the British to note this unit’s arrival in Palestine (GHQ IS 10/7/17, 11/7/17, and 24/7/17). Shortly thereafter the British scored an intelligence coup when the battalion commander of the 2nd Battalion, 59th Regiment defected to their lines with several of his officers. Such a high-ranking deserter was unusual, and he undoubtedly brought with him broad knowledge of his division’s deployment (GHQ IS 31/8/17). His arrival preceded a flood of further desertions from each of the 26th Division’s regiments, with 58 of 82 deserters from the Turkish army in September coming from this one division (GHQ IS 4/10/17). Their statements confirmed the identity of the division’s regiments around the two redoubts, as well as the location of the two reserve regiments near Sheria (GHQ IS 26/10/17). Furthermore, the reserve regiments’ camps had been pinpointed by an RFC mission in early October (GHQ IS 3/10/17). Clearly, the information relating to the 26th Division on the 28 October map came overwhelmingly from the large number of deserters that this division provided, supplemented by aerial reconnaissance in the unit’s rear areas.

Farther south and east, occupying the section of front straddling the Wadi-el-Sheria, the Hareira-Tepe Redoubt, and the Rushdi System (see Figure 5.2), was the Turkish 16th Division, consisting of the 47th, 48th, and 125th regiments (low center of Figure 5.4). Entries relating
specifically to this division were sparse in the EEF GHQ records, but the sector of the line it occupied was the target of heavy aerial reconnaissance because it was beyond the range of persistent ground reconnaissance by the British forces. These missions relied upon indirect indications of enemy presence, such as tents and shelters, new work on entrenchments, and artillery positions (RFC WD Vol. 1, 2). The deployment of the division’s regiments was gleaned from a deserter of the 47th Regiment who arrived in the British lines in mid-October (GHQ IS 13/10/17). The paucity of information about this unit in the British records called into question the seemingly certain designations that appeared on the 28 October operation map. Based on the available evidence, the 16th Division’s location and identify appear to have been derived primarily from aerial reconnaissance supplemented by a few deserter statements. The uncertainty about this unit’s identity would cause some confusion as the British offensive and Turkish reactions made the battlefield conditions more fluid in the coming days.

The final and southernmost Turkish unit in the Hareira sector was the already-mentioned 24th Division, which consisted of the 2nd and 143rd regiments and occupied the Kauwukah system of trenches directly south of Sheria (lower right of Figure 5.4). This division was another late arrival in the theater, having been tracked passing through the Rayak railway junction by wireless intercepts in the first two weeks of September (GHQ IS 26/9/17). The specific deployment of this unit on the 28 October map revealed some interesting details about how Meinertzhagen’s staff officers resolved conflicting information. During October the 24th Division’s two regiments furnished the British with deserters who provided information about its deployment in the Kauwukah System (GHQ IS 21/10/17, 26/10/17, 27/10/17). However, other deserters—from the Turkish 7th and 54th divisions—stated that the 24th was instead deployed farther south around Beersheba (GHQ IS 21/10/17). Thus, on the same day the EEF intelligence
officers received reports that the same unit was in two different locations. Meinertzhagen chose to present the information provided by the 24th Division deserters after their accounts were corroborated by an RFC mission on 25 October, which had sighted an increase in tents in the Kauwukah area (RFC WD Vol. 1, 25/10/17; GHQ IS 25/10/17). This information indicated that the 24th Division’s location was plotted based primarily on deserter statements with confirmation provided by aerial reconnaissance.

**Figure 5.5.** Annotated facsimile of the Gaza sector of the 28 October operation map. The horizontal distance of this figure is approximately ten miles. (This figure is intended to be printed in color)

*Beersheba Sector*

The final sector of the Turkish front—the fortifications around Beersheba—was also the farthest from the British trenches (Figure 5.5). These fortifications were thought to be defended by a single Turkish infantry division—the 27th—on 28 October, and screened to the west by the Turkish 3rd Cavalry Division. Beersheba’s topographical location in a shallow bowl around the
Wadi-el-Saba and the presence of the Turkish cavalry on the high ground west of the town (see Figure 5.5), prevented British ground forces from observing this area from the south or west. These factors influenced Allenby’s decision to assault the town using a flanking maneuver to the east, thereby attacking downhill from the Judean foothills with the benefit of good fields of view. Beersheba’s distance from the British lines meant that few soldiers from the occupying units could easily desert. Thus, information about the 27th Division deployed around the town was relatively scanty, though the presence of troops in the fortifications had been well-established by aerial reconnaissance. This portion of the map demonstrated how the British would rely on signal intercepts and aerial reconnaissance when circumstances prevented them from using deserters or direct observation.

The Turkish 27th Division, according to British intelligence, consisted of the 67th and 81st regiments along with one other regiment that either was never identified or never existed. Deserters had identified these regiments around Beersheba in July and August 1917, but this report was followed by a long stretch of time during which the intelligence summaries omitted any mention of these units. This silence lasted until a deserter from the 81st Regiment crossed over on 27 October, just before the start of the offensive (GHQ IS 30/7/17, 1/8/17, 27/10/17). The lack of information in the intervening period prompted at least one report by the intelligence staff that the Turks had evacuated Beersheba. The presence of a third regiment around Beersheba was indicated by wireless intercepts (“reliable”) in mid-September, while the presence of the 27th’s headquarters in the town was confirmed when a wireless station began operating there a few days later (GHQ IS 19/9/17, 21/9/17). Additionally, RFC missions over the town provided a steady stream of reports about the locations of camps, horse lines, and artillery positions (RFC WD Vol. 1, 25/10/17 through 30/10/17). Thus, while the specific deployments depicted on the 28
October for the 67th and 81st regiments likely came from the deserter who arrived on 27 October, the primary sources of information of the 27th Division were aerial reconnaissance and signal intercepts.

The Turkish 3rd Cavalry Division was unique among the units depicted on the 28 October map insofar as both its location and the identification of two of its three regiments were derived primarily from direct ground observation. One of the division’s regiments—the 27th Cavalry—was shown far to the north of Beersheba in front of the Kauwukah fortifications (lower right of Figure 5.4). The other two—the 6th and 8th cavalry regiments—were deployed on the high ground to the west of Beersheba, screening the town and its fortifications from view (left side of Figure 5.5). Only one deserter and one prisoner from this division were captured by the British in the period from July until the start of the Beersheba-Gaza offensive, but the GHQ intelligence summaries were replete with reports of direct observations of Turkish cavalry by ground and aerial assets (see GHQ IS 15/9/17 and 16/10/17 for example). As cavalry were easier to spot than infantry from the both ground and the air, the British consistently overestimated the strength of this division (GHQ IS 1/8/17). The 27th cavalry regiment was certainly located and identified by a combination of aerial reconnaissance and signal intercepts, but—in the absence of other data—the remaining two cavalry regiments and their screen line on the 28 October map appear to have been under observation by the nearby British 53rd Division, a conclusion I based on my own rough field-of-view analysis. Thus, ground reconnaissance appears to have been the primary source for these symbols, supplemented by aerial reconnaissance and signal intercepts.

The 28 October operation map as a whole was unique in the entire series of operation maps because it represented the accumulated knowledge of unit positions gathered by the EEF over a number of months, rather than the rapid-fire daily tracking of a dynamic situation that the
subsequent maps represented. This map’s heavy reliance on multiple information sources for each unit symbol emphasized the importance of the information gathering phase of the EEF cartographic system. Except in the case of spies, the speed at which information could be processed and given to the mapmakers does not appear to have restricted what was depicted on this map. Furthermore, the evidence pertaining to the location and identity of each Turkish unit appears to have been generally unambiguous, a fact that further deemphasized the importance of the information-processing phase. The dominant source of information for the information depicted on this map was the statements by Turkish deserters. This source was usually confirmed by signal intercepts and aerial reconnaissance.

Altogether, the 28 October map proved the most complete picture the British GHQ would make of the battlefield in the coming campaign. As the offensive commenced and increasing numbers of units maneuvered on each succeeding day, the following maps began to exhibit less confidence in the mapmakers’ depiction of enemy and even friendly positions.
Figure 5.6. Overview of the major maneuvers conducted by both armies during the first phase of the 3rd Battle of Gaza (29 October to 6 November). (This figure is intended to be printed in color)

The Assault: 29 October - 6 November

The editions of the 7th FSC operation maps that recorded the British approach to and assault on the Beersheba-Gaza line illustrate the context in which these maps excelled: a comprehensively analyzed and thoroughly planned set-piece battle. The British offensive opened with the dramatic assault by the Desert Mounted and XX\(^5\) Corps on the Turkish flank at Beersheba (Figure 5.6). In the ensuing days the British continued their advance from Beersheba...

\(^5\) In British military naming conventions, corps are generally referred to simply as “XX (twenty) Corps,” rather than the US style of saying and writing “the XXth (twentieth) Corps.” As I am discussing British military formations, I chose to employ this convention in my own writing.
towards the central sector of the Turkish line. Once many of the Turkish reserve forces had been drawn east, the EEF launched a direct frontal assault on the Gaza defenses. During these nine days of operations the relative importance of the information-processing, document-distribution, and document-use phases of the EEF cartographic framework increased, while the information-gathering phase relied less on deserters and more on ground reconnaissance and signal intercepts.

The 29 and 30 October operation maps (not shown) contained no significant modifications to the EEF’s picture of the Turkish army’s deployment. This was not surprising insofar as the few reports in the GHQ intelligence summaries for these days generally reinforced the picture presented on the 28 October map. One minor exception was the Turkish 19th Division, which moved slightly west to the area around Huj. This movement had been revealed by wireless intercepts and aerial reconnaissance during the day on 30 October (GHQ IS 30/10/17). Additionally, on 29 October a small skirmish had allowed the British to retrieve the body of a Turkish soldier, whose papers confirmed the location of the Turkish 16th Division (GHQ IS 29/10/17). Aside from these two incidents, the only significant differences between two maps and the 28 October map was that they tracked the British Desert Mounted and XX Corps’ incremental progress eastwards to their assault positions around Beersheba. EEF GHQ had ordered all British units to send situation reports at regular intervals; these reports contained, among other information, the location of these units’ headquarters as well as the locations of their subordinate formations (XX WD Vol. 1, “Force Order No. 54”). Thus, the communications systems of the EEF—mostly cable telephone and telegraph at this point—were the primary sources of information for the changes to these maps, emphasizing the importance of information processing to the mapmaking process.
Figure 5.7. Annotated facsimile of the 0930 working copy operation map produced on 31 October showing the initial penetration of the Beersheba perimeter by the British 60th Division and the flanking advance of the British cavalry. The horizontal distance of this figure is approximately 15 miles. (This figure is intended to be printed in color)

Figure 5.8. Annotated facsimile of the 4pm working copy of the 31 October operation map showing further British advances. The horizontal distance of this figure is approximately 15 miles. (This figure is intended to be printed in color)
The first major deviation from the 28 October map appeared on the several maps that depicted the situation on 31 October, the day that the British initiated their assault on Beersheba. Throughout the day the British created four working operation maps, which depicted the British unit positions from “dawn to 0900,” and at 0930, 1305, and “4pm (?).” These crude maps led to a finalized edition depicting the situation of both the British and Turkish forces as known at 6pm. The working copies reflected the information recorded in the written dispatches sent to EEF GHQ and other headquarters from the XX and Desert Mounted Corps headquarters during the day. For example, the “dawn to 0900” map reflected a dispatch to GHQ from XX Corps sent at 0600 stating that all its forces were in position for the assault (XX WD Appendix I/27). The 0930 map reflected the initial breach of the Beersheba perimeter by the 60th Division, announced by a dispatch sent at 0940 from XX Corps (Figure 5.7) (XX WD Appendix I/34). The time stamp on
the dispatch indicated that the time printed on the working maps represented the situation when the information was sent rather than when that the map was prepared, whereas the polished final operation map represented the situation when the map was printed.

The final 31 October map showed the British 60th and 74th Divisions having penetrated the Beersheba defenses from the west, while the brigades of the ANZAC Mounted Division threatened the town from the east (Figure 5.9). The Turkish 3rd Cavalry Division was shown as having withdrawn north into the Kauwukah system and the deployment of the Turkish infantry forces in that entrenchment were graphically reordered. In addition, a new cavalry unit identified as “4 divisional squadrons” appeared on this map near Sheria (not shown). In the hills to the northeast of Beersheba another small force of Turkish cavalry was shown facing off with the Australian 2nd Light Horse Brigade (upper right of Figure 5.9) and to the northwest of the town the British 53rd Division continued to screen the central sector of the Turkish lines (upper right of Figure 5.9). The Turkish reserve regiments shown within the Beersheba perimeter on 30 October had moved to the surrounding trenches in the south and northeast on 31 October map. North of Gaza the symbol representing Turkish 7th Division (not shown) was shifted south to the previous location of the 19th Division (see Figure 5.3). Otherwise, the map showed no changes to the Turkish positions along the rest of the front.

Overwhelmingly the sources of information for the differences between the 30 and 31 October maps came from ground reconnaissance and contact, with the gathered information being transmitted in dispatch form by wire telegraph or telephone after the initial report reached a corps headquarters. One indication of this process was the small Turkish cavalry unit opposing the 2nd Australian Light Horse in the hills northeast of Beersheba. Instead of an identity, the text accompanying this unit’s symbol recorded a strength estimate of “200 sabres” (top right corner
of Figure 5.9). The fact that the unit’s strength could be estimated but not its identity, along with the close proximity of the British cavalry force, indicated ground reconnaissance as the source of this information. Additionally, the movement of the Turkish reserves within the Beersheba perimeter could be traced to a specific dispatch revealing another ground reconnaissance report, wired to from XX Corps GHQ at 11:15, stating that the 60th Division had observed “an enemy body 300 or 400 strong moving from behind the trench line...in a N.N.E. direction” towards the trenches being threatened by the horsemen of the Desert Mounted Corps (center of Figure 5.9) (XX WD Appendix I/35). Furthermore, the GHQ intelligence summary noted that the presence of the two known enemy regiments in the Beersheba perimeter had been confirmed “by contact” (GHQ IS 31/10/17). However, neither the maps nor any of the British intelligence summaries accounted for the fact that prisoners from nearly all the Turkish regiments portrayed as occupying the Kauwukah system were taken in the fighting around Beersheba, a fact that indicated an analysis process by Musgrave and Meinertzhagen during the information processing phase, which I will discuss below.

The presence of a small cavalry unit annotated as “4 divisional squadrons” and the shift of the Turkish 3rd Cavalry Division farther north on the map in the Kauwukah system on the 31 October and 1 November maps (see Figure 5.11) indicated the use of an additional source of information besides ground reconnaissance, and also provided insight into the analysis process used by Meinertzhagen’s staff. The GHQ War Diary for the 31st recorded that aerial reconnaissance had observed three bodies of cavalry converging on a point near Sheria and that a later reconnaissance observed 1400-1500 cavalry holding the eastern end of the trenches. The narrative then speculated that the smaller groups of cavalry were “Divisional squadrons being concentrated with a view towards forming a new composite cavalry regiment” and that the larger
body was “probably the 3rd Cavalry Division” (GHQ IS 31/10/17). This entry revealed that the presence of cavalry in these two locations was based on hard information gathered through aerial reconnaissance, but the identity of these units as indicated on the map—particularly that of the divisional cavalry squadrons—was wholly derived through informed speculation. This highlighted the influence of staff analysis on the content of these two maps.

An additional observation about the final polished copy 31 October map provided information about its production schedule because it appeared to confirm Meinertzhagen’s stated timeline for submission and printing at 4pm and 6pm, respectively. This process highlighted one of the weaknesses of the operation mapping process. Because the map production timeline was designed to provide commanders with a product by 6pm, events that occurred after this time failed to make it onto the maps. In the case of the operations on 31 October, the key event of the day—the capture of the town of Beersheba and its wells in a dramatic cavalry charge—did not occur until after 7pm. The final 31 October map showed the Turkish forces still in control of the town but being threatened by the XX Corps from the west and the Desert Mounted Corps from the east (Figure 5.9). This would have limited the operation map’s usefulness for planning the operations for 1 November as the situation on the ground at the end of 31 October was drastically different from the reality portrayed, since the Turkish units in the Beersheba defenses had actually been destroyed or withdrawn north. The periodic cycle of the operation mapping process could break down if operations proceeded more rapidly or more slowly than the officers operating within its structure could account for, a fact that would become increasingly important when the situation across the front became more fluid in the coming weeks.
Figure 5.10. Annotated facsimile of the area of the 0600 1 November working copy operation map showing the situation around Beersheba. This map showed the town in British hands and British infantry consolidating their gains to the north. The horizontal distance of this figure is approximately 15 miles. (This figure is meant to be printed in color).

Figure 5.11. Annotated facsimile of the finalized 1 November edition operation map showing the area of the front north of Beersheba. The horizontal distance of this figure is approximately twenty miles. (This figure is meant to be printed in color)
Meinertzhagen and his staff appear to have grasped this weakness in the mapping cycle, as they produced another working copy map indicating the updated British unit positions as of 6am on 1 November, sufficiently early for the maps to have been incorporated into the latter parts of the day’s operational planning (Figure 5.10). This working copy map showed the British 53rd Division moving onto the ridgeline north of Beersheba from whence it could observe the Kauwukah trench system, and the 10th Division occupying positions southwest across the Wadi Imleh from the Rushdi trench system. The final edition of the 1 November map showed both of these units in position with picket lines pushed forward to keep the entire Turkish front line south and east of Hairpin Redoubt under observation (Figure 5.11) (GHQ IS 1/11/17).

The Turkish positions on the southeastern flank of their line, as shown on the final edition of the 1 November map, reflected a marked decrease in precision from the editions of previous days. Prior to the Beersheba assault nearly every Turkish unit symbol had been accompanied by text noting its identity down to the regimental level, but the 1 November map reduced the precision of many of these descriptors one step up the chain of command to the division level, using large blocks to represent the Turkish 24th and 27th Divisions around Sheria along with parenthetical notes listing their subordinate regiments (Figure 5.11). The note next to the 27th Division—previously garrisoning the Beersheba defenses—indicated that its regiments were “remains of” the formations that had participated in the previous day’s actions. The Kauwukah and Rushdi trench systems were shown as occupied by a thin picket line rather than the strong line of regiments portrayed previously. As with the 31 October map, the 1 November map represented a blending of hard information sources with informed speculation and analysis by Musgrave, Meinertzhagen, and their subordinate intelligence staff. The loss of precision evident on this map reflected an inability by the EEF intelligence officers to easily reconcile their own
neat picture of the battlefield with conflicting reports coming from the large number of prisoners captured at Beersheba.

The symbols for the Turkish 24th and 27th Divisions represented aerial reconnaissance missions that reported large numbers of troops in motions around Sheria. These missions, supplemented by ground reconnaissance from the 10th and 53rd Divisions, kept the Rushdi-Kauwukah area under continuous observation during the course of the day. Furthermore, prisoners captured during the previous day’s fighting from regiments not belonging to the 27th Division prompted the EEF intelligence staff to reevaluate their picture of the situation northwest of Beersheba (GHQ IS 1/11/17). The regiments of the 24th Division that had been confidently portrayed as garrisoning the Kauwukah system on the previous editions of the operation maps were now aggregated farther north under their parent division’s symbol (top center of Figure 5.11). Their replacement with a picket line (left center Figure 5.11) in the trenches represented confusion about the actual positions of the Turkish regiments. This confusion arose from the fact that prisoners from these formations had been taken in Beersheba, where they should not have been according to the British intelligence. The location of the 24th and 27th Division symbols indicated that Meinertzhagen and Musgrave used the aerial reconnaissance reports from this part of the front to paint a revised picture of the previous day’s developments, one in which both Turkish divisions—rather than just the 27th—had taken part in the fighting and then withdrawn north to Sheria in confusion (RFC WD 1/11/17).

One other detail of the 1 November map worth noting illustrated a further drawback of the operation mapping cycle. The map included a small symbol for an infantry formation on the

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6 The prisoners taken from Beersheba gave precise information about the composition of the Beersheba garrison that proved to be dizzyingly confusing for someone attempting to show a neat and orderly disposition of the Turkish army. For example, prisoner statements revealed that a battalion of the 27th Division’s 67th Regiment was actually in Galilee, that a battalion of the 81st Regiment was assigned to the 53rd Division around Gaza, and that this battalion had been replaced in the 27th’s order of battle by a battalion of the 181st Regiment not previously known to have been on the Palestine front (GHQ IS 1/11/17).
far eastern edge with the uncertain note “1 Battn. [battalion]?” (not shown). This symbol originated from an early morning aerial reconnaissance mission that had sighted “about 500” enemy infantry in this area moving north (GHQ IS 1/11/17). However, no further information arrived during the day confirming the location of this significant body of troops, and so the map drafters were left with the dilemma of having to speculate on where they had gone. They opted to leave the symbol where the initial report had indicated even though the information placing it there was almost twelve hours old. This illustrated two points: first, the cycle of the operation mapping process forced the intelligence staff in some cases to use old information because there were no intervening maps on which to plot enemy positions. Second, Meinertzhagen and his officers were being forced to rely on single sources of information and even single reports to derive their picture of Turkish deployments, often without confirmation from other sources. This contrasted with the multi-source approach that had informed their mapmaking in the more static operations prior to the Beersheba assault. This trend would only become more acute as the offensive developed.
Figure 5.12. Annotated facsimile of the portion of the 2 November operation map showing the Gaza sector of the front. This example shows the shallow penetration of the Turkish front line by the British 52nd Division and the deeper penetration along the coast by the 54th Division. The horizontal distance of this figure is approximately five miles. (This figure is intended to be printed in color)
The hours before dawn on the 2 November saw the EEF launch the second phase of the offensive: the frontal assault on the trenches defending Gaza. By daybreak the British XXI Corps had occupied most of its initial objectives, which consisted of the Turkish front line trenches on Umbrella Hill and northwards (Figures 5.2 and 5.12). Their deepest penetration occurred in the sand dunes along the coast, where the British 54th Division captured the town of Sheikh Hassan. This division was unable, however, to maintain a position on the low ridge that ran parallel to the sea and protected Gaza from direct observation (see Figure 5.2) (54 Div. WD 2/11/17). These advances were depicted on another working copy operation map representing the situation at 8am on 2 November (not shown).

The eastern sector of the front also saw significant—though more controversial—cartographic development in the already-discussed migration of the Turkish reserve 19th Division from its initial position south of Huj to the eastern edge of the line, accompanied by the 26th
Division (see Chapter 4). These divisions were shown being opposed by British cavalry formations that had moved north from Beersheba since the previous day (right side of Figure 5.13). The situation in the Kauwukah and Rushdi trench systems was also depicted more confidently than on the day prior, perhaps representing the benefit to the EEF staff of twenty-four hours in which to analyze the large amount of data generated by the capture of Beersheba. The only other significant change from the 1 November map was a lengthening of the amount of front covered by the Turkish 54th and 16th Division to account for the departed 26th Division formations (upper right of Figure 5.13). These symbols represented a growing confidence on Meinertzhagen’s part in his process of portraying Turkish deployments. They also highlighted the intelligence staff’s tendency at this point to depict their analysis and speculation on the operation maps without differentiating these from hard data.

In the Gaza sector, the 1:100,000 scale of the base line map used by the operation mapmakers was too small to adequately show the intricate trench systems and the deployments of the units occupying them. This limitation highlighted the fact that the maps were intended to support the operational and strategic rather than the tactical levels of planning. As such, the Turkish positions were depicted as a dense line of regiments bending back away from the coast opposing the British penetrations of the front (upper left of Figure 5.12). The source of information for these symbols on the 2 November map was largely ground reconnaissance and contact (Hare, “Report on the 3rd Battle of Gaza”). The arrangement of the Turkish symbols was designed to communicate the strong resistance that the British infantry were facing in their

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7 The EEF produced some very detailed and effective large-scale tactical maps of this sector of the front. Of particular note is a trench map preserved in Chetwode’s papers at the Imperial War Museum that assigned a code name to each individual section of trench in the complex Turkish fortifications. This map divided the Gaza sector into three sub-sectors within which all the code names followed a consistent theme; for example, women’s names for one sector and men’s names for another. These code names were frequently cited in the war diaries of the assaulting XX Corps units to mark their progress into the Turkish defenses.
attempt to slog farther into the complex network of trenches around Gaza, rather than to give a precise picture of how the various Turkish regiments were arrayed (XXI WD 2/11/17).

On the eastern end of the line, Meinertzhagen’s interpretation of the battlefield was on display more clearly than perhaps in any other example. His decision to portray the 19th and 26th Divisions on the extreme eastern flank was built on a strong foundation of aerial reconnaissance missions that had reported dense clouds of dust indicating an eastward movements of Turkish forces. These reports indicated that these two reserve divisions had moved east (GHQ IS 1/11/17; XX WD Appendix I/78). Even so, Meinertzhagen appears to have jumped the gun in pushing his interpretation of the raw data. As noted in Chapter 4, he had not accounted for Dawnay and Allenby’s fears about how his confident portrayal of a strong Turkish movement to this flank would impact the decision-making of the two British corps commanders at that end of the battlefield, Chetwode and Chauvel. Moreover, the 2 November map appeared to illustrate a major error of analysis insofar as the 26th Division probably never actually moved from its position in the central sector until the Turks had evacuated the line on the night of 6 November.

This episode illustrated the limitations of long-range reconnaissance by both aerial and ground observers, since neither the combined efforts of constant observation by the British 10th and 54th Divisions nor multiple Royal Flying Corps missions could deduce the identity of the Turkish formations in motion behind the front or even determine their direction of travel in some cases (XX WD Appendix I/78). The misidentification of the Turkish 26th Division on the 2 through 4 November operation maps further highlighted the importance of staff analysis in the information-processing phase of the cartographic process. This analysis amplified the subjective nature of the end-product maps even though clear and concrete sources—in this case aerial and ground reconnaissance—were often abundantly available. Disagreement over what these sources
of information actually meant could lead to large variations in how the Turkish deployments were depicted.

I have already recounted the dance of the Turkish 19th Division across the next to two days’ editions of the operation maps (see Chapter 4). I will not belabor this point further other than to note that this unit’s oscillation back and forth across the front from 2 to 4 November corroborated the role played by information-processing in the production of the operation map. Apart from this, the maps for 3 and 4 November appeared to show—in their liberal use of attenuation symbols for nearly all of the Turkish units south and east of Hairpin Redoubt—an increasing frustration on the part of Meinertzhagen, Musgrave, and their fellow intelligence officers over their superiors’ reluctance in accepting their analyses, as well as frustration with their own inability to communicate a clear picture of the confused and rapidly-changing situation at the eastern end of the ongoing battle (Figure 5.14).

On the other hand, these two maps also illustrated an increasing willingness by the mapmakers to employ more of Jacques Bertin’s visual variables in altering unit symbols on the operation maps to add nuance to the depicted information (Muller 1981, 1-3). Up to this point the
operation mapmakers had manipulated the variables of position, orientation, hue and size to denote the location, facing, nationality, and relative strength of units on the maps. From this point onwards they would also alter the texture and shape of their symbols to communicate uncertainty (Figure 5.14), raw data (Figure 5.15), disintegration (Figure 5.16), and motion (Figure 5.18). One of the first examples of this occurred on the 3 November operation map, on which several Turkish division were represented by hollow rather than solid box symbols. The mapmakers in this case altered the symbols’ texture to communicate uncertainty (Figure 5.14).

To say that the 3 through 5 November maps represented a cartographic temper tantrum on the part of Meinertzhagen and his staff would unjustly impugn their well-demonstrated professionalism. Even so, these three maps had an air of someone throwing up their hands and saying “you figure it out!” after the rebuff they had received from Dawnay and Allenby on 2 November. Essentially, the only sure symbols on the eastern flank of the 3 November map were representative of raw data being plotted rather than analysis (see Figure 5.14). For example, at the southernmost point of the Turkish defenses were two notes stating “decrease in T&S [tents and shelters]” on the west side and “increase in T&S” to the east, a sure indicator of the simple transcription of an aerial reconnaissance report onto a corresponding location on the map. Between these two notes was a small cavalry symbol with its attached text stating “2 small cavalry camps,” another example of raw data simply plotted on the map without any attempt at interpretation (RFC WD 3/11/17). Farther north nearly every Turkish division was represented by a hollow box escorted by a question mark to show Meinertzhagen’s perhaps grudging acknowledgement that he and his staff could not definitively identify or even locate these units with the information available to them. Even so, Meinertzhagen and Musgrave tentatively continued to use their maps to try to show their superiors what they believed was occurring: a
Turkish move to the eastern flank. They did this by showing several of the division markers accompanied by line and arrow symbols and text indicating that “Part or all of this Div. may have moved E.SE.”

The 4 and 5 November maps demonstrated somewhat greater clarity, with the 19th Division now definitively marked on the eastern flank (though not the 26th Division) along with the 16th and 3rd Cavalry Divisions (Figure 5.15). The clarity here represented information gathered by contact as the 53rd Division and attendant cavalry brigades skirmished with these units and captured prisoners who identified their own units and those nearby. These prisoners also provided more distant intelligence that was represented on the maps, including the Turkish 57th Regiment’s location marked far north of the battle line, clearly informed by a prisoner statement that located this unit “4 days march from the front,” as well as the arrival of the 12th Depot Regiment8 from Jerusalem along the road from Hebron (both not shown) (GHQ IS 4/11/17). Furthermore, Figure 5.15 shows an example of a new symbol that the intelligence officers began to employ during this time: a tent representing a camp observed from the air with an attached note indicating the camp’s size. As with the 3 November map, these symbols and annotations were examples of raw data transcribed from the GHQ intelligence summaries rather than interpretation, but the rest of the 5 November map suggested an intelligence staff getting back into the saddle with increasing confidence that their superiors would accept and distribute their analysis (GHQ IS 4/11/17 and 5/11/17).

8 This Regiment did not actually reach the front but rather stopped in Hebron, where it remained until early December, opposed by a rotation of British units from XX Corps. On some days this unit was the only enemy formation that the British were able to positively identify on the operation map.
The 2-5 November maps represented more than an interesting record of cartographic uncertainty, interpretation, and contestation. They also showed a staff who learned through their frustration to break out of the constraints of the standardized symbols they had been using and to be increasingly inventive with how they used the operation maps to communicate their analysis. The maps from 6 November onward showed an increasingly broad use of Bertin’s retinal variables (especially shape and texture) to manipulate the green and red symbols on the operation maps to communicate uncertainty and specific events that they believed were occurring. The first example of this occurred on the 6 November map at the eastern flank of the line where the Turkish 16th and 19th Division had been portrayed on the previous day. Instead of the usual rectangular symbol, on 6 November the units were represented by amoeba-like shapes with green dots scattering away from them (Figure 5.16). This was an attempt by Meinertzhagen and his staff to communicate their belief that these units were in the process of disintegrating and fleeing after their combat with the British XX Corps, who had finally attacked through the Kauwukah and Rushdi trench systems towards Sheria and Hareira.
Overall, the cartographic efforts of Meinertzhagen and his staff during the set-piece phase of the Gaza-Beersheba offensive demonstrated a transitional learning process mirroring the evolving sources and quality of the information available to them. Before the battle began they had been able to rely on multiple sources—primarily a combination of deserter statements, signal intercepts, and aerial reconnaissance—to confidently triangulate a highly accurate picture of how the Turkish forces were arrayed. But as the situation of these forces became increasingly fluid, particularly on the Beersheba end of the line, the intelligence staff began to struggle to maintain the clarity of the situation depicted on their maps. The rapid pace of events and the rigid 24-hour mapmaking cycle forced these operational cartographers to increasingly rely on single sources of intelligence and their own interpretation of scarce raw data—gathered mostly through ground and aerial reconnaissance in the confusion of combat—to plot where they believed the Turkish forces were located. Along the way their picture of reality ran afoul of their superiors because Meinertzhagen perhaps (or perhaps not) misread how influential the operation maps could be
when interpreted by the British corps commanders, particularly Chetwode. This led, after a brief bout of frustration, to an increasingly sophisticated manipulation of map symbols by Meinertzhagen’s staff to communicate and differentiate what they knew, what they believed they knew, and what they didn’t know about the situation on the ground.

**Phase 2: Mobile Operations and Cartographic Experimentation, 7-14 November**

With the British XX Corps’ seizure of Hareira and Sheria on 6 November, the position of the Turkish army on the Gaza front had become untenable. The Turkish command seems to have grasped this fact more quickly than their British opponents. In fact, Dawnay’s dampening of Meinertzhagen’s enthusiasm for using the operation maps to communicate analysis rather than raw data may have occurred at a particularly inopportune time for the British, since Meinertzhagen seems to have eschewed representing his conclusion that the Turks were evacuating their line on the 6 November map at the exact moment when this was in fact occurring (Meinertzhagen Vol. 20, 48). The German commander of the Turkish army, General Kress von Kressenstein, did in fact extract his remaining forces from the Gaza-Beersheba front on 6 November without undue interference from the British troops, who found the opposing trenches empty of Turkish troops when they launched a general assault on the night of 6-7 November. The withdrawal saved from encirclement the Turkish forces that had survived the previous weeks’ fighting and foiled the ultimate British objective of destroying von Kressenstein’s army.

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9 Meinertzhagen claimed in his diary that Dawnay again refused to credit his analysis that the Turks were withdrawing (Meinertzhagen Vol. 20, 48).
Figure 5.17. Overview of the second phase of the Gaza campaign in which the EEF pursued the retreating Turkish army northwards from 7-15 November. (This figure is intended to be printed in color)
This evacuation was also a transformative event for the EEF intelligence staff and mapmakers. In the span of a day the EEF had lost contact with nearly the entire Turkish army, throwing into confusion months of operational intelligence-gathering. From 7-14 November the operational mapmakers struggled each day to piece together a coherent picture of the Turkish deployments, a situation made even more difficult by the fact that both the retreating Turkish and advancing British units were in motion nearly every day of this period. Indeed, at times the EEF command struggled to keep track of its own units, much less those of the enemy. Meinertzhagen and his staff were able to piece together the location of bodies of enemy troops from fragmentary reports on many days, though almost never during this week of operations were they able to tag an identity to these enemy units. This dynamic and confusing operational context prompted the EEF intelligence staff to experiment with how they portrayed information on the operation maps, daily employing both tested and novel techniques to communicate what they knew and what they didn’t, and to differentiate between the two.

7-8 November: Retreat, Pursuit, and Disappointment

The 7 and 8 November editions of the operation maps showed attempts by the EEF intelligence officers to use innovative symbols to communicate their analysis, but on a much larger scale than before, insofar as the mapmakers, perhaps emboldened by their correct prediction of the Turkish evacuation, seemed to regain confidence in their interpretation of the situation on the ground. Even so, these maps contained incorrect and incomplete information, as both the EEF information-gatherers and information-processors failed to keep pace with the new and rapidly changing operational situation of either the Turkish or British forces. Furthermore, these maps and the intelligence summaries that informed them highlighted the importance of the EEF’s communication systems to the information-processing phase of the cartographic system.
Figure 5.18. Annotated facsimile of the 7 November operation map showing two of the three comet-like symbols that depicted the Turkish army’s northward retreat (the third such symbol was at the eastern end of the map). This excerpt also shows the dashed perimeter attenuation symbol that was used to show the predicted extent of the Desert Mounted Corps’ advance. The horizontal distance of this figure is approximately 12 miles. (This figure is intended to be printed in color)

The 7 November operation map was notable for two reasons: it used innovative symbols to show the incorrectly perceived flight of the Turkish army, and it indicated that the EEF had
lost communication with the Desert Mounted Corps, which composed nearly one third of the
British army. The staff also produced another working copy map showing the location of British
units at 0830 on 7 November (not shown). This working copy showed the British XXI Corps in
possession of Gaza and the surrounding fortifications, which had been occupied the previous
night when XXI Corps had belatedly attacked the abandoned Turkish trenches. In the east,
Chetwode’s XX Corps was shown deployed in the Turkish fortifications around Hareira and
Sheria, and the units of the Desert Mounted Corps were located south of XX Corps, preparing for
its overdue attempt to burst into the Turkish rear areas. From this working copy, the cartographic
picture would only become less clear.

The final edition of the 7 November map showed a considerably more confused picture.
The Turkish army was depicted streaming north by three large symbols. These symbols
manipulated texture, shape, and direction to show, at a glance, that Meinertzhagen and his staff
believed that the Turkish army was fleeing in confusion. The symbols were oriented north and
were squared at their front, but the rear of the symbols were streaming away south like the tail of
a comet, creating an impression both of movement and of disintegration (two of these are shown
in Figure 5.18). Text next to these symbols noted the divisions and regiments that each was
believed to represent. Along the Wadi-el-Hesi—the next defensible line north of Gaza—two
small and unidentified unit symbols were depicted defending the wadi’s road and railroad
crossings (left center of Figure 5.18). In contrast to the confusion north of Gaza, farther south the
Turkish 54th and 26th Divisions were shown in full detail with their positions unchanged from
the previous day, still holding the trenches between Gaza and Hareira (bottom left of Figure
5.18). The only major changes to the British deployment on this map from the 0830 working
copy showed two divisions of XXI Corps having advanced from Gaza to the Wadi-el-Hesi and,
more interestingly, a very large area of the map within a red dashed line showing the predicted location of the Desert Mounted Corps (lower right of Figure 5.1).

The Turkish positions on the final copy of the 7 November map were based almost entirely on speculation by the EEF intelligence staff. The exceptions to this were the depiction of the Turkish 54th and 26th Divisions—shown still holding their positions in the center of the Turkish line—that were located by ground reconnaissance from the British XXI Corps, which had occupied the Turkish trenches around Gaza over-looking these units’ fortifications on the previous night, as well as the unidentified Turkish rear guards along the Wadi-el-Hesi. These rear guards were located by contact with the pursuing Imperial Service Cavalry Brigade (GHQ IS 7/11/17; XXI IS 7/11/17). Otherwise, the comet-like symbols used by the operation mapmakers for the retreating Turkish forces appear to represent a somewhat over-optimistic analysis by Meinertzhagen that the Turkish army was in headlong flight, with the disintegrating tails of the symbols giving the impression of units shedding soldiers and equipment in an attempt to speed their escape. This picture showed Meinertzhagen’s view—articulated in his diary—that a great victory had been won after hard fighting, and all that remained was for the cavalry to exploit it (Meinertzhagen Vol. 20, 48). His staff’s depiction of a fleeing army defended by particularly small rear guard symbols was a cartographic argument for the British cavalry to go into pursuit mode, a hope that would be dashed on the following day’s map.

Meinertzhagen and his staff also employed a new method to depict the unsure location of the EEF’s Desert Mounted Corps, which had passed through Hareira and Sheria into the Turkish rear. The DMC’s estimated position on 7 and 8 November was shown by a large dashed perimeter around text identifying its units (Figures 5.18 and 5.19). Both the form of the symbol and its size indicated what was occurring; EEF GHQ had lost communication with the advancing
cavalry. Without reports coming back from the DMC, the EEF GHQ could only estimate how far its units had advanced (AMD Signal Squadron WD 7/11/17; DMC Signal Squadron WD 7/11/17). Furthermore, the size of the perimeter estimating the Desert Mounted Corps’ position indicated that Meinertzhagen and his staff were again overly optimistic in their analysis of how far Chauvel’s cavalry had advanced into the Turkish rear areas. The extent of this symbol gave the impression that the Turkish 54th and 26th Divisions were essentially surrounded by the advancing horsemen, which was an opinion that Meinertzhagen also recorded in his diary (Meinertzhagen Vol. 20, 48). The events of the following day would show this analysis to have been flawed.

Figure 5.19. Annotated facsimile of the 8 November operation map showing the hollow box symbols used to replace the previous day’s comet-like symbols representing fleeing Turkish units. The horizontal distance of this figure is approximately forty miles. (This figure is intended to be printed in color)

The 8 November operation map dispensed with the comet symbols in favor of the hollow boxes that the intelligence staff had employed to depict unsure Turkish positions earlier in the battle (Figure 5.19). Three of these showed the positions of three groups of Turkish divisions,
though text next to each box noted that their exact positions were “unknown” or “doubtful,” a fact that the ensuing days’ maps would confirm. The shift to these symbols didn’t indicate a change in the actual situation on the ground. Rather it reflected Meinertzhagen’s personal disappointment with what he viewed as the slow progress of Chauvel’s Desert Mounted Corps, which was allowing the Turkish army to escape intact (Meinertzhagen Vol. 20, 48-50). Even so, he and his staff continued to perpetrate one inaccurate holdover from the 7 November map in the form of the dashed perimeter symbol for the indefinite locations of the Desert Mounted Corps.

On the 8 November map, this symbol, which also revealed that for a second day nearly a third of the British army was out of communication with GHQ, had shifted northward and grown a lobe to the eastward. This lobe indicated that the cavalry might be able to cut off the retreat of the remnants of the Turkish 27th Division, still shown as opposing the British forces on the far eastern end of the line, a hope that would prove as disappointing as the similar circumstances surrounding the Turkish 54th and 26th Divisions on the previous day.

Overall, the 7 and 8 November maps showed that the EEF had largely lost contact with nearly the entire Turkish army as well as large part of their own forces. The implications of this were that if the Desert Mounted Corps could not communicate their own situation to GHQ, then they certainly could not communicate any information about the enemy. Furthermore, despite Meinertzhagen’s depiction on 7 November of a disintegrating Turkish army, Turkish rear guards along the Wadi-el-Hesi prevented the pursuing British forces from gaining any useful information about the enemy’s location. This represented a general breakdown of the information-gathering phase of the EEF cartographic system, which created a void that Meinertzhagen and his intelligence officers attempted to fill with overly optimistic analysis.

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10 The need to gain firm location intelligence for the Desert Mounted Corps became so acute that the RFC diverted aerial reconnaissance missions to locate these friendly formations rather than enemy deployments (RFC WD 7/11/17).
Whether this optimism led to complacency among the EEF commanders on the night of 7-8 November is unclear, as some commanders (particularly those in the Desert Mounted Corps) would not have even had access to these maps at this point. What is clear is that the maps presented a record of the elation of victory being felt at EEF GHQ after a week of hard fighting, but also of disappointment that the triumph was not as complete as first hoped.

9-11 November: Symbols Old, New, and Old

The operations maps that the EEF printed and distributed from 9 to 14 November showed an intelligence staff that was grasping for ways to show *something* that could help them make sense of the confused events unfolding around the Turkish retreat. On 9 November they first

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**Figure 5.20.** Annotated facsimile of the 9 November operation map showing the northea
tward retreat of the Turkish forces. The horizontal distance of this figure is approximately fifteen miles. (This figure is intended to be printed in color)
attempted a return to the traditional rectangular symbols that had served the operations maps so well during the set-piece phase of the battle (Figure 5.20), but quickly abandoned these for more ambiguous line symbols on the 10 and 11 November editions. These line symbols allowed them to depict an enemy force blocking their advance without having to differentiate the units that the lines composed. Thereafter until 14 November Meinertzhagen’s staff utilized a tested cartographic method developed on the Western front in France, which divided the Turkish front into sectors for the various enemy divisions holding their line. Overall, these editions showed an intelligence staff that was demonstrating increasing cartographic agility in how they used their maps to communicate information, though they also highlighted a further structural weakness of the twenty-four hour operation mapping process.

The most obvious difference between the 8 and 9 November maps was that the base map had changed. The new base map was similar to the previous one in that it showed only basic terrain features including towns, roads, railroads, and major water obstacles. However, this newer edition, printed at a scale of 1:250,000—as opposed to the 1:100,000 of the older editions—covered a broader area, depicting Palestine north to Ramle and east to the Dead Sea and encompassing the holy city of Jerusalem, the capture of which was one of the objectives of the British offensive (see Figure 3.3 in Chapter 3). The smaller scale of the new maps reflected the fact that the mobile operations following the collapse of the Gaza-Beersheba defenses had begun to run off both the northern and eastern edges of the old base maps. Furthermore, these new maps signified the fact that the methods the EEF cartographers had employed in the set-piece offensive around Beersheba and Gaza were becoming increasingly inappropriate for the mobile operations that followed.
The 9 November operation map depicted concrete positions for the Desert Mounted Corps—which had finally reestablished communications—showing its subordinate ANZAC Mounted Division establishing a picket line north of the Wadi-el-Hesi parallel to the infantry advance of the XXI Corps along the coast (lower left of Figure 5.20). To their north, the Turkish forces were depicted by long rectangles oriented from southwest to northeast along the road to Ramle with text noting that these symbols represented “Mass troops and Transport” of the “disorganized” 54th and 26th Divisions, protected by a small symbol representing an unidentified Turkish rear guard unit (Figure 5.20). The sources of the information portrayed on this portion of the map were aerial reconnaissance missions that observed moving troops and transport but could not identify them (GHQ IS 9/11/17). Many of the remaining divisions of the Turkish—including the 19th, 24th, 27th, and the newly arrived 20th Divisions—were depicted farther east, opposite the British 53rd Division south and west of Hebron, a fact that not only contradicted their location on the previous day’s map, but also established the Turkish 19th Division as perhaps the most cartographically mobile formation on the battlefield (Figure 5.21).

Figure 5.21. Annotated facsimile of the 9 November operation map showing the area to the southeast of Figure 5.20. This area contained the symbols for the remaining Turkish divisions which had been located in far different positions on the 8 November map. The horizontal distance of this figure is approximately twenty-five miles. (This figure is intended to be printed in color)
The 9 November map illustrated the limitations of the rectangular unit symbols that the EEF mapmakers had been employing up to this point. The solid blocks denoting the eastern group of divisions (Figure 5.21) gave the impression that their location was based on solid intelligence reports. In truth, the location of these units on the map was based largely on speculation. Aerial reconnaissance had observed troops in these areas, but the intelligence staff at this point could not determine what units they represented (GHQ IS 9/11/17). Meinertzhagen and his staff seem to have realized the weakness of portraying their conjecture as established fact—perhaps learning from their over-eagerness in illustrating the advance of the Desert Mounted Corps—and to have taken steps to improve the precision of their graphics on the succeeding editions of the operation maps by resorting to new and inventive symbols that departed from the traditional rectangles and hollow boxes.

The 10 and 11 November editions illustrated a new symbol employed by the EEF mapmakers. This symbol depicted a front line for the Turkish forces, but did not differentiate between the units that the line represented. In the western sector of the 10 November map the EEF intelligence staff placed a series of wavy lines identified only as “Rearguard Units” running southwest from the coast and blocking the British advance (Figure 5.22). These undulating symbols gave the impression of a tentative and weak stand by the Turkish forces along a line that had been located by contact as the divisions of the British XXI and Desert Mounted Corps probed forward. This analysis was reinforced by signal intercepts that indicated Turkish intentions to attempt to defend this line (52 Div. WD 10/11/17; GHQ IS 10/11.17). No identifications for Turkish units were present along this line with the exception of the Roman numerals indicating that this sector of the front was the responsibility of the Turkish VIII Army headquarters, a fact that would be established definitively by signal intercepts the following day.
Figure 5.22. Facsimile of the 10 November operation map showing the wavy line symbol used to represent the poorly defined Turkish front line that was forming. The horizontal distance of this figure is approximately twenty miles. This figure is intended to be printed in color.

The 11 November operation map (not shown) was similar to its 10 November predecessor in that it continued to depict the Turkish defenses with an undulating wavy line symbol, but this symbol was now accompanied by text denoting the fortification of this line as “Freshly dug and incomplete” instead of the “Rear guard units” note of the previous day. Many of the other differences for this map were more significant, starting with the base map on which the symbols were printed. This had changed again on 11 November to a 1:168,960 scale map after two days of using the 1:250,000 scale maps as a base, a change that allowed somewhat more detail to be depicted. Furthermore, rectangular unit symbols disappeared completely from this edition of the operation maps, suggesting that the mapmakers believed line symbols accompanied by descriptive text were a better means to communicate the staff’s analysis. This map also showed the first occurrence of a new labeling that Meinertzhagen and his officers would employ henceforth: text offset in the area of the map depicting the Mediterranean Sea that
communicated information that could not be tied to any specific location on the map. In the case of the 11 November map this text stated that “Identifications from all enemy Corps was obtained by contact on 10-11-17” and went on to qualify this with the statement that “They do not show the presence of these Corps in the enemy line but rather indicate disorganization” before concluding that “Locations of Divisions is unknown” (Figure 5.23).

![Facsimile of the new labeling technique that appeared first on the 11 November operation map. These labels were located in the area of the Mediterranean Sea on the map and contained information about units that could not be located as well as other qualitative information.](image)

This combination of wavy line symbols with offset text was an artful way for Meinertzhagen to communicate both what he and his staff knew—that a Turkish defensive line comprising the surviving formations of the Turkish army was coalescing as indicated—and what they did not know, namely the specific deployments of the Turkish subunits within this line. The lack of precision on these maps did not represent so much a dearth of information—plenty of intelligence was being gathered from prisoners who had been captured from the retreating Turkish army—as an inability to process the gathered information and depict it on a map quickly enough for the plotted symbols to be current (XXI IS No. 86). Thus the two mapping cycles of 8 to 9 and 10 to 11 November represented an accordion effect within the EEF cartographic system in which the information-gathering phase failed as the British lost contact with their opponents and then the information-processing and document-distribution phases failed as

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11 In which incoming information slowed to a trickle while British forces were attempting to locate their opponents, but then increased to the point where the information could not be analyzed quickly enough and thus began to back up when a solid Turkish position was encountered, much like the accordion effect of traffic engineering.
contact was reestablished and produced a glut of raw data that could not be analyzed and plotted quickly enough to account for the altered battlefield conditions. This is not to say that Meinertzhagen and his staff failed in their mapping efforts. On the contrary, the 11 November map was the culmination of numerous lessons learned by the EEF staff over the preceding days that demonstrated agility in dealing with the difficulties imposed both by the conditions of the battlefield and the structure of the operation mapping cycle. The following three days would demonstrate further cartographic growth on the part of these officers.

13-14 November: Tested Techniques and Help from Above

By mid-1917 the British Expeditionary Force in Europe and its staff processes were becoming increasingly professional and effective in contrast to their failures at the Somme in 1916. When Allenby transferred from this force to Palestine in the summer of 1917, he brought with him many of the modern and sophisticated staff processes being employed in France (Meinertzhagen 1917, Vol. 20, 23). One of these appears to have benefitted the operation mapmakers directly in their attempts to portray an accurate picture of the battlefield from 12 to 14 November. In the archival records of the British 3rd Army are a series of “Order of Battle” maps that depicted the German front line divided into sectors for each division and annotated with text noting which German units were not accounted for (Figure 5.25). This technique appears to have been commonly used by British staff officers on the Western Front (Chasseaud 2013). The EEF’s editions of the operation maps for 13 and 14 November are strikingly similar to these maps, a fact that indicates some influence exerted by the British Expeditionary Force in Europe on the operational cartography of the EEF. This is not surprising, as officers (including Allenby and Meinertzhagen) commonly transferred between these theaters.
Figure 5.24 (left) Facsimile of an area of the 13 November operation map showing the sector method of organizing the front lines (Turkish forces in green) and Figure 5.25 (right), a facsimile of a British 5th Army “Order of Battle Map” from the battle of Arras in France in April 1917 (German forces in red). Note the nearly identical symbols for the enemy front on the two maps.

After the 11 November edition the next operation map printed by the 7th FSC was annotated as presenting the situation as known by the EEF GHQ at 0200 on 13 November. This departure from the usual pattern of daily 6pm maps reflected the fact that the EEF GHQ and the 7th FSC had both moved forward from their original positions around Gaza on 12 November (Dawny to his wife, 24 November 1917). As such, the task of transporting the 7th FSC and its equipment northwards, reestablishing it near the new front, and still producing a map to cover the developments of 12 November indicated both commitment to the process by the mapmakers as well as the importance that the EEF command placed on map analysis. Even more impressive

12 This map was in place of the 6pm map that would have been produced on 12 November.
is that this map edition employed a new technique. The two 13 November maps portrayed the Turkish front line—which was assuming an increasingly north-south orientation as the British forces continued to advance north along the coast—with symbols that were identical to those used by the British army in France. These symbols added details to the previous editions of 10 and 11 November by dividing the Turkish front into divisional sectors and plotting the location of major headquarters (see Figures 5.24). This renewed detail indicated that the EEF intelligence staff was again combining multiple intelligence sources, including statements from the more than 7,900 prisoners taken since the start of the offensive, as well as aerial reconnaissance and signal intercepts, to triangulate the location and identification of the opposing Turkish forces (EEF IS 9/11/17 and 13/11/17; DMC IS 14/11/17). Even so, the Turkish lines that these maps portrayed did not last long, and neither did this cartographic technique.

![Facsimile of the 14 November operation map showing rectangular symbols representing northward retreating Turkish units protected by an outpost line. The horizontal distance of this figure is approximately ten miles. This figure is intended to be printed in color.](image)

**Figure 5.26.** Facsimile of the 14 November operation map showing rectangular symbols representing northward retreating Turkish units protected by an outpost line. The horizontal distance of this figure is approximately ten miles. This figure is intended to be printed in color.
The 14 November edition operation map highlighted the fluidity of the problem facing the EEF’s operational cartographers. These officers had just begun to reestablish a picture of the Turkish deployments when further British advances breached the Turkish line and sent the enemy retreating north yet again (Figure 5.26). This map showed the British forces opposed only by a Turkish picket line and marked a return to the traditional rectangular unit symbols to depict the Turkish positions, though these symbols were placed sparingly on this edition of the map. In this case they were used to depict four Turkish divisions and a regiment marching in column along the road to a new defensive line north of Jaffa (center Figure 5.26). The sources for these Turkish symbols were derived from ground reconnaissance by the Yeomanry Mounted Division and the XXI Corps in the case of the Turkish picket line, and aerial reconnaissance in the case of the northward moving columns (YMD WD 14/11/17; GHQ IS 14/11/17). Eastwards towards Jerusalem, the remainder of the Turkish army deploying in the Judean hill country was not located at all but rather relegated to a text label that noted which units the staff believed were there. This note stated that these units’ “positions [were] unknown.” This uncertainty once again highlighted the fact that concrete information about enemy locations dried up when the British forces lost contact with their Turkish opponents on the ground.

Meinertzhagen and his staff leaned more heavily on different sources of information during this phase than those they had relied upon in the first phase. British forces were capturing thousands of Turkish soldiers who were willing to give them information, but this source was too slow given the circumstances. The intelligence staff relied instead on information sources that could provide them with near-immediate snapshots of the rapidly changing battlefield such as aerial and ground reconnaissance and signal intercepts. These sources could locate the enemy but not identify them. Even so, aerial reconnaissance in particular came into its own during this
phase because troops in motion were far easier to spot from the air than stationary ones. With so much of both armies in motion each day, the reports from the pilots became the most prominent sources portrayed on the operation maps. Signal intercepts also came more to the fore since—in the absence of information about where the enemy formations were—this source could reveal German and Turkish commanders’ intentions, which allowed Meinertzhagen to speculate on the location of the Turkish divisions.\textsuperscript{13}

The 14 November map also marked the end of the mobile pursuit phase of the offensive initiated by the 3\textsuperscript{rd} Battle of Gaza and a transition into a new phase characterized by a more stable front line and a deliberate British advance eastward into the Judean hill country. The preceding week of operations had seen Meinertzhagen and his staff lean heavily on their own speculation and analysis in the absence of good or current information arriving from the EEF’s information-gatherers. The increasingly confused situation on the ground, the alternating droughts and gluts of incoming information as units gained and lost contact with the enemy in the running fight northwards, and the inflexible twenty-four hour cycle of the operation mapping process, led these officers to experiment with a variety of symbols and techniques to communicate both knowledge and speculation about operational conditions. The EEF staff grew in their cartographic ability through these operations, but the more stable conditions of the next phase of the campaign would return them to the techniques they had employed in the early days of the battle.

\textsuperscript{13} On 11 November the EEF intercepted a Turkish order commanding their forces to counter-attack. The transmission was received clearly by the British receiving station but not by the Turkish recipients. As such, the Turks were forced to resend the message to their subordinate forces. Meinertzhagen noted gleefully in his diary that perhaps never before in military history had an army known its opponent’s orders before the opposing army received them (Meinertzhagen 1917, Vol. 20).
Phase 3: Advance on Jerusalem and Mapping for History, 15 November to 18 December

The operation maps underwent a striking transformation after 14 November that raised questions about their intended purpose at this point of the campaign. Prior to 15 November, each edition of the operation maps had been printed at relatively large scales and on physically large sheets that allowed significant detail in the symbols depicting the opposing units. From 15 November onward, however, the maps were printed on a 1:500,000 scale map. Furthermore, the physical dimensions of these maps shrank from the size of a tabletop to the size of a piece of letter paper. This format, though more easily transportable, was also less conducive to depicting
operational detail with precision, a disadvantage that was ameliorated by the fact that the information available was not particularly precise at this time. Moreover, the pattern of distribution for these maps as well as entries in several of the associated officer’s diaries indicated that the purpose of the operation maps had shifted away from maintaining an accurate operational picture, and towards creating a historical record of the EEF’s accomplishments. This is not to say that the operational purpose of the maps had vanished; rather, this purpose was joined by another: communicating the EEF’s accomplishments to the world and to posterity.

*Reestabishing the Front, Physically and Cartographically, 15-17 November*

These new format maps were printed at a time when the front was once again stabilizing and when the EEF intelligence staff could again slow down and triangulate information from multiple sources to both locate and identify the Turkish units confronting them. The first step in this process was to locate the new Turkish front line, a task that was accomplished from 15 to 17 November and recorded on the corresponding editions of the operation maps. Over these three days the intelligence officers gained an increasingly clear picture of how the Turkish divisions and regiments were distributed as well as which enemy units had been destroyed outright in the fighting of the previous two weeks (Figure 5.28 and 5.29). The slower pace of operations allowed the staff to process the statements from thousands of prisoners captured in the fighting and to piece this intelligence back into their analysis of the Turkish deployments.

**Figure 5.28.** Facsimile of a note on the 15 November map indicating that the Turkish 26th Division had likely been disbanded.
Each successive map for the period of 15 to 17 November depicted marginally greater detail than the previous day’s edition, capitalizing on the fact that the front was relatively stable
during this period. Few Turkish unit symbols were actually present on the 15 November map (not shown), reflecting the fact that ground reconnaissance was still feeling for the forward edge of the Turkish lines. What major units were depicted could all be traced to aerial reconnaissance missions that reported either moving troops or freshly dug fortifications in these locations (GHQ IS 15/11/17).

Some interesting information was communicated by text set away from the scene of action that could only have been learned from prisoners, signal intercepts, or from agents. One note offset over the sea observed that, among the units that were still to be located by the EEF, the 26th Division had “Probably [been] drafted into other units” and was therefore no longer on the board, so to speak, and that the 53rd Division had “suffered very severely,” a preamble to perhaps removing this unit from the Turkish order of battle as well (Figure 5.28). More troublingly for the British, a note to the north on the 16 November map stated there were probably “12,000 German infantry at or near Shechem,” a report that must have come either from signal intercepts or an agent and that in retrospect was rather far-fetched (Figure 5.29). One area where each of these three maps consistently provided both the location and identification of the Turkish units was far to the south where the Turkish 12th Depot Regiment and 24th Division opposed the XX Corps Cavalry Regiment on the road south of Hebron, a fact that had been established through prisoner statements and could be confidently plotted because this portion of the front had been stable for several days (Figure 5.30) (GHQ IS 15/11/17).

The 16 November map showed somewhat more detail along the Turkish front lines than on previous days. This greater precision reflected a series of targeted aerial reconnaissance missions for that day that observed numerous signs of a consolidating Turkish defensive line including large camps, entrenched gun positions, and bodies of troops in defensive postures, and
also that British ground patrols were probing forward and making contact with their now-stationary adversaries (GHQ IS 16/11/17). Two distinct fronts for the Turkish forces appeared on this edition, one anchored on the Mediterranean coast just north of Jaffa and oriented on an east-west line parallel to the Auja River, and the other to the east on a north-south axis blocking the approaches to Jerusalem (Figure 5.29). Both of these deployments reflected intelligence gathered by RFC missions flown on the morning of the 16th. From this point onwards the general deployment of the Turkish army would change only incrementally and at a pace with which the EEF cartographic system could match, a trend highlighted by the 17 November operation map (not shown) on which the only significant difference from the previous day’s map was a northward shift of the Turkish line to the far side of the river Auja, a deployment that had been detected by aerial reconnaissance and confirmed by British ground patrols pushing north (GHQ IS 17/11/17; YMD WD 17/11/17).

*The Advance on Jerusalem, 18 November to 18 December*

The month of operations following the reconsolidation of the front lines on the river Auja and before Jerusalem marked a return to the more stable multiple sources approach for Meinertzhagen and his staff. This period was similar to the processes they employed prior to printing the first operation map on 28 October. From 18 November until the end of this operation map series on 18 December14 the EEF cartographic system was able to create an increasingly precise picture of the Turkish deployments as the more stable front allowed Turkish deserters greater opportunity to give themselves up. Even so, the maps detailed yet another episode of faulty analysis by Meinertzhagen and his staff, illustrating the difficulty involved in attempting

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14 The last edition of the operation maps present in the National Archives collection is the 18 December edition. However, the war diary of the 7th FSC records that they continued to print editions until at least middle of January.
to make sense of an enemy’s intentions using only the fragmentary data that operational intelligence-gathering could generate.

Figure 5.31. Annotated facsimile of the 19 November operation mapping indicating a premature evacuation of Jerusalem. The Turks would not actually abandon the city until 9 December. The horizontal distance of this figure is approximately ten miles. (This figure is intended to be printed in color)
The 18 to 20 November editions of the operation maps illustrated how fragmentary information combined with premature optimism could still conspire to cause the EEF’s cartographic system to portray an inaccurate picture of Turkish intentions, if not deployments. While the British XXI Corps pushed into the difficult terrain of the Judean hills in a deliberate advance against the Turkish line protecting Jerusalem (lower left in Figure 5.31), aerial reconnaissance provided the EEF GHQ with information that led them to believe—prematurely—that the Turkish forces would evacuate the holy city without a fight. These aerial missions recorded a northward movement of troops and transport along the road between Jerusalem and Shechem, though the actual direction of travel was more a matter of conjecture than hard fact. The intelligence staff interpreted these data as an evacuation, screened by a defensive line protecting the exposed flank of the withdrawing columns (GHQ IS 18-20/11/17). The EEF cartographers communicated their analysis by placing text on the 18 to 20 November maps that noted “Considerable movement northward” on the road as well text identifying the Turkish defensive line as a “strong flank guard” (Figure 5.31). This analysis proved to be faulty, as the Turks would not actually evacuate Jerusalem until 9 December. Even so, this incident further reflected the trend of Meinertzhagen and his officers using text to differentiate their analysis from the solid symbols that denoted hard data.

The ensuing days’ maps dispensed with this prediction regarding Turkish intentions and acknowledged that the Ottoman Empire would not surrender one of its holiest sites so easily. The 21 through 23 November editions of these maps illustrated a top-down approach for organizing the reemerging Turkish order of battle. The staff first identified corps sectors within the Turkish line before breaking these into subordinate divisional areas. This information was provided by a steady flow of prisoners and deserters and confirmed by signal intercepts that triangulated the
location of the corps and army headquarters. Furthermore, aerial and ground reconnaissance maintained contact with the Turkish front lines as the British XXI Corps continued advancing up the approaches to Jerusalem (GHQ IS 21/11/17; XXI IS 21/11/17). The map editions for these days reflected this top-down process by their progressively precise demarcations for the Turkish corps sectors. By 23 November the British had once again leveraged the information provided by Turkish prisoners and deserters to refine their operational picture down to the division and regiment level across the entire front line.

The 24 November operation map (not shown) was the first since the start of mobile operations on which the EEF intelligence officers were able to attach identification to each of the Turkish units depicted. This fact did not so much reflect new information as it did analysis by Meinertzhagen’s staff, which was finally able to begin collating and processing the large amount of information that had been arriving over the previous days from prisoners and deserters, aerial and ground reconnaissance, and signal intercepts. This process of analysis was reflected by an identification table in the GHQ intelligence summary entry for 24 November. The entries in this table corresponded to every Turkish unit portrayed on the operation map for that day (GHQ IS 24/11/17). Even so, some formations still remained at large, a fact that continued to be communicated by a now standard text note listing un-located Turkish divisions, a list that consisted at this point of the Turkish 16th, 19th, and 20th Divisions. Prisoner statements aided by wireless intercepts allowed the EEF intelligence staff to place these units on the map on 26, 27, and 28 November, respectively, leaving the list of unidentified enemy units to be replaced on the 28 November edition by a single note about German and Turkish reinforcements possibly bound for this front (GHQ IS 26/11/17 and 28/11/17).
The editions of the operation maps covering the days prior to capture of Jerusalem on 9 December showed little variation to the deployments of either army other than the gradual northward transfer of the British XX Corps, which had remained around Beersheba and Gaza for logistical reasons throughout the mobile phase of the campaign. Other than slow and incremental eastward British advance on Jerusalem, the only major daily differences between the deployments depicted on these maps came from attempts by the mapmakers to communicate signal and agent information about new Turkish formations arriving to the front (GHQ IS 1/12/17, 4/12/17, and 8/12/17).

The precision of the maps suffered another temporary setback when the Turkish army—under pressure from the steady advance of the British XX Corps—evacuated Jerusalem on 9 December, ceding the city to the EEF without a protracted fight. From 9 to 16 December Meinertzhagen’s officers returned to the technique of using single large symbols to depict the unsure location of numerous Turkish units with which the EEF had lost contact after they withdrew beyond the city. These large rectangles were slowly broken up into divisional and regimental symbols as the deployments of each unit once again became clear through the statements of prisoners and deserters. By 17 December every Turkish unit on the map was once again individually located and identified, a state of affairs that would remain stable during the ensuing months (GHQ IS 12/12/17, DMC IS 16/12/17, XX IS 16/12/17, XXI IS 16/12/17).

Overall, this third period of operation mapping reflected a more casual approach by Meinertzhagen and the intelligence staff, which indicated a decline in the importance attached to the maps by the EEF command. Insofar as the operation mapping process was less vital to ongoing operations than in had been earlier on the campaign, this less rigid approach indicated a new purpose for the maps. Up to this point the operation maps had played an important role in
tracking the Turkish order of battle’s spatial deployment on the battlefield and in aiding the
decision-making processes of the EEF commanders. However, the losses inflicted by the EEF on
the Turkish army precluded the immediate threat of a strong Turkish counterattack, so much so
that keeping track of the Turkish army became more a matter of informational housekeeping than
a vital component of intelligence feeding into the British advance on Jerusalem. One indicator of
this fact is that while the staff possessed information about the deployment of Turkish units
down to the regimental level as early as 25 November, they did not actually plot any of these
identifications on the operation maps until 12 December, nearly three weeks later, despite the
stability of much of the front line during this time (GHQ IS 25/11/17).

*Mapping for History – A New Purpose for the Maps*

Other evidence indicated that by this point in the campaign the purpose of the operation
maps had shifted to communicating the exploits of the EEF to the rest of the British military
establishment and to the broader public. Highlighting this new purpose was the fact that when
the 7th FSC changed the format of the operation maps to their final 1:500,000 scale sheets on 15
November, they also reprinted all of the previous editions of the operation maps in this new
format. These reprints of the original maps are what were preserved in Meinertzhagen’s diary
and in Pirie-Gordon’s 1919 account of the campaign. This format was also what Dawnay
dispatched to London in his summary of the EEF’s operations during 3rd Gaza (Dawnay, “Note
on Operations on the Palestine Front for CIGS and DMO, 17 November 1917”). No plausible
military justification existed for reprinting maps that showed deployments on battlefields long-
since abandoned by both armies. Therefore, the purpose must have been historical.

Thus, the purpose of these new maps was at least in part to communicate the EEF’s story
to an external audience in contrast to the internal audience these maps had served earlier. This
fact is unsurprising, given the relative drama and decisiveness of operations on this front as compared to the grinding stalemate on the Western Front, as well as the romance of the Palestinian setting that led the largely Christian-educated officers of the EEF (including Meinertzhagen) to compare their campaign to a modern-day crusade (Meinertzhagen Vol. 20, 60-66). This new historical purpose was highlighted by the fact that Meinertzhagen preserved a complete set of these new format maps in his own diaries and that the 7th FSC’s Indian draftsmen, Mr. Malama, deposited another complete set of this format with the British Army’s Historical Section after the war.\textsuperscript{15} The simple form of these maps was useful to the operational decision-making of the EEF in the heat of battle, and also lent itself to communicating the flow of the campaign to others outside of the EEF. Even so, as historical sources these maps present some challenges for researchers, which I will discuss in Chapter 6.

**In Retrospect**

Overall, the sources and methods used by the EEF cartographic system to place symbols on the operation maps varied with the nature of the operations being conducted. The EEF was better able to leverage multiple sources of information to both locate and identify enemy units when the front was stable and when few units—both friendly and enemy—were in motion. This was because the cartographic process that created the operation maps required not only good information but also time for the EEF’s information-processors to transmit, analyze, and plot the data. During more stable periods of operations, particularly during the set-piece phase of the initial assault and then again in the final advance on Jerusalem, Meinertzhagen and his staff benefitted from sufficient time to analyze high-yield information sources like prisoner and deserter statements and signal intercepts. During these times, they could plot this information on

\textsuperscript{15} This set of maps is now located in the British National Archives in the collection WO 153/1041.
the operation maps with reasonable confidence that the situation on the ground had not changed significantly since the information was initially gathered.

By contrast, when the operational context became more dynamic during the northward pursuit of the Turkish army, the operation mapmakers were forced to rely on sources of intelligence that could be gleaned rapidly but that could only uncover limited types of information. During this period aerial and ground reconnaissance came to the fore as the primary sources of information represented on the operation maps. These methods could locate groups of enemy soldiers, but they could not identify them. This limitation resulted in an ever more confused picture of Turkish deployments. The rapidly changing nature of the battlefield during this time also meant that what information did arrive at EEF GHQ was often far out-of-date before it could be plotted by the intelligence staff. These difficult cartographic conditions led Meinertzhagen and the intelligence staff to experiment with ways to graphically differentiate uncertainty, fact, and speculation. These attempts led to some failures in the operation mapping process, most notably when the EEF lost communication with the Desert Mounted Corps. Meinertzhagen’s estimated position for this corps gave the impression that a large portion of the Turkish army had been surrounded when it was in fact escaping northward. Another failure occurred when the intelligence staff communicated a premature evacuation of Jerusalem by the Turkish army, though with less dire consequences than the earlier misstep.

Even so, Meinertzhagen and his subordinate intelligence officers showed an impressive ability to adapt their mapping methods to changing conditions. They learned from their difficulties in trying to depict a chaotic situation within the rigid bounds of the standardized symbols that British military mapping initially offered them. When these symbols failed, the officers cast them aside, sometimes in favor of completely new techniques, or by replacing them
with methods learned from the Western Front, but always attempting to communicate to the command structure of the EEF what was known, what was speculated, and what was unknown about the opposing forces. How successful they were with these maps—in terms of accuracy, effectiveness, purpose, and use—I will discuss in the next chapter.

Figure 5.32. Areas shown by the operation map facsimile excerpts that are figures in this chapter.
6. Findings and Conclusions

In this chapter I will discuss my findings with regards to my two research questions. To review, the two questions were 1) how did the EEF leverage different sources of intelligence to create the operation maps? and 2) what was the intended purpose of the operation maps? I will also discuss my conclusions about the strengths and pitfalls of the operation mapping process and its products in relation to the maps’ intended purpose, and comment on the value of the maps as historical artifacts. I will then provide some commentary on the effectiveness of my research methodology. Finally, I will conclude by outlining areas of my research that have highlighted subjects in need of further study. Overall, the data I collected and analyzed proved to be more than sufficient for answering my research questions, and in many cases I was confronted by what seemed an embarrassment of riches in archival sources. This wealth of information allowed me to draw numerous conclusions, some of which went beyond the initial scope of my investigation.

Research Question 1: Intelligence Sources for the Operation Maps

In determining which of the five general sources of intelligence available to the EEF were dominant in the operation mapping process, I came to the conclusions 1) that the answer to this question depended heavily upon the operational context in which the intelligence was gathered and analyzed, 2) some intelligence sources proved themselves valuable in all contexts, and 3) that the operation maps proved to be the most accurate and useful when the EEF’s intelligence staff had sufficient time to leverage multiple sources to triangulate the locations and identities of the Turkish units in the field. In general, the intelligence summaries compiled each day by the EEF and its subordinate commands allowed me to clearly identify what source or combination of sources prompted Meinertzhagen and his intelligence officers to place their symbols and text representing the positions and identities of Turkish formations on the daily maps. Over the course of the approximately six-week campaign between the start of the Gaza-Beersheba
offensive and the capture of Jerusalem, these numerous data points became recognizable patterns showing how the operation cartographers attempted to systematically map the battle.

As I described in the introduction chapter, the operational context of the 3rd Battle of Gaza campaign went through three distinct phases, each with its own unique challenges for the EEF’s cartographic system. During the initial phase, from 28 October to 6 November, which saw the meticulously planned set-piece assault by the British on the long-held Turkish defenses, the EEF’s intelligence and mapping systems benefitted from the ability to rely on multiple sources of information in most cases. The static nature of the front allowed the British the time and stability necessary to apply numerous reports to the task of pinpointing individual units. The most common source during this time was statements from Turkish deserters who crossed into British lines in the months and weeks prior to the offensive. Not a single Turkish division failed to provide deserters to the EEF intelligence officers, and this fact, along with Meinertzhagen’s effective interrogation techniques, ensured that deserters alone provided rich and abundant location, identity, and qualitative data about the units deployed in Palestine.

These human sources were ably complimented by aerial reconnaissance, wireless intercepts, and ground reconnaissance missions that confirmed the deserters’ statements and gave direction to the ongoing information-gathering process, though none of these sources appears to have been individually as versatile or complete as the enemy soldiers’ reports. Aerial reconnaissance, which provided location data for large bodies of troops, encampments, and entrenchments, never provided the identity data that the EEF intelligence staff required to make these troop deployments fit logically into the Turkish order of battle. Even so, aerial reconnaissance was superior to ground reconnaissance because it was more mobile and able to observe a far greater area. Nonetheless, ground reconnaissance missions often yielded prisoners
who could be interrogated. By contrast, wireless intercepts were useful in the position mapping process primarily as a source of identity data for enemy units in the line, though they also provided some location data about Turkish formations far behind the front. The reports of agents behind the lines sending information about Turkish units passing through the rail junctions of Palestine and Syria arrived at EEF GHQ too slowly to do anything but confirm data and analysis already gleaned from other sources. The result of this multi-source approach was a series of maps with a high—though not perfect—degree of accuracy regarding the dispositions of the Turkish army deployed on the Palestine front.

This clear picture broke down in the phase of pursuit and mobile operations that followed the Turkish evacuation of the Gaza-Beersheba line on the night of 6-7 November. The high tempo of operations and pace of events made it difficult to bring multiple sources and even single sources of information to bear against the problem of graphically tracking the Turkish order of battle. The conditions of this phase forced Meinertzhagen and his staff to rely more heavily on sources that could be directed from GHQ and that could yield information quickly but with far less fidelity and richness. More useful in this context were ground and aerial reconnaissance, as opposed to the more passive methods of deserter interrogations and wireless intercepts, which generally provided information too slowly to be operationally useful in this fast-paced context. The result was decreasing completeness and accuracy on the operations maps produced during this phase as each consecutive map built on the increasingly flawed product from the previous day.

The repeated failure of even these sources, along with the strain placed on the EEF communication conduits by the rapid forward movement of the army, meant that the information-processing phase of the EEF cartographic system—and in particular the analysis of
ambiguous information by Meinertzhagen and his staff—assumed far greater influence on map content. This over-reliance on analysis and speculation caused predictably negative results for the maps’ quality. The lack of information available for plotting data on the operation maps during this phase meant I needed to add an additional seventh hypotheses to my possible explanations for the sources of unit positions on the operation maps: staff speculation. These conditions also prompted the mapmakers to add annotations indicating uncertainty. These annotations usually took the form of a list of enemy units whose whereabouts remained unlocated.

In the third and final phase of the Gaza campaign the opposing forces reestablished a stable front and the EEF began a slow but steady advance into the Judean hills to capture Jerusalem. These conditions fostered a gradual return to the multi-source methods practiced in the first operational phase of the campaign. Prisoner and deserter statements again reasserted their preeminence in the graphical depiction of the Turkish units on the map, but by this point in the campaign the urgency of purpose for the operation maps had declined along with the Turkish ability to counterattack or shift reserves to parry British thrusts. The Turkish army had suffered significant losses in soldiers and material in the preceding weeks, substantially curtailing its capabilities. Without a credible threat from the opposing Turkish army that needed to be tracked daily, Meinertzhagen’s staff and the 7th FSC were free to use the operation maps as a canvas to tell the story of the EEF’s successes to the broader world. This they proceeded to do with the 1:500,000 scale operation maps produced after 15 November.

**Research Question 2: What was the purpose of the operation maps?**

I initially found the simplicity and cartographic silences of the operation maps to be somewhat puzzling as they seemed at first glance to be far too general for detailed military
planning. However, in the context of all of the other tactical, logistical, and strategic maps produced by the EEF, as well as the daily intelligence summaries submitted by the various intelligence staffs, the purpose of these maps became apparent. The operation maps at their best allowed the EEF intelligence staff to provide the army’s senior commanders with a clear, uncluttered, and easily understood picture of the battlefield. The intent was to keep commanders abreast of the distribution of the enemy forces in the field and make them aware of major enemy troop movements, as well as the location of friendly formations. These maps’ simplicity would have allowed a commander to determine these facts at a glance and—along with other planning and cartographic products—decide how his forces should respond to them.

But were the operation maps actually used as intended? Indeed they were in the first operational phase of the battle; Dawnay’s concern about the influence of the maps on Chetwode’s and Chauvel’s deployments on the eastern flank of the battle line indicates that the maps may have had more influence than intended some cases (see Chapter 4). Also, the attention that Meinertzhagen paid to the map production process both during the campaign and subsequently in his diary indicates that he at least believed they were essential in communicating an accurate situational awareness of friendly and enemy deployments in the Palestine theater. Maule, the 7th FSC’s commanding officer, recorded in his report on the activities of the 7th FSC that:

The Headquarters were visited daily by Major R. Meinertzhagen, D.S.O. G.S.O.2(I) whose technical knowledge proved of very great help. Besides keeping the section in close touch with the trend of affairs all ranks were greatly encouraged by the close interest taken in the work of the Company by the General Staff. On September 27th, the
Headquarters was visited by the Commander-in-Chief, who remained some time with the different Sections (Maule 1919, 6).

Meinertzhagen clearly thought the maps were important in their intended role, and the fact that they were similarly viewed by Allenby and his corps commanders during the course of the campaign speaks to their influence.

As decision-making aids in the second operational phase of the campaign the operation maps were hardly useful. The editions produced during this period were so lacking in any sort of consensus on the location of major portions of the Turkish army that at best they merely warned advancing British commanders about where un-located Turkish units might appear. Even so, it was during this period that the EEF cartographers demonstrated the most creativity in providing the army with a common operational picture (see chapter 5). The limitations of the operation mapping technique during this phase reflected the limits of technology and information available to the mapmakers, not lack of ability or motivation. In truth, the mapmakers’ ability to bring any sort of graphical clarity out of the chaos attending the EEF’s northward pursuit after the collapse of the Gaza defenses commends both these officers’ effort and intelligence.

**Strengths and Weaknesses of the Operation Maps**

The operation mapping technique as practiced by the EEF cartographic system was a thoroughly modern process analogous to the networked digital moving map displays in use by twenty-first century warriors such as the US military’s Blue Force Tracker/FBCB2 system. The major systematic differences between the modern mapping process and that employed by the EEF in the Palestine campaign in 1917 are that the modern systems not only shrink the length of

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1 The US version of this networked digital moving map technology is a dual system alternately known as FBCB2 or Blue Force Tracker. It places a networked system relying on GPS in combat vehicles and headquarters. This system transmits the location of each unit to a central headquarters. Furthermore, units equipped with the system can mark locations on the map for observed enemy positions or obstacles. These reports are filtered through a headquarters staff intelligence officer and then re-sent to all units equipped with the system so that everyone has a common picture of the battlefield situation.
the mapping cycle from twenty-four hours to less than a minute, but also distribute the maps over digital radio and satellite networks. Moreover, these differences are complimented by the enhanced information-gathering capabilities of modern sensors. These differences underscore the obvious weaknesses of the EEF’s operation maps.

The operation maps were innovative not so much in the information that they attempted to communicate but rather in the short intervals over such a prolonged period of time over which they were updated and distributed. Theses maps were a modern product for a modern war, as the scale of conflict in World War I and the new technologies its belligerents employed precluded a commander from personally observing and understanding the entirety of the battlefield as had been possible as recently as the American Civil War and Franco-Prussian War. The operation maps produced by the EEF allowed the intelligence staff to distil the large amounts of data arriving at the headquarters into a simple and easily understandable picture that commanders could substitute for the panoramic vantages sought by earlier warriors. In addition, these centrally produced maps ensured that the entire army (or at least those parts of it that received the maps) possessed a common understanding of the battlefield situation, allowing for a greater unity of purpose exemplified by the skillful way in which Allenby launched his successive blows to break the Turkish defenses while still granting his subordinates the autonomy to maneuver their formations without undue micromanagement.

The major weakness of the operation mapping technique lay in its rigid twenty-four hour cycle, which often precluded the timely dissemination of incoming information. Although the mapmakers were resourceful and conscientious, the communication and printing technology

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As battlefields have grown larger and combat more complicated, the importance of a commander’s staff has increased over the past century. Commanders do not have the time to analyze the huge amounts of raw data that modern military operations produce. They must instead rely on a staff of officers who distil the data into useful information that allows a commander to choose among a limited set of pre-determined options, much as Allenby did in this campaign (US Army 2010).
available to the EEF and the 7th FSC did not permit them to print and distribute the maps at a faster pace. One minor example of this weakness was that the 31 October edition of the map series that failed to show the British capture of the town of Beersheba (see chapter 5). Indeed, the only fix available to Meinertzhagen and his staff may have actually been to slow down the mapping process to accommodate late developments, which would have delayed the distribution of the maps.

As with all maps, the operation maps were vulnerable to faulty data. As I have already discussed, the mobile pursuit phase of the campaign saw a marked decrease in the quality and currency of data arriving at GHQ each day, resulting in operation maps that were all but useless on particularly chaotic days. The staff was limited by what their forces in the field could see, and fields of view could be blocked by surprisingly minor terrain features that hid large enemy formations on numerous occasions, not the least of which was the low coastal ridge west of Gaza that facilitated the escape of the Turkish forces from the town on the night of 6-7 November. The low quality of incoming data initially prompted Meinertzhagen and his officers to depict speculation masquerading as fact on some of the operation map editions. GHQ’s loss of communication with Desert Mounted Corps for two entire days and Meinertzhagen’s resulting over-optimistic depiction of the extent of this units advance is a case in point for this pitfall of the operation mapping technique.

The lack of data coming back from the Desert Mounted Corps meant both that its own position needed to be estimated on the 7 and 8 November operation maps and that whatever data its units were generating by ground reconnaissance and contact were lost to GHQ somewhere along the broken communication chain back between the two headquarters. Because the mapmakers lacked sufficient time to gather and analyze the data necessary for an accurate map,
the resulting product depicted a far faster advance for the British cavalry than was actually occurring on the ground. These maps also failed to depict the Turkish evacuation of the central sector of their line, an omission that likely helped facilitate the northward escape of these enemy forces (see Chapter 5). Even so, as the campaign progressed the EEF’s cartographers—to their credit—learned to graphically differentiate speculation from hard data, and also to portray uncertainty with map symbols. The relative advantages of the operation maps must have been sufficiently great for the purposes of the EEF staff because the technique reappeared in an improved form for Allenby’s final offensive that commenced in September 1918 (G.F. Bird Papers).

Did the operation maps materially influence the outcome of the 3rd Battle of Gaza? Here the record is ambiguous. While these maps were certainly influential, they did not actually alter hard facts on the ground, such as the availability of drinking water or the tenacity of enemy resistance, which shaped the course of the campaign. The German commander of the Turkish army, General Kress von Kressenstein, who was well-regarded by his British opponents, published an article after the war in a British military journal in which he commented on the German and Turkish perspective of the battle and argued that the Turkish forces were actually far weaker than the British believed (Kressenstein 1922, 509-10). Sheffy (1998) and Nuno (2012) also ascribe to this interpretation of Turkish strength and British estimates. The implication of this interpretation of the battle is that the Turkish forces were likely too weak to stop the British offensive regardless of how the British responded to Turkish maneuvers. While I agree that the Turkish army was probably somewhat weaker than the British believed, I am skeptical of claims that British maneuvers, influenced by the operation maps, were unimportant to the ultimate outcome of the 3rd Gaza campaign.
Historical Value

As historical artifacts, the operation maps are a fascinating and valuable record of the Palestine campaign. Despite their biases and limitations, these maps are a depiction of the situation on the battlefield as known at EEF GHQ at 6pm each day. Even so, they are not an objective portrayal of where all the units on the battlefield actually were located at a given time. As such, the operation maps provide a valuable insight into the decision-making of the British command because they show what these officers believed at the time to be the situation on the ground. They are less valuable for interpreting how the campaign actually unfolded because of their inaccuracies and significant cartographic silences. However, I found that mapping out the problem by overlaying and combining the relatively simple operation maps with other charts, including digital elevation models and other historical maps, served to reveal important details about the course of the campaign and provided insight that would not otherwise be evident (see Chapter 4).

The operation maps also influenced the development of subsequent military mapping in the United States Army. James T. Kelly, an infantry officer in the US Army, wrote a paper for the Command and General Staff School (CGSS) in 1933 in which he indicated that copies of the operation maps were available to military researchers in America, and that the CGSS advocated modeling US intelligence maps after the 7th FSC’s operation maps (Kelly 1933, 39). Further investigation of American inter-war and World War II operational-level military maps may reveal how influential the operation maps were to the development of US military cartography, possibly providing a bridge to the already discussed present-day networked digital map systems.

Numerous individuals and units central to the Palestine campaign preserved these maps in various archives, including Meinertzhagen, Chetwode, and each of the EEF’s corps GHQs.
The continual reappearance of these maps in diverse archives and academic publications speaks to their value as historical resources. What made them valuable tools in an operational context also makes them useful as historical artifacts. They are a ready-made and easily digested means of understanding in broad terms the unfolding of the 3rd Battle of Gaza and the Palestine campaign. Their use was sufficiently widespread and their influence sufficiently strong—at least in the early days of the battle—for me to assert that no historical understanding of this campaign is complete without including these maps.

**Value of the Woodward Framework**

Woodward’s (1974) suggested framework for studying cartographic systems proved to be a valuable and appropriate resource for investigating the EEF’s production and use of the operation maps. A survey of scholars who have cited Woodward’s 1974 article reveals that it has been undeniably influential in cartographic scholarship but rarely as rigorously applied as I have attempted to do in this project. This framework is particularly well-suited for the study of military cartography because military units are in effect self-contained cartographic systems that produce and use their own maps at a prodigious rate to solve all manner of problems ranging from combined arms assaults to casualty evacuation to landscape beautification. A more widespread and rigorous application of this technique in cartographic scholarship would benefit the field and provide further insight into the subjects studied.

Furthermore, both Woodward’s framework and the operation mapping technique have application beyond the history of cartography and the study of military geography because any rapidly changing situation that needs to be mapped on an ongoing basis is appropriate for this method, and the Woodward framework is a recipe for designing organizations that both produce and use these maps. Certainly military applications come to mind, but also disaster relief
scenarios such as the Fukushima reactor disaster or the response to the 2010 Haiti earthquake (an operation in which I participated). Modern communications and sensors have mitigated many of the shortfalls experienced by the EEF cartographers, and the technique is already institutionalized in modern militaries around the world. An application of this framework to continuous mapping situations could help to streamline these cartographic processes by identifying and organizing key actors, phases, and information flows.

Further Research

My examination of the EEF position maps—while built on the foundation of other scholars who have studied in depth other aspects of the cartography in this campaign—revealed other areas that would benefit from further study. Specifically, the operation map technique reappeared in 1918 briefly for the EEF’s abortive summer raids across the Jordan River and later in an improved form for Allenby’s final offensive that effectively and decisively destroyed the Turkish army on the Palestine front and resulted in the capture of Damascus. To date I have found no single collection of all these later maps as exists for the 3rd Gaza map series, but I did find sufficiently numerous copies of these newer maps to lead me to believe that they too were produced on a daily basis during active operations. These maps were obviously a more thoroughly planned and improved evolution of the 1917 operation maps in that they were all printed on a single base map specifically meant for this purpose that was appropriate for covering the entire course of the campaign. These new base maps contained a locator inset to track strategic intelligence about enemy forces not actually in the theater but still near enough to intervene eventually, and they dedicated another inset for text notes about un-located units and qualitative data, a systematic improvement over the 1917 maps. Most of the copies of the 1918 maps that I found are located in the G.F. Bird Papers collection at the Imperial War Museum.
In addition, my investigation found that the EEF used maps for a broad range of purposes, ranging from trench maps of minute detail and organization, to maps of water resources and communication networks on the Palestine front. Additionally, the EEF used full-sized terrain models—created from aerial photographs and direct observation—of important Turkish fortifications to both plan and rehearse their assault on the enemy line. This is another very modern application of military cartography practiced by the EEF, and dovetails nicely with Alistair Pearson’s (2002) research about World War II terrain models. Also, little is known of the parallel Turkish and German cartography on this front outside of the few scraps of captured material located in British archives. Indeed, the Turkish forces were certainly conducting their own parallel operation mapping effort. Meinertzhagen included in his diary a captured Turkish/German map of the Palestine front prior to the Gaza offensive that showed with disheartening detail (from the British perspective) that the Turkish headquarters possessed nearly as complete a picture of the British deployments as the British did of their own (Figure 6.1).

While many of the German records and archives were destroyed during World War II, the Turkish archives might be relatively complete, though the chaotic end to the Palestine campaign in 1918 and the destruction of the Turkish army on that front might have precluded complete records from ever reaching the archives. Regardless, someone with access to the Turkish archives might well discover a great deal about parallel Turkish cartographic activity on the Palestine front. Any of these subjects—and doubtless many others—could provide a rich and interest field for further historical research.
Figure 6.1. Facsimile of a German map of the Gaza front titled “Turkish Egyptian Border Area” that is remarkably similar in form and content to the British 7th FSC operation maps. This particular map was accidentally dropped by a German pilot while flying over the front and retrieved by Meinertzhagen, who preserved it in his diary (Meinertzhagen 1917, Vol. 20: 35).
Appendix A. Selected Further Readings in Palestine Campaign Military History


## Appendix B: Multiple Hypothesis Results for Each Edition of the Operation Maps

<table>
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<tr>
<th>Date of Operation Map</th>
<th>Unit or Annotation</th>
<th>Primary Hypothesis</th>
<th>Secondary Hypothesis</th>
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| <strong>19-Nov</strong> | &quot;Probably a Strong Flank Guard...&quot; | Ground Recon. and Contact | Aerial Reconnaissance | GHQ IS 19/11/17 |
| <strong>20-Nov</strong> | 24th Division | Aerial Reconnaissance | GHQ IS 20/11/17 |
| 12th Depot Regiment | Aerial Reconnaissance | GHQ IS 20/11/17 |
| VII Army | Conjecture | Aerial Reconnaissance | GHQ IS 20/11/17 |</p>
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Appendix C. Archival Methods and Reproducing Maps

Several scholars had told me that “weird things happen in the archives,” that you just cannot predict what sort of archive rules, equipment challenges, or acts of god might conspire to upset your well-planned research agenda. Furthermore, I had also been told that “research is messy,” even though finished products of research are usually neat, even sterile. I found this to be true in my own archival research while photographing the most central and important documents for this thesis: the original 7th FSC operation maps. In this appendix I will relate my difficulties photographing these maps in the archives, and also in digitally reproducing them for this thesis. I hope this brief discussion of my processes and methods, both in the archives and later during my data analysis, may be of use to other researchers who find themselves in similar circumstances.

Photographing the Operation Maps

As I noted in Chapter 3, my equipment and I were thoroughly prepared upon arriving at the British National Archives at Kew, London. Furthermore, those archives and the people who run them are thoroughly efficient, friendly, and accommodating. I was provided with an assigned desk of sufficient size with a built-in outlet and, more importantly, an attached camera stand for photographing documents. These conditions, along with an efficient system for ordering up records, meant that I was able to conduct my research with minimal wasted time or energy. The one exception to this positive experience lay in my attempts to photograph the operation maps. The 7th FSC operation maps are physically large documents, measuring approximately a yard by a yard and a half. As such, I was required to go to the archive’s map reading room to examine them. This was another well-equipped and fully-staffed area, with larger tables that also held built-in camera stands. Unfortunately the operation maps were slightly larger even than these tables, and the archive rules state that researcher may not allow parts of documents to hang
off the edge of the table. Even so, I decided that four or five inches of overhang must not be too important, and so I placed the maps on one of these tables, screwed my camera into the stand, and began photographing. These captures produced some very high quality pictures of the first several operation maps before the “weird thing” happened.

One of the archive’s blue-coated attendants came over and informed me politely but firmly that my documents were hanging off the edge of the table and would I please move them to the larger table over there, yes that one without the camera stand. Obviously I complied, and since the rules also precluded me from placing any items (including my own camera stand) directly on the documents, I was relegated to standing on a chair, leaning as far as I could over the maps, and attempting capture as clear of a picture of the map as possible. Unsurprisingly, the maps I photographed in this way were of noticeably lower quality than the ones I had photographed using the camera stand. One way I tried to compensate for this was by photographing the maps in sections instead of whole. This worked for some of the maps, but not for all, particularly not for those editions printed on the 1:250,000 and 1:168,960 scale base maps. At the time I didn’t think much of the differing quality of these captures, but they became much more important as I began to write my thesis.

**Reproducing the Operation Maps**

The size and scale of the operations maps precluded including them whole as figures in this thesis, and the quality of the later photographs made this impractical anyway. Therefore, I considered three different methods for reproducing portions of these maps to illustrate the points I was discussing. These were: 1) using an essentially un-enhanced facsimile of the map, 2) using Adobe Photoshop to enhance the maps’ legibility and attractiveness, and 3) completely reinterpreting the maps by creating my own reproductions using Adobe Illustrator. These
alternatives forced me to weight the relative importance of showing the original maps about which I was writing, maintaining the clear flow of my narrative with legible maps, and adding my own interpretations and analysis to the original charts. In the end I settled on a compromise between the latter two options. I will discuss each of these methods below.

![Figure C.1](image)

**Figure C.1.** Example of an unenhanced portion of a facsimile of the 28 October Operation map. Approximately original size.

The first method I considered was to include excerpts of the operation maps that were essentially un-altered from the photographs I had captured in the archives. To do this, I first took the original digital photograph and used the perspective crop tool in Adobe Photoshop to remove the distortion caused by the angle at which the photograph had been taken. I then cropped the photo to the area I wanted to highlight and adjusted the size of the image to fit on a page. This process resulted in products that contained some shadows and blurred or illegible text, and were generally unsightly (Figure C.1).
The second method I employed was to enhance the original images using Adobe Photoshop to improve legibility and aesthetics. I used two different processes to do this, depending on the quality and area of the original photograph, which I was trying to enhance. The first process was to adjust the color levels to remove the background shadows from the image and increase the contrast of the symbols. Unfortunately, this would usually “wash out” many of the map symbols, and so I was forced in most cases to laboriously touch up many or all of the map symbols in black, red, and green, darkening them to prevent this washout effect (see Figure C.2).

The second process was to use Photoshop’s magic wand tool to select the variously colored symbols in turn and re-color them with uniform shades of black, green, or red. I then used the magic wand tool to select the background color and replace it with white. This process had its own pitfalls insofar as the tool would often select (or fail to select) pixels other than the ones I had intended, forcing me to still go in and retrace much of the map’s text and symbology.
Even so, this process was essential on larger examples and the later maps that contained far more black background symbols. I also added text to the resulting images to indicate my analysis and interpretation. This method generally produced legible and attractive maps.

I decided to employ these enhanced maps as figures in the body of my thesis because they preserved the original form of the operation maps, which I considered important. However, the quality of the original photo captures and the labor involved in enhancing them meant that I could generally include only small areas of the original maps as figures, which I believe could be somewhat disorienting for a reader who is unfamiliar with the geography of this campaign, as I was when I began this project. Furthermore, the original operation maps omitted information important for understanding the progress of the campaign, particularly topography. Therefore, I employed a third method of reproduction, which would allow me to legibly show the entire area of the original maps and also add some additional relevant information.

In this third method I used Adobe Illustrator to superimpose the original operation map captures onto topographical maps (see Chapter 3). I first traced the maps’ limited terrain features into one layer of the file. I then traced the unit and text symbols for each day into individually separate layers. This allowed me to turn layers on or off to compare unit positions, analyze the importance of terrain (rough view-shed analysis in Chapter 3), and track the daily progress of the battle. This produced a series of maps that approximated the information content of the original operation maps but that could be reproduced in whole within the page-size constraints of this thesis. I decided to include these reinterpreted operation maps as a series in Appendix D.
Figure C.3. Reinterpretation of the Beersheba sector of the 28 October operation map, enlarged from the Adobe Illustrator file used to create several other figures in this thesis.

Each methods had drawbacks, which imposed a tradeoff between remaining true to the original material and enhancing and reinterpreting key details to increase legibility. The results show that a combination of methods that enhance and reinterpret original documents may sometimes be necessary in order to study a digitally captured document and to clearly communicate findings of the research. Furthermore, as others have told me, researchers need to be thoroughly prepared and also flexible when approaching archival research. Even the friendliest archives can pose unanticipated problems that require creativity to overcome.
Appendix D. Operation Map Reproductions

28 October
29 October
30 October
1 November
6 November
7 November
8 November

[Map of military operations with various units and locations marked, including Ashkelon, Gaza, Beersheba, and other strategic points.]
9 November
10 November
12 November
13 November
14 November
15 November
16 November
17 November

Enemy Units Unlocated
26th Div.
53rd Div. both these Divs and
16, 24, 27 are very weak.

Mediterranean Sea
18 November

Enemy Units Unlocated
53rd Div. both these Divs and 16, 24, 26, 27 are very weak.
19 November
21-22 November
23 November
Units Unlocated: 16, 19, 20

Mediterranean Sea

24-25 November
26 November
27 November
28 November

2 German and 1 Turkish cavalry regiments may be in the area.
29 November
30 November – 2 December

Unlocated:
2 Cavalry regiments and elements of 150th regiment arriving from Amman
3 December

Unlocated:
2 Cavalry regiments and elements of
150th regiment arriving from Amman
4 December

Unlocated:
2 Cavalry regiments and elements of 150th regiment arriving from Amman
5 December

Unlocated:
2 Cavalry regiments and elements of 150th regiment arriving from Amman
Unlocated:
2 Cavalry regiments and elements of 150th regiment arriving from Amman

6 December
9 December
11 December
12-14 December
15 December

Unlocated:
3rd Cavalry Division

Note:
1 Battn. German Infantry &
1 Regt. Turkish Infantry
(1st Div.) marching on Tul
Keram from via Jenin
& El Afule respectively
Date of arrival unknown
16-19 December

Unlocated:
3rd Cavalry Division

Note:
1 Battn. German Infantry &
1 Regt. Turkish Infantry
(1st Div.) marching on Tul
Keram from via Jenin
& El Afule respectively
Date of arrival unknown
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**Published Primary Sources**


**Secondary Sources**


Vita

NAME OF AUTHOR: Joel Douglas Radunzel

PLACE OF BIRTH: Minneapolis, Minnesota

DATE OF BIRTH: 19 July, 1983

GRADUATE AND UNDERGRADUATE SCHOOLS ATTENDED:

    United States Military Academy, West Point, NY

DEGREES AWARDED:

    Bachelor of Science in Human Regional Geography