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The American Expeditionary Forces, Communications and the First World War: A Case Study in Inter-Allied Learning

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Abstract: By adopting an inter-organisational learning model to the case study of the American Expeditionary Forces (AEF) Signal Corps during the First World War, this article seeks to position the neglected subject of inter-allied learning within the broader context of the contentious debates surrounding the AEF's training and military operations. Employing American, British, and French sources, the article examines the experiences of the AEF Signal Corps, an organisation whose role and influence historians of the AEF have largely overlooked and failed to fully appreciate. It argues that although recent interpretations of the AEF's receptivity to certain British and French methods are generally correct, they underestimate the varied and interconnected nature of the driving influences that shaped the AEF's learning processes, as well as the collaborative and reciprocal characteristics of inter-allied learning more broadly.

Keywords: American Expeditionary Forces (AEF), Signal Corps, First World War, inter-allied learning, military adaptation

Writing shortly after the First World War, Colonel Alvin Voris recalled his initial experiences as the Director of the First Corps Signal School, American Expeditionary Forces (AEF) in October 1917:

> I had been given extraordinary opportunities since arriving in France to visit both the English and French fronts from time to time, and to observe their lines of information. During intervals between school terms, the several instructors [of the Signal School] were sent to these fronts and to the several signal schools operated by our allies. By a system of evening conferences with the instructors of the First Corps Signal School, we outlined the courses of the school by taking what we thought best from the English and French methods

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> and adapted them to our particular needs, as relates to our instruments, and our organization as it then existed.[1]

Voris' testimony as to the value of the information gleaned from his battle-hardened allies is significant, for it stands in almost complete contrast to the views held by many senior AEF commanders. Both the commander-in-chief of the AEF, General John Pershing, and Colonel [later Major-General] Harold Fiske, chief of the AEF's General Headquarters (GHQ) Training Section, for instance, considered British and French tactical advice to be »a positive detriment«,[2] »of little value«,[3] and »a serious handicap in the training of our troops«.[4]

In seeking to understand why Pershing, Fiske and other senior AEF commanders held such views, historians have suggested three main explanations: First, official US Army doctrine in 1917, commonly referred to as »open warfare«, was at fundamental odds with that of its allies.[5] Three years of modern trench warfare had forced the British and French armies to develop tactical and operational methods that emphasised meticulously-planned set-piece attacks, employing massive amounts of firepower in a combined-arms approach for limited objectives.[6] Senior AEF commanders deplored such methods which went against the very principles enshrined in US Army regulations: self-reliant infantry, dependence upon the rifle and bayonet, unlimited objectives, and an aggressive and

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1 »Colonel Alvin C. Voris, Signal Corps. Personal Narrative«, 28 January 1919, History of the Signal Corps, AEF, Vol. 3, Record Group 120, Entry 204, Box 43, National Archives and Records Administration (NARA), College Park. Voris would go on to serve as Chief Signal Officer of I Corps and Third Army respectively. After the war he became the ninth commanding officer of the Army Signal School at Fort Monmouth, New Jersey. See: Historical Office, Office of the Deputy Chief of Staff for Operations and Plans, U.S. Army CECOM, *A History of Army Communications and Electronics at Fort Monmouth, New Jersey 1917–2007* (Washington, D.C., 2008), 150.

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2 John Pershing Diary, 25 August 1918, John J. Pershing Papers, mss35949/2, Library of Congress (LOC), Washington, D.C.

3 Pershing, John J. *My Experiences in the World War*, Vol. 2 (New York: F.A. Stokes, 1931), 106.

4 »Memorandum for the Chief of Staff. Subject: Training«, 4 July 1918, U.S. Department of the Army, Historical Division, *United States Army in the World War 1917–1919*, Vol. 14 (Washington, D.C., 1991), 304 [hereafter *USAWW*].

5 Groteluesche, Mark E. *The AEF Way of War: The American Army and Combat in World War I* (Cambridge: Cambridge University Press, 2007), 30–36.

6 Prior, Robin, and Trevor Wilson. *Command on the Western Front: The Military Career of Sir Henry Rawlinson 1914–1918* (Oxford: Basil Blackwell 1992); Goya, Michel. *La Chair et L'Acier. L'Armée Française et L'Invention de la Guerre Moderne 1914–1918* (Paris: Tallandier, 2004).

manoeuvrable style of warfare.[7] Second, the intransigence of senior AEF officials was also the result of their own assessment of the allied predicament in 1917. Simply put, British and French methods had thus far failed to secure a decisive victory, so why imitate them? As the commander of the AEF's 77th Division, Major-General Robert Alexander, later observed, American commanders wanted to avoid »contagion« of what was perceived to be an allied »doctrine of defeat and failure«.[8] Third, and finally, by adhering to a unique doctrine of open warfare, Pershing sought to deflect repeated allied calls for US manpower to be amalgamated into existing British and French units.[9] Embracing allied methods wholeheartedly would have made it difficult to justify the creation of a distinctive and independent American Army,[10] which in turn would have »obscured the American contribution to victory«.[11]

Despite these motivations, the notion that the AEF rejected *all* aspects of allied military assistance has been challenged by some historians. Robert Bruce, Mark Grotelueschen, Jim Beach, and James Doty have argued that although some AEF commanders opposed British and French interference in US tactical doctrine, they were more receptive to allied armour, artillery, airpower, and intelligence methods, largely because these were areas that the US Army either lacked any formal organisation before the war, or had fallen behind in the technological developments that had taken place between 1914 and 1917.[12] In light of these interpretations, the dichotomy between the views held by Voris and senior AEF commanders as to the significance of allied military assistance raises two interesting and, as yet,

7 War Department, Office of the Chief of Staff, *Field Service Regulations United States Army 1914, Corrected to July 31, 1918* (Washington, D.C., 1918), 73–97. For additional context, see Bonura, Michael. *Under the Shadow of Napoleon: French Influence on the American Way of Warfare from Independence to the Eve of World War II* (New York: NYU Press, 2012), 200–212.

8 Alexander, Robert. *Memories of the World War, 1917–1918* (New York: Macmillan, 1931), 32.

9 McCrae, Meighen. *Coalition Strategy and the End of the First World War: The Supreme War Council and War Planning, 1917–1918* (Cambridge: Cambridge University Press, 2019), 139–150.

10 Trask, David. *The AEF and Coalition Warmaking, 1917–1918* (Lawrence, KS: University Press of Kansas, 1993), 5–12.

11 Nenninger, Timothy K. »American Military Effectiveness in the First World War«, in *Military Effectiveness: Vol. 1. The First World War*, ed. by Allan R. Millett and Williamson Murray (Cambridge: Cambridge University Press, 2010), 116–156, 126.

12 Bruce, Robert B. *A Fraternity of Arms: America & France in the Great War* (Lawrence, KS: University Press of Kansas, 2003), 126–128; Grotelueschen, Mark E. *Doctrine Under Trial: American Artillery Employment in World War I* (Westport, CT: Praeger, 2001); Beach, Jim. »Origins of the Special Intelligence Relationship? Anglo-American Intelligence Co-operation on the Western Front, 1917–18«, in *Intelligence and National Security*, 22/2, 2007, 229–249; Doty, James L. »›With A Little Help from Our Friends‹: The Development of Combat Intelligence in the American Expeditionary Forces, 1917–1918«, unpublished Ph.D. thesis, Ohio State University, 2010.

unexplored questions. To what extent was there a genuine desire within the AEF, and the Signal Corps in particular, to learn from its allies, with regards to communications in modern warfare? If there was a genuine desire to learn from the British and French, as Voris suggests, what form did this learning take? Answering these questions has important implications both for our understanding of the AEF's training and military operations, and for the ongoing academic debates surrounding the nature of military learning and adaptation more broadly.

In 1919, one of the principal findings of the AEF Superior Board on Organization and Tactics, convened to ascertain the main lessons to be learned from the war, was that »communications were absolutely vital to military success«.[13] Despite this official verdict, and the fact that recent studies have reached similar conclusions with regards to the operations of the British and German armies,[14] the subject of communications has received remarkably little attention in the scholarship on the AEF. While this may be symptomatic of a general lack of interest in the First World War in the United States,[15] scholarly debates assessing the AEF's military effectiveness, as well as its contribution to the allied victory in 1918, have been the subject of several important recent works. Striking a middle ground between the initially orthodox view that the AEF successfully overcame some initial teething problems to become a very efficient fighting force, making a decisive contribution to the outcome of the war,[16] and a revisionist interpretation that painted a picture of the AEF as an incapably-led, poorly-trained, and inadequately-equipped army, unable to adapt to the challenges of modern warfare,[17] historians such as Grotelueschen, Richard Faulkner, and Edward Lengel have provided

13 US Army, AEF, »Report of the Superior Board on Organization and Tactics«, 1 July 1919, 95, Combined Arms Research Library (CARL), Fort Leavenworth, Kansas.

14 Hall, Brian N. *Communications and British Operations on the Western Front, 1914–1918* (Cambridge: Cambridge University Press, 2017); Cowan, Anthony. »Genius for War? German Operational Command on the Western Front in Early 1917«, unpublished Ph.D. thesis, King's College London, 2016, 185–209.

15 Lamay Licursi, Kimberly J. *Remembering World War I in America* (Lincoln, NE: University of Nebraska Press, 2018); Keene, Jennifer D. »Remembering the ›Forgotten War‹: American Historiography on World War I«, in *The Historian*, 78/3, 2016, 439–468.

16 Pershing was instrumental in establishing this interpretation. See Pershing, *My Experiences* (see note 3). It was subsequently reinforced, albeit with some minor criticism, in Coffman, Edward M. *The War to End All Wars: The American Military Experience in World War I* (New York: Oxford University Press, 1968). The most recent addition to this school is perhaps Wawro, Geoffrey. *Sons of Freedom: The Forgotten American Soldiers who Defeated Germany in World War I* (New York: Basic Books, 2018).

17 For examples, see Nenninger, »American Military Effectiveness« (see note 11); Braim, Paul F. *The Test of Battle: The American Expeditionary Forces in the Meuse-Argonne Campaign* (Newark, DE: University of Delaware Press, 1987); Rainey, James W. »Ambivalent Warfare: The Tactical Doctrine

more balanced and nuanced assessments.[18] Within this body of work, however, the coverage given to communications has been limited in terms of its focus,[19] detail and source material.[20] Moreover, while historians have examined the relationship between the AEF and its allies,[21] including aspects of the military training provided by the British and French, the communications dimension to this narrative is missing.[22] Given how significant communications were in determining battlefield success, this article seeks to make a first move towards filling an important gap within the historiography by assessing the influence of allied communications doctrine, organisation and technology upon the training undertaken by AEF Signal Corps units.

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of the AEF in World War I«, in *Parameters*, 13/3, 1983, 34–46; and Rainey, James W. »The Questionable Training of the AEF in World War I«, in *Parameters*, 22/4, 1992–93, 89–103.

18 Grotelueschen, *The AEF Way* (see note 5); Faulkner, Richard S. *The School of Hard Knocks: Combat Leadership in the American Expeditionary Forces* (College Station, TX: Texas A&M University Press, 2012); Faulkner, Richard S. *Pershing's Crusaders: The American Soldier in World War I* (Lawrence, KS: University Press of Kansas, 2017); Lengel, Edward G. *Thunder and Flames: Americans in the Crucible of Combat, 1917–1918* (Lawrence, KS: University Press of Kansas, 2015).

19 The two most well-known aspects are the role of the female telephone switchboard operators and the post-war influence of the long-distance telephone circuits established by the Bell Telephone System employees of the Signal Corps. See Cobbs, Elizabeth. *The Hello Girls: America's First Women Soldiers* (Cambridge, MA: Harvard University Press, 2017); Lavine, A. Lincoln. *Circuits of Victory* (New York: Doublecki, 1921); and John, Richard R., and Léonard Laborie, »›Circuits of Victory‹: How the First World War Shaped the Political Economy of the Telephone in the United States and France«, in *History and Technology*, 35/2, 2019, 115–137.

20 Nenninger, Timothy K. »›Unsystematic as a Mode of Command‹: Commanders and the Process of Command in the American Expeditionary Forces, 1917–1918«, in *Journal of Military History*, 64/3, 2000, 761–765; Orsi, Douglas J. »The Effectiveness of the U.S. Army Signal Corps in Support of the American Expeditionary Force Division and Below Maneuver Units during World War I«, unpublished MA thesis, Fort Leavenworth, 2001; McEvoy, William P. »Communications in World War I: The Meuse-Argonne Campaign of 1918«, in *A Companion to the Meuse-Argonne Campaign*, ed. by Edward G. Lengel (Chichester: Wiley & Sons, 2014), 410–424; Clark, Paul W., and Laurence A. Lyons, *George Owen Squier: U.S. Army Major General, Inventor, Aviation Pioneer, Founder of Muzak* (Jefferson, NC: McFarland, 2014), 171–204.

21 Woodward, David R. *Trial by Friendship: Anglo-American Relations 1917–1918* (Lexington, KY: University Press of Kentucky, 1993); Keene, Jennifer D., *Doughboys, the Great War, and the Remaking of America* (Baltimore: Johns Hopkins University Press, 2001), 105–131; Bruce, *A Fraternity* (see note 12); Kempshall, Chris. *British, French and American Relations on the Western Front, 1914–1918* (London: Palgrave Macmillan, 2018).

22 The overwhelming focus has been on the training of the infantry and artillery. See: Rainey, »The Questionable Training« (see note 17); Grotelueschen, *Doctrine* (see note 12), 1–29; Grotelueschen, *The AEF Way* (see note 5), 25–58; Yockelson, Mitchell A. *Borrowed Soldiers: Americans under British Command, 1918* (Norman, OK: University of Oklahoma Press, 2008), 62–78; Faulkner, *The School of Hard Knocks* (see note 18).

The case study of AEF Signal Corps training also provides an opportunity to examine the neglected subject of inter-allied learning.[23] Contrary to the traditional view that sees military organisations as resistant to change unless forced to do so by external pressures in extreme circumstances,[24] over the past 30 years a rich and growing body of literature has argued that many armed forces, particularly those undertaking operations post-1945, have proven fluid, agile and adaptable to change.[25] Most of these studies focus upon two main issues: first, identifying *where* learning takes place; and, second, understanding *how* learning occurs. With regards to the former, generally speaking, this line of enquiry has identified three principal sources of change: »top-down« change, instigated primarily by outsiders, often in peacetime;[26] »bottom-up« change, usually resulting from successful adaptation by frontline units in wartime;[27] and, »horizontal« change, involving the successful exchange of new ideas between neighbouring formations.[28] In terms of understanding how military organisations learn, scholars have differentiated between »formal« learning processes, which are institutionally sponsored and officially codified practices, such as training schools and doctrinal publications, and »informal« learning methods, which are tacit, inadvertent and localised endeavours, such as face-to-face meetings.[29] Fundamentally, however,

23 For an overview of the literature, see Griffin, Stuart. »Military Innovation Studies: Multidisciplinary or Lacking Discipline?«, in *Journal of Strategic Studies*, 40/1–2, 2017, 196–224. Calls for more research into inter-allied learning have been made by Philpott, William, and Jonathan Boff, »Introduction: Transforming War, 1914–1918«, in *British Journal for Military History*, 5/2, 2019, 10 f; Dyson, Tom. »The Military as a Learning Organisation: Establishing the Fundamentals of Best-Practice in Lessons-Learned«, in *Defence Studies*, 19/2, 2019, 124; and Coticchia, Fabrizio, and Francesco Niccolò Moro, »Learning from Others? Emulation and Change in the Italian Armed Forces since 2001«, in *Armed Forces & Society*, 42/4, 2016, 696–718.

24 Posen, Barry. *The Sources of Military Doctrine: France, Britain and Germany between the World Wars* (Ithaca, NY: Cornell University Press, 1984).

25 See, for example, Russell, James. *Innovation, Transformation and War: Counterinsurgency Operations in Anbar and Ninewa Provinces, 2005–2007* (Stanford, CA: Stanford University Press, 2011); and Kollars, Nina A. »War's Horizon: Soldier-Led Adaptation in Iraq and Vietnam«, in *Journal of Strategic Studies*, 38/4, 2015, 529–553.

26 Rosen, Stephen. *Winning the Next War: Innovation and the Modern Military* (London: Cornell University Press, 1991).

27 Farrell, Theo. »Improving in War: Military Adaptation and the British in Helmand Province, Afghanistan, 2006–2009«, in *Journal of Strategic Studies*, 33/4, 2010, 567–594; Catignani, Sergio. »›Getting COIN‹ at the Tactical Level in Afghanistan: Reassessing Counter-Insurgency Adaptation in the British Army«, in *Journal of Strategic Studies*, 35/4, 2012, 513–539.

28 Foley, Robert T. »A Case Study in Horizontal Military Innovation: The German Army, 1916–1918«, in *Journal of Strategic Studies*, 35/6, 2012, 799–827.

29 Foley, Robert T., Stuart Griffin and Helen McCartney, »›Transformation in Contact‹: Learning the Lessons of Modern War«, in *International Affairs*, 87/2, 2011, 253–270; Catignani, Segio. »Coping

it is argued that the most important factor determining how well armed forces respond to challenges in wartime is military culture, defined by Williamson Murray as »the sum of the intellectual, professional, and traditional values of an officer corps«.[30] Although much of this literature has been written by political scientists, a number of historians have made important contributions to the field, including those examining British and German military learning and adaptation during the First World War.[31]

In nearly all of the above works, though, the overwhelming focus has been on how military organisations learn from their own experiences, what in the social sciences is termed »intra-organizational learning«. However, organisations can also learn by drawing upon the knowledge of others, whether they be partner institutions or rival firms.[32] »Inter-organizational learning«, as it is known, is particularly prevalent in organisations that have limited previous operational experience, and which have the ability and willingness to »identify, assimilate, and utilize« the knowledge of a more experienced and resourceful partner.[33] In many respects, this was the situation the AEF found itself in in 1917, a situation made more unique by the fact that the AEF did not undertake its first major offensive operation until the end of May 1918, nearly 14 months after the US declared war on Germany.[34] Without first-hand operational experience, the AEF was forced to turn to its allies to help prepare it for the challenges ahead.[35]

However, a closer reading of modern organisational theory suggests that the driving influences behind inter-allied learning might not be so clear-cut. Inter-

with Knowledge: Organizational Learning in the British Army?«, in *Journal of Strategic Studies*, 37:1, 2014, 30–64.

30 Murray, Williamson. »Innovation: Past and Future«, in *Military Innovation in the Interwar Period*, ed. by Williamson Murray and Allan R. Millett (Cambridge: Cambridge University Press, 1996), 300–328, 312f. See also: Farrell, Theo. »The Dynamics of British Military Transformation«, in *International Affairs*, 84/4, 2008, 777–807.

31 Foley, Robert. »Dumb Donkeys or Cunning Foxes? Learning in the British and German Armies During the Great War«, in *International Affairs*, 90/2, 2014, 279–298; Fox, Aimée. *Learning to Fight: Military Innovation and Change in the British Army, 1914–1918* (Cambridge: Cambridge University Press, 2018); Boff, Jonathan. *Haig's Enemy: Crown Prince Rupprecht and Germany's War on the Western Front* (Oxford: Oxford University Press, 2018).

32 Holmqvist, Mikael. »Experiential Learning Processes of Exploitation and Exploration within and between Organizations: An Empirical Study of Product Development«, in *Organization Science*, 15/1, 2004, 70–81.

33 Mariotti, Francesca. »Exploring Interorganizational Learning: A Review of the Literature and Future Directions«, in *Knowledge and Process Management*, 19/4, 2012, 215–221.

34 Millett, Allan R. »Cantigny, 28–31 May 1918«, in *America's First Battles, 1776–1965*, ed. by Charles E. Heller and William A. Stofft (Lawrence, KS: University Press of Kansas, 1986), 149–185.

35 Beach, »Origins« (see note 12); Doty, »›With a Little Help‹« (see note 12).

organisational learning depends upon an organisation's »absorptive capacity«, defined as »the ability to recognise the value of new, external knowledge, assimilate it, and apply it to commercial end«.[36] While much will hinge upon the willingness and initiative of the »learner firm«, it is also acknowledged that the »teacher firm« plays a pivotal role. Successful inter-organisational learning, therefore, should be seen as »a joint outcome of the interacting organizations' choices and abilities to be more or less transparent and receptive«.[37] With this in mind, it has been argued that three key factors influence successful inter-organisational learning. The first of these is the *susceptibility* of the learner to the ideas of the teacher, measured in terms of the former's motivation to learn and the state of its existing capabilities. Broadly speaking, the student firm will be more receptive to external knowledge if it lacks relevant operational experience and if its existing resources are deemed inadequate or inappropriate. The second key factor is the *infectiousness* of the teacher firm's knowledge, methods and resources. Emulation is more likely if the existence of solutions to perceived problems are made readily available, if said solutions are deemed successful, and if the teacher firm is regarded as reputable. The third, and final, factor is *social proximity*, which measures how easily information moves between organisations. Generally speaking, inter-organisational learning is greatly facilitated when organisations operate within the same working environment and perceive themselves as sharing similar structures, goals, and culture.[38]

By applying this model to the case study of the AEF Signal Corps, this article seeks to position the neglected subject of inter-allied learning within the broader context of the debates surrounding the AEF's training and military operations. Employing American, British, and French sources, it assesses the key motives behind the Signal Corps' desire to learn from its European allies, as well as examining the formal and informal learning processes that underpinned Signal Corps training, measuring in particular the influence of British and French communications doctrine, organisation, and technology. The evidence presented suggests that the driving influences shaping the AEF's learning methods were more varied and interconnected than hitherto thought, and that inter-allied learning in

36 Lane, Peter J., and Michael Lubatkin, »Relative Absorptive Capacity and Interorganizational Learning«, in *Strategic Management Journal*, 19/5, 1998, 461–477, 462.

37 Larsson, Rikard, Lars Bengtsson, Kristina Henriksson and Judith Sparks, »The Interorganizational Learning Dilemma: Collective Knowledge Development in Strategic Alliances«, in *Organization Science*, 9/3, 1998, 285–305, 289.

38 Greve, Henrich R. »Interorganizational Learning and Heterogeneous Social Structure«, in *Organization Studies*, 26/7, 2005, 1025–1047.

general should be viewed as a collaborative and reciprocal endeavour, rather than a one-way process.

I. Susceptibility

When the US declared war on Germany on 6 April 1917, the British, French, and German armies on the Western Front had been locked in a strategic stalemate for just over two-and-a-half years. Unprecedented state mobilisation had resulted in all three fielding huge conscript forces. Opposing a German Army nearly three million strong at the beginning of 1917 was a French Army of 2.8 million soldiers, organised in 107 divisions, and a growing British Army some 1.6 million strong in 56 divisions.[39] The concentration of such forces in a relatively compact area was just one reason for the military stalemate. Three other factors also contributed to the longevity of trench warfare: first, the overwhelming superiority of defensive firepower, most notably artillery; second, the absence of an effective mobile arm of exploitation; and, third, the lack of secure and reliable »real-time« communications.[40] Although no army had proved capable of breaking the deadlock, it was not for want of trying. Contrary to popular myth, the Western Front was a dynamic learning environment, where all sides had been busy developing and employing new tactics, technologies and operational procedures.[41] Such developments meant that by 1917 it was more than possible for an attacker to break into a defender's forward position. However, transforming the *break-in* into a decisive *breakthrough* remained elusive, and one of the main reasons for this lay in the tenuous state of battlefield communications.

During the heat of battle, telephone and telegraph lines were destroyed by shellfire; radio (wireless) sets were bulky, fragile and transmitted information in Morse code only; visual signalling via lamps, flags and heliograph was difficult and fraught with danger; and message carriers – runners, carrier pigeons and dogs – were vulnerable and time-consuming means. Without accurate and timely information, reserves were often committed at the wrong time and place, or not at all, artillery barrages raced ahead of exposed infantry, and thus opportunities to

39 Greenhalgh, Elizabeth. *The French Army and the First World War* (Cambridge: Cambridge University Press, 2014), 176.

40 Todman, Dan, and Gary Sheffield, »Command and Control in the British Army on the Western Front«, in *Command and Control on the Western Front: The British Army's Experience 1914–18*, ed. by Gary Sheffield and Dan Todman (Stroud: Spellmounts, 2004), 1–11, 5–7.

41 For an overview of some of these developments, see *British Journal for Military History*, 5/2, 2019, Special Issue: Transforming War, 1914–1918.

exploit initial successes were lost, the defender was given ample time to plug any gaps, and the momentum of the attacking forces ground to a halt. All armies invested enormous resources into developing better methods of communication, along with a corresponding growth in the size and complexity of their communications infrastructure. Between 1914 and 1918, for instance, the British Army's Signal Service grew from an establishment of just under 2,400 officers and men to an organisation numbering nearly 42,000.[42] In short, any attempt to secure victory on the battlefield had to address the challenges posed by inadequate communications.

When measured against these developments, the US Army in 1917 was woefully unprepared, inexperienced, and ill-equipped for the task ahead; factors that made the Signal Corps particularly susceptible to allied methods.[43] The entire US Army was just 200,000 strong, of which two-thirds were Regulars and one-third National Guardsmen.[44] Structurally, the largest combat organisation was the regiment, while in terms of tactics and weaponry, the army was »more suited to fighting Apaches than Europeans«.[45] The situation was equally unfavourable with regards to the Signal Corps. The communications contingent of the Signal Corps consisted of 55 officers and 1,570 men, divided into four field signal battalions, four field telegraph battalions, and six depot companies.[46] A field signal battalion, initially comprising 239 officers and men, constituting a headquarters and supply section and three companies (wire, radio, and outpost), was assigned to each AEF division, responsible for maintaining communications between divisional and regimental headquarters.[47] Field telegraph battalions, meanwhile, would ensure communications between the AEF's base ports and divisional headquarters.[48] In the event, the prescribed personnel and material assigned to the initial field signal and field telegraph battalions proved totally

42 Hall, *Communications* (see note 14), 22.

43 For a critical assessment of the state of unpreparedness of the US Army in 1917, see »The Present Situation in Regard to Military Assistance by the United States«, 17 May 1917, WO106/467, The National Archives (TNA), Kew.

44 Ayres, Leonard P. *The War With Germany: A Statistical Summary* (Washington, D.C., 1919), 16.

45 Woodward, David R. *The American Army and the First World War* (Cambridge: Cambridge University Press, 2014), 6.

46 Robbins Raines, Rebecca. *Getting the Message Through: A Branch History of the U.S. Army Signal Corps* (Washington, D.C.: CMH, 1996), 168. The Signal Corps was also responsible for meteorology, photography and, until May 1918, aviation.

47 For more detail, see *Field Battalion Signal Corps. Tables of Organization and Equipment 1917* (Washington, D.C., 1917), 7; and *Drill Regulations for Signal Troops* (Washington, D.C., 1917), 169–214.

48 Lavine, *Circuits* (see note 19), 102–104.

inadequate, and resulted in significant increases and modifications.[49] It was a problem compounded by the lack of suitable pre-war combat experience.

The most recent experience the Signal Corps could draw upon was the army's Punitive Expedition in Mexico in 1916–17, in which, over the course of 11 months, a haphazard force led by Pershing failed to track down and eliminate the revolutionary leader Francisco »Pancho« Villa and his guerrilla forces.[50] In a report to his superiors in mid-March 1916, Pershing judged the army's signal equipment to be »unserviceable and communication absolutely unsatisfactory«. In June he noted that the cavalry's pack radio sets were »of little value«, and radio communication in general was deemed »very difficult and uncertain«.[51] The demand for telegraph and telephone communication »grew more and more pressing and insistent« as the campaign wore on, but the long lines of uninsulated wire laid along the ground proved difficult to maintain. The Signal Corps was forced to construct a permanent poled system of insulated wire but, although 677 miles of telegraph and 642 miles of telephone lines were laid, it remained unfinished when the campaign ended.[52] While the Expedition undoubtedly provided much needed experience for the Signal Corps, the conditions in Mexico were a far cry from the realities of the war on the Western Front.

The only other environment in which Signal Corps personnel could hone their skills before 1917 was on the training ground. The importance of communications in the Russo-Japanese War of 1904–05 contributed to the decision to open an Army Signal School at Fort Leavenworth, Kansas, in 1905.[53] Despite having been established in 1860, according to one instructor, to most army officers »the Signal Corps itself was a vague, if not unknown, quantity«.[54] While the reputation of the Signal Corps certainly improved before 1917, instruction at the Army Signal School was largely theoretical and of a highly technical nature. Laboratory-based

49 *Report of the Chief Signal Officer to the Secretary of War 1919* (Washington, D.C., 1919), 6.

50 Prieto, Julie Irene. *The Mexican Expedition 1916–1917* (Washington, D.C.: CMH, 2016).

51 Thomas, Robert S., and Inez V. Allen, *The Mexican Punitive Expedition under Brigadier General John J. Pershing, United States Army, 1916–1917* (Washington, D.C., 1954), Ch. 3, 23; Appendix D, 18.

52 Megill, Lieutenant-Colonel Sebring C. »Frontline Signal Communications«, in *Signal Corps Information Bulletin*, 14, June 1922, 24; Raines, *Getting the Message Through* (see note 46), 150.

53 On the value of communications in the Russo-Japanese War, see: Sullivan, M.C. »Signal Service in Modern War«, in *Scientific American*, 91, September 1904, in *Military Signal Communications*, Vol. 2, ed. by Paul J. Scheips (New York: Arno, 1980), no pagination; Toepfer, Captain Carl. »Technics in the Russo-Japanese War«, in *Professional Memoirs, Corps of Engineers*, 2/6, 1910, 174–201; Peek, Captain E.D. »The Necessity and use of Electrical Communications on the Battle-Field«, in *Journal of the Military Service Institution of the United States*, 49, December 1911, 336–339.

54 Knowles, A.C. »The Army Signal School: The Training School of the New Combatant Arm«, in *Journal of the Military Service Institution of the United States*, 42, July–August 1908, 31.

learning was the order of the day, with student officers required to »dismantle, ›take to pieces‹ and reassemble« signal equipment, as well as attend courses on »nearly all the forms of signalling which would ordinarily be utilised by the mobile army in time of war«.[55] Although there were opportunities to test signalling practices in annual exercises and manoeuvres, not only were troops often handicapped by a shortage of equipment, but the conditions under which the exercises took place were hardly conducive to the environment in which the Signal Corps would find itself in in 1917–18.[56]

Indeed, Signal Corps doctrine in 1917 broadly adhered to the mobile, offensive-minded doctrine espoused by the army. *Field Service Regulations* specified that information could be transmitted via four mediums: wire (telegraph, buzzer, and telephone); visual (flag, heliograph, and night lamp); radiotelegraph; and messenger (foot, mounted, cycle, motorcar, and aeroplane). While it stated that »all available means are utilised to facilitate the transmission of information«, particular emphasis was given to messengers for all short-range messages (up to half a mile).[57] For longer distances, since providing communications in mobile operations was considered the »first and most important duty« of the Signal Corps, field signal battalions were to be »stripped of impedimenta« and required to carry »apparatus which will enable them to lay wires along the ground at a trot or a gallop«.[58] However, acknowledging that »difficulties increase rapidly with the lengths of lines involved«, the Chief Signal Officer, Brigadier-General George Scriven, stated in 1914 that the Signal Corps was doing all it could to »improve portable radio apparatus«.[59] By 1917, though, the two most-portable radiotelegraph apparatus the army possessed were the one-ton Wagon Set, drawn by four mules and incorporating an »80-foot jointed mast«, and the Pack Set, designed primarily for cavalry use, requiring three mules to carry the load which included an 85-foot antenna.[60] The British Army had gone to war in 1914 with very similar equipment and soon realised it was totally unsuited to the conditions of trench warfare.[61]

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55 »Report of Major L.D. Wildman, Director of Army Signal School«, in *Annual Report of Brigadier General H.A. Greene, Commandant the Army Service Schools, Fort Leavenworth, Kansas, 1915* (Leavenworth, KS, 1915), 43–52.

56 Saltzman, Major C. Mark. »The Signal Corps in War«, in *Arms and the Man*, 46, April 1909, in *Military Signal Communications* (see note 53), no pagination.

57 *Field Service Regulations* (see note 7), 21–24.

58 Saltzman, »The Signal Corps in War« (see note 56).

59 *Report of the Chief Signal Officer, US Army, 1914* (Washington, D.C., 1914), 510–512.

60 War Department, *Radiotelegraphy. U.S. Signal Corps, Revised October, 1916* (Washington, D.C., 1917), 85–127.

61 Hall, Brian N. »The British Army and Wireless Communication, 1896–1918«, in *War in History*, 19/3, 2012, 290–321, 298.

Despite these developments, neither the Signal Corps nor the US Army as a whole were devoid of information regarding the war on the Western Front. Between 1915 and 1917, US military observers and attachés in Europe provided detailed reports on nearly all aspects of the fighting, including communications. As early as March 1915, the allied use of aeroplanes as a means of facilitating communication between advancing infantry and their headquarters, as well as improving the direction of artillery fire, was keenly noted.[62] Reports detailing the latest developments in portable, man-carried radio sets were also made, as too were reports submitted on the intricacies of the growing trench telephone and telegraph systems.[63] Some British and French tactical notes, reports and manuals were also acquired, while translations of captured German Army documents detailing aspects of its communications system were procured.[64] At the same time these reports were being commissioned, army officers were engaging in their own analysis of the ongoing developments in Europe within the pages of the various service journals. Of particular interest was infantry-artillery cooperation and the methods employed by the European armies to ensure communication between these two vital arms was maintained.[65] One article in the *Infantry Journal* admitted that the issue of communications in the »fire-swept zone« was »only generally treated in the [US] regulations and leaves much to be desired as to how we may definitely expect smaller units to be actually and promptly brought in touch with one another during combat«.[66] As Scriven exclaimed in 1915, »it has been shown by events abroad that the service of the lines of information has become a major factor in the conduct of military affairs, if it is not now, indeed, the para-mount element in the control of modern wars. Without information and knowledge of events and conditions as they arise, all else must fail«.[67]

62 Margetts, Captain N.E. »Use of Aeroplanes in Reconnaissance, Observations and Direction of Artillery Fire«, 25 March 1915, Reports of the Office of the Military Observers with the French Army, 1915–17, RG120/444/3464, NARA.

63 Margetts, Captain N.E. »Portable Wireless Apparatus«, 16 June 1915; Logan, Major James A. Jr. »Lines of Information«, 10 April 1916, RG120/444/3469, NARA.

64 For example, »Experiences Gained from the September Offensives on the Fronts of the Sixth and Third Armies [Translation of a German Document]«, 5 November 1915, RG120/444/3464, NARA.

65 Merrill, Walter M. »The Employment of Artillery in the Present European War«, in *Field Artillery Journal*, 6/3, 1916, 412f.; Anon. »Some Lessons of the War from the Latest Available Information«, in *Journal of the Military Service Institution of the United States*, 41, January 1917, 182–190.

66 Palmer, Lieutenant Albert K.C. »Inter-communication on the Battlefield«, in *Infantry Journal*, 12/1, 1915, 92.

67 Scriven, Brigadier-General George P. *The Service of Information, United States Army* (Washington, D.C., 1915), 10f.

Although there was no shortage of information from Europe regarding the changing character of modern warfare, Signal Corps doctrine, mirroring US Army doctrine as a whole, simply stagnated, largely because of »an unwillingness to believe the Army would soon have to fight on such a scale or in such an environment«.[68] While the Signal Corps did make some preparations shortly before the US declared war, such as forging closer links with the civilian telecommunications companies in late 1916, and establishing the Signal Officers' Reserve Corps and Signal Enlisted Reserve Corps,[69] it did not alter the fact that in practically every area – organisation, training, doctrine, and equipment – the US Army entered the First World War »with ideas of battle communication not much advanced beyond those of the period of the [Russo-]Japanese war«.[70] The anachronistic nature of US Army communications when compared to those of the British and French armies in 1917 would appear, therefore, to be the most obvious factor influencing the Signal Corps' desire to learn from its allies. Moreover, with only a small cadre of experienced officers and NCOs to preside over the training of the soon-to-be mass citizen army, it is little wonder Pershing had to turn to his allies for help.[71] However, this susceptibility alone was not sufficient to guarantee AEF emulation of allied communication practices. The Signal Corps needed to be convinced that what the British and French had developed was superior and successful. Furthermore, information pertaining to allied communications doctrine, equipment, and organisation needed to be made readily available.

II. Infectiousness

Given that Pershing and other senior AEF commanders deplored the supposed defensive-minded »heresy of the trench warfare cult«,[72] it might be assumed that British and French communication practices had little appeal. However, it has been argued that within complex organisations different patterns of learning can often be exhibited, »with the organizational core less subject to change and other units more responsive to stimuli from other organizations«.[73] Indeed, when Major Ruby Garrett was appointed Chief Signal Officer of the US 42nd Division in January

68 Grotelueschen, *The AEF Way* (see note 5), 24.
69 Lavine, *Circuits* (see note 19), 63; Powell, Major E. Alexander. *The Army Behind the Army* (New York: C. Scribener's Son, 1919), 5.
70 Sawyer, Captain C.N. »Infantry Signal Communications«, in *Infantry Journal*, 17/5, 1920, 474.
71 Faulkner, *The School of Hard Knocks* (see note 18), 169.
72 Alexander, *Memories* (see note 8), 2.
73 Coticchia/Moro, »Learning from Others?« (see note 23), 701.

1918, he immediately applied for a pass that would permit him to travel to the British and French sectors to see first-hand how his allied counterparts ran their communication systems. Although the division approved his application, it was turned down by AEF GHQ. Undeterred, Garrett took matters into his own hands and, using the pass as a means of identification, first visited the British line west of Rheims, before travelling to the French sector between Toul and Nancy. From the »extensive notes and sketches« he made while on these visits, Garrett drew up a plan that »constituted the basis on which the Signal personnel of the 42nd Division was trained and functioned during the remainder of the war«.[74] Garrett's experience was illustrative of a genuine desire exhibited throughout the Signal Corps to learn as much as possible from their battle-hardened allies, a desire that stemmed in large measure from an organizational culture that fostered intellectual curiosity, creative thinking and pragmatism, and was motivated further by the recognition of superior and successful allied developments.

When the AEF's Chief Signal Officer, Colonel [later Brigadier-General] Edgar Russel, and his staff made their first inspections of British and French signal equipment in June 1917, they were »frankly amazed at the complex, novel, and ingenious devices that the war had produced«.[75] This was particularly the case with regards to radio development. Whereas the Signal Corps entered the war with radio equipment »about as easy to move around as an old fashioned square piano without casters«,[76] three years' intensive research had enabled the allies to develop a range of smaller earth-induction and man-portable radio sets, incorporating the latest advances in vacuum tube and battery technology.[77] Recognising the inherent value of such equipment, the Signal Corps' Research and Inspection Division immediately took steps to liaise with its allied counterparts in order to procure such devices, not only to ensure that the first-arriving AEF divisions were suitably equipped, but also to serve as a starting point for independent research.[78] »Emergency orders« for electric signalling lamps, telephone switchboards, field wire, and other »important signal developments of the war« were also placed with the allied governments, although ultimately it was decided that the majority of signal equipment would be obtained from French rather than British sources,

74 Reilly, Henry J. *Americans All. The Rainbow at War: Official History of the 42nd Rainbow Division in the World War* (Columbus, OH: F.J. Heer, 1936), 106–108.

75 Lavine, *Circuits* (see note 19), 129.

76 Ibid., 520.

77 *Report of the Chief Signal Officer 1919* (see note 49), 128; Petzing, Captain Edwin R. »Development of Radio in the United States Army«, in *Signal Corps Bulletin*, 42, March 1928, 35f.

78 »History of the Division of Research and Inspection, Signal Corps – AEF«, 1919, RG120/2041/43, NARA.

since French devices were generally deemed to be superior.[79] While eventually much of this equipment would be adapted according to American standards, the technological advances made by the British and French between 1914 and 1917 served as an important stimulus for the Signal Corps' desire to learn from its allied counterparts.

The one notable exception to this was telephony. In 1917, the US led the world in telephone engineering, due mainly to the recent successful application of vacuum tube repeaters to its transcontinental telephone network.[80] Upon their arrival in Europe, many AEF officers complained about the poor state of the French telephone system.[81] Enlisting the engineering talent of the civilian telecommunications firms, most notably the employees of the Bell Company, the Signal Corps quickly set about constructing an American-based telephone system along the Services of Supply (SOS) to connect the base ports with army headquarters.[82] The superiority of this system was not lost on the British and French. Colonel [later Major-General] George Gibbs, commanding the AEF's communications in the Zone of Advance, recalled after the war the »astonishment« of the Allied generalissimo, Marshal Ferdinand Foch, »when he talked for the first time from Treves to Paris and then to London and to Brest«.[83] Whilst installing a telephone repeater near British GHQ at Montreuil-sur-Mer in June 1918, one Signal Corps NCO remembered being »absolutely bombarded with questions about the *repeater* from a group of interested British officers; what it would do, how it worked [...] and they showed a lively interest in the proceedings«.[84] Such exam-

79 »Colonel Edgar Russel to Chief Signal Officer of the Army, Washington, D.C.«, 10 July 1917, »Extract of Colonel Russel for July 1917«, Records Relating to Signal Corps Equipment, RG111/77/1, NARA. For Allied scientific cooperation in general, see MacLeod, Roy. »Secrets Among Friends: The Research Information Service and the ›Special Relationship‹ in Allied Scientific Information and Intelligence, 1916–1918«, in *Minerva*, 37/2, 1999, 201–233.

80 The repeaters improved the quality of speech over long distances. See John/Laborie, »›Circuits‹« (see note 19), 115. In Europe, the telephone and telegraph networks were state-owned, whereas in the US they were owned and operated by private companies, which spurred innovation. See Purves, T.F. »Telephones in England and the USA«, in *Post Office Electrical Engineers' Journal*, 4, 1911–12, 98f.

81 »Correspondence in Connection with Visit to United States of Lieutenant-Colonel J.B. Pomey of the French Army«, August 1917, RG111/77/1, »John Quekemeyer to Major Dennis Nolan«, 20 September 1917, Correspondence of Major John C. Quekemeyer, RG120/52/3491, NARA.

82 »Signal Corps Activities. Headquarters, Services of Supply, A.E.F., Tours, France, June 23, 1919«, *USAWW*, Vol. 15, 103f.; Crowell, Benedict. *America's Munitions 1917–1918* (Washington, D.C., 1919), 568–571.

83 Gibbs, Major-General G.S. »Signal Service in the Theatre of Operations«, in *Signal Corps Bulletin*, 43, June 1928, 5.

84 Lavine, *Circuits* (see note 19), 396.

ples serve to illustrate the reciprocal nature of inter-allied learning, a point reinforced by two French officers shortly after the war, who argued that when it came to telephone organisation and operation, »we have everything to learn from the American Signal Corps«.[85]

Nevertheless, while the Signal Corps could draw upon the expertise of the civilian telephone companies, maintaining communications under battle conditions was »quite a different proposition from undisturbed commercial construction«.[86] From their initial conferences with allied representatives, as well as observations of British and French frontline practices, senior Signal Corps officers quickly identified the inadequacies of US communications doctrine. Acknowledging that allied methods had »advanced in an unbelievable manner«,[87] they set about collecting »a mass of information« regarding allied communications doctrine.[88] In September 1917, the Intelligence Division of the Signal Corps was established and entrusted with the collection, translation and distribution of British and French publications.[89] The British and French were only too eager to oblige Signal Corps' requests for written material, not least to »prevent them from falling into the various pitfalls that had beset the career of the pioneers«.[90] With regards to British training and technical publications, for example, Pershing and his British counterpart Field Marshal Sir Douglas Haig agreed that requests for existing manuals were to be made via the British liaison officer at AEF GHQ, and supplied with the number of copies required, for a cost. A single copy of publications no longer in circulation would be provided to the AEF, but it was up to the latter to undertake any re-printing.[91]

Fortunately for the Signal Corps, shortly before the US declared war the British Army had published its first authoritative communications doctrine manual, *SS. 148 Forward Inter-communication in Battle*.[92] The initial Signal Corps impression of the manual was very positive, one report noting it contained »very

85 Colonel de Chambrun and Captain de Marenches, *The American Army in the European Conflict* (New York: Macmillan, 1919), 219.

86 Dienst, Captain Charles F., et. al., *History of the 353rd Infantry Regiment, 89th Division, National Army, September, 1917–June, 1919* (Wichita, KS: 353rd Infantry Society, 1921), 228.

87 *Report of the Chief Signal Officer 1919* (see note 49), 22.

88 »History of the Signal Corps, Vol. 2«, 17, RG120/2041/42, NARA.

89 *Report of the Chief Signal Officer 1919* (see note 49), 17–19.

90 Priestley, R.E. *The Work of the Royal Engineers in the European War, 1914–19. Vol. 4: Signal Service in the European War of 1914 to 1919 (France)* (Chatham: W.&J. Mackay, 1921), 301.

91 Haig to Pershing, 18 November 1917, RG120/52/3492, NARA.

92 *SS. 148 Forward Inter-communication in Battle* (March 1917); Hall, *Communications* (see note 14), 83–87. On British doctrine more generally, see Beach, Jim. »Issued by the General Staff: Doctrine Writing at British GHQ, 1917–1918«, in *War in History*, 19/4, 2012, 464–491.

complete instructions for keeping up communications during and immediately after an assault. These instructions have been evolved from over two years of experience in actual warfare and probably cannot be improved on at the present time«.[93] In November 1917 the British updated *SS. 148* in the form of *SS. 191 Intercommunication in the Field*, which was similarly judged by the Signal Corps as providing »a good basis for communications«.[94] Although both manuals were studied and adopted by the Signal Corps, the US War Department printing 20,000 copies of *SS. 148* alone,[95] neither was revised to reflect Signal Corps organisation and terminology.[96] To add further confusion, the Signal Corps also translated and disseminated French communications manuals, most notably *Liaison Instructions for All Arms* in July 1917, and *Liaison for All Arms* in June 1918. The latter, based on the December 1917 French edition, became »the official manual on this subject« for the AEF, partly because the Signal Corps favoured French communications equipment, but also because the AEF's deployment in the Lorraine sector placed it side-by-side the French Army, thus making interoperability smoother.[97] In all, just over 63,000 copies of the manual were printed.[98]

Although the formal adoption of *Liaison for All Arms* was an attempt to codify best practice, the fact that both British and French publications had been in circulation up until the summer of 1918 meant that »a number of ways for handling communications grew up in the different divisions«.[99] As one British instructor observed in September 1918, »ambiguity is no doubt increased by the simultaneous teaching of British, French, and American methods«.[100] While some field signal battalions seem to have embraced allied methods unreservedly,[101] others

93 »Notes on Liaison in Modern Warfare. Compiled from the Latest Sources, April 1917«, 3, Army Signal School (Issuances on Various Subjects), RG120/405/1794, NARA.

94 »Lecture 16: The British Signal Service«, AEF Army Signal School, Miscellaneous Files, RG120/407/1796, NARA.

95 *Annual Report of the Public Printer* (Washington, D.C., 1918), 141.

96 Both *Forward Intercommunication in Battle* (Washington, D.C., May 1917) and *Intercommunication in the Field* (Washington, D.C., May 1918) were word-for-word copies and, as such, made reference to organisations that were uniquely British, such as the Royal Flying Corps and the Royal Artillery.

97 McAndrew, Brigadier-General James W., AEF Chief-of-Staff. Foreword in *Liaison for All Arms* (Washington, D.C., June 1918).

98 »American Expeditionary Forces Publications«, 30 June 1919, *USAWW*, Vol. 14, 329.

99 »Report of the Superior Board«, 95, CARL.

100 »Final Report of the 3rd Course of the American Staff College, by Lt. Col. Sir T. Cuninghame, Bart. Chief British Instructor«, 11 September 1918, WO106/499A, TNA.

101 »Liaison in the 1st Division, A.E.F.«, 2 August 1918, US Army, 1st Division, *World War Records of the First Division A.E.F. (Regular)*, Vol. 7 (Washington D.C., 1930), no pagination [hereafter *WWRFD*].

adopted British or French practices »with such modifications as suited the characteristic qualities of our troops«.[102] However, while acknowledging that British and French signal units had standardised their methods to a certain extent,[103] officer candidates at the AEF's Army Signal Schools were advised that »it may be found necessary to depart from them at times and places«, since »conditions vary greatly in different sectors and conditions within the same sector may differ considerably at different times«.[104] Thus, while British and French publications served as important templates for AEF communications doctrine, Signal Corps officers were expected to be flexible and pragmatic in their application, traits that some historians have argued underpinned not only the combat performance of some of the AEF's more capable divisions in 1918,[105] but also the British Army's successful learning processes throughout the war.[106]

III. Social Proximity

Although the assimilation of allied doctrinal and technical publications represented an important institutional learning process for the Signal Corps, their distribution »was made on a somewhat confused and limited basis and made it difficult for the average officer to possess what he needed and almost impossible for the non-commissioned officer and soldier even to see the manuals«.[107] In other words, they were not sufficient alone to guarantee successful knowledge transfer. However, the *social proximity* of the AEF and the British and French armies, measured both in terms of their geographical propinquity on the Western Front as well as their cultural and organizational similarities,[108] provided additional

102 Taylor, Emerson Gifford. *New England in France, 1917–1919: A History of the Twenty-Sixth Division, USA* (Boston, MA: Houghton Mifflin, 1920), 51.

103 It was noted there existed »a striking analogy« between British, French and German signal regulations. See »Lecture 49: Liaison Service in the German Army«, April 1918, RG120/404/1, NARA.

104 »Lecture 29: Signal Communication in the Regimental Area«, Army Signal Schools, AEF, France. Second Course – Officers' School, Monday, February 11, 1918, to Saturday, March 23, 1918, RG120/404/4, NARA.

105 Groteluesch en, *The AEF Way* (see note 5), 343–352.

106 Fox, *Learning to Fight* (see note 31), 240–250.

107 Kreidberg, Marvin A., and Merton G. Henry. *History of Military Mobilization in the United States Army 1775–1945* (Washington, D.C.: USDA, 1955), 289.

108 Greve, »Interorganizational Learning and Heterogeneous Social Structure« (see note 38), 1027 f.

scope to establish other formal and informal learning mechanisms aimed at acquiring and disseminating allied best practice.

Arguably the most important bureaucratic learning platform established by the AEF was its training school system. Sceptical of the quality of the initial training undertaken in the United States,[109] in the autumn of 1917 Pershing established a number of specialist schools in France, under the supervision of the GHQ Operations and Training Sections, aimed at preparing officers and NCOs for the realities of combat.[110] Training schools were established at army, corps and divisional levels, complementing a standardised three-month training regimen for all newly-arriving divisions: one month of technical and tactical training behind the lines; a second month training in a quiet frontline sector under allied tutelage; and a third month devoted to open warfare manoeuvres.[111] What did this training programme entail for the Signal Corps and how influential was allied input?

According to the Director of the AEF's Army Signal Schools, Colonel William McCornack, in September 1917 it was recognised that, given the dearth of experienced officers and NCOs, »Signal Schools should be organised where the functions of Signal troops would be taught utilising the services, not only of the few of our own officers who had been able to familiarise themselves with conditions by serving with the British or French, but also utilising the services of especially well-informed British and French instructors, who were cheerfully supplied [to] us by our Allies«.[112] Three levels of school were established: the Army Signal Schools opened at Langres on 1 December 1917; three Corps Signal Schools were set up between October 1917 and August 1918;[113] and most divisions formed their

109 On the stateside training of the US Army in 1917–18, see Johnson, Douglas. »A Few ›Squads Left‹ and off to France: Training the American Army in the United States for World War I«, unpublished Ph.D. thesis, Temple University, 1992. See also: Mastriano, Douglas V., and David T. Zabecki, »U.S. Army Professional Military Education in the Early 20th Century«, in *Pershing's Lieutenants: American Military Leadership in World War I*, ed. by David T. Zabecki and Douglas V. Mastriano (Oxford: Osprey, 2020), 325–331.

110 Pershing, *My Experiences* (see note 3), Vol. 1, 134f.

111 The urgency created by the German offensives in early 1918, however, meant that only the first four AEF divisions (1st, 2nd, 26th, and 42nd) came close to completing this schedule. All subsequent divisions underwent drastically reduced and uneven training programmes. See Faulkner, *The School of Hard Knocks* (see note 18), 141–148.

112 »Final Report by the Director, Army Signal Schools, American Expeditionary Forces Conducted at Langres (Haute Marne) France from December 1st, 1917 to January 31st, 1919«, RG120/402/1, NARA.

113 The First Corps Signal School was established at Gondrecourt in October 1917. The Second Corps Signal School opened at Chatillon-sur-Seine in January 1918, and the Third Corps Signal School commenced in August 1918 at Clamecy. *Report of the Chief Signal Officer 1919* (see note 49), 88.

own signal schools during the war,[114] with the 2nd Field Signal Battalion (1st Division) establishing the first in September 1917.[115] This school model was based upon a »cascade training« or »teach the teacher« system, similar to that employed in the British and German armies,[116] whereby those undertaking their training higher up the system would then pass on their knowledge to those below them.[117]

Through this training system, Signal Corps officers and NCOs gained valuable exposure to allied best practice from experienced British and French officers who acted as instructors. Although the majority of the instructors at the Army and Corps Signal Schools were American, the allied instructors played an active role in curriculum delivery.[118] This mainly took the form of lectures on specialist subjects, particularly the practicalities of establishing and maintaining communications under battle conditions, leaving American instructors to provide lectures and conduct experiments and demonstrations related mainly to the technical aspects of communications equipment.[119] At the Army Signal Schools, candidates were told early on that »the main points« concerning the handling of messages »will undoubtedly be those which have been found necessary by Allied Armies«.[120] At the Second Corps Signal School, meanwhile, not only was the syllabus laid out in accordance with the principles advocated in *Liaison for All Arms*, but the French instructor, Lieutenant Boucher, initiated a »War Game« for each cohort; an interactive lecture employing visual tools and a large screen map to illustrate the system of communication in a division during an engagement.[121] In all, 1,472 officers and men attended the Army Signal Schools, while 504 officers and 969 men passed through the Second Corps Signal School alone, and they were the beneficiaries of a system that sought to impart the latest knowledge

114 »Memorandum Governing Divisional Training«, 18 July 1917, Miscellaneous and Historical Files, RG120/443/1, NARA.

115 »Personal Narrative of Lt. Col. O.S. Albright, S.C.«, 4 January 1919, RG120/2041/43, NARA.

116 Fox, *Learning to Fight* (see note 31), 94; Foley, »Dumb Donkeys or Cunning Foxes? (see note 31), 290.

117 *Report of the Chief Signal Officer 1919* (see note 49), 81; »The General Principles Governing the Training of Units of the American Expeditionary Forces«, 9 April 1918, *USAWW*, Vol. 2, 296f.

118 One British and four French instructors were employed at the Army Signal Schools, while at the Second Corps Signal School, just one British and one French instructor worked alongside 23 American instructors. »Final Report by the Director, Army Signal Schools«, RG120/402/1, NARA; »Report of the Director of the Signal School, Second Corps Schools, Chatillon-sur-Seine, France, 1918–1919«, 19 April 1919, 3f., Cat. No. 1986.19.4, National World War I Museum and Memorial (NWWMM), Kansas City, M.O.

119 »Army Signal Schools. Second Course – Officers' School«, RG120/404/4, NARA.

120 »Lecture 3: Handling of Messages«, Army Signal Schools. First Course – Officers' School, Monday, January 7th, 1918, Saturday, February 2nd, 1918, RG120/404/2, NARA.

121 »Report of the Director of the Signal School, Second Corps Schools«, 59, 105, NWWMM.

concerning military communications practice, derived in no small measure from the teaching received from experienced allied instructors.[122]

Allied influence was even more pronounced at the divisional level. Notwithstanding those divisions that were taught exclusively by the British as part of the arrangements agreed between Pershing and Haig in early 1918,[123] the majority of divisional-level training, and especially the training of the first four AEF divisions, was undertaken with French assistance.[124] In late August 1917, the 2nd Field Signal Battalion began its instruction under the tutelage of Captain Edmond Kissell of the French 8th Engineers. According to one signal officer, Kissell »was to teach us the game of signal communication as the French had learned it« and, with the assistance of several French NCOs, the signal battalion »gleaned much information from him of the French methods and apparatus«.[125] This involved classroom demonstrations, lectures, and guidance provided during exercises.[126] With regards to the latter, in early October the 1st Division commander, Major-General William Sibert, explained to Pershing that the signal arrangements »which seem satisfactory to us frequently meet with severe and absolute correct criticism from the French officers observing the exercises. They will quickly explain to our satisfaction how impossible or dangerous the [...] liaison arrangements [...] would be under battle conditions«.[127] This feedback would then be discussed at a conference the following week and any resulting modifications to communication practices forwarded to brigade and regimental commanders.[128] It was a similar experience for the 1st Field Signal Battalion (2nd Division), whose French instructor, Lieutenant Charles DeLauriston, also of the 8th Engineers, »proved of wonderful assistance to the outfit. He was a man who had been through the game and knew the whys and wherefores of means of liaison and his services [...] were invaluable«.[129]

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122 *Report of the Chief Signal Officer, 1919* (see note 49), 87–89.

123 Under the terms of the agreement, six US divisions were to be transported to France and trained by the British. See »Agreement to Provisions of Training with British«, 31 January 1918, *USAWW*, Vol. 3, 38f.; »Training of American Divisions Attached to British Troops, April 1918«, WO106/466, TNA; Yockelson, *Borrowed Soldiers* (see note 22), 19f.

124 »Request for French Officers to Assist in Training«, 10 October 1917, *USAWW*, Vol. 3, 495.

125 »Personal Narrative of Lt. Col. O.S. Albright«, RG120/2041/43, NARA.

126 Autrey, Major John L. »Communication in the First Division«, in *Signal Corps Bulletin*, 96 (May–June 1937), 5f.

127 »Sibert to Pershing«, 8 October 1917, *WWRFD*, Vol. 12.

128 »Memorandum«, 22 September 1917, *WWRFD*, Vol. 20.

129 »History of the First Field Battalion, Signal Corps«, 23 February 1919, GHQ, G-3, Special Operations Reports, RG120/270/21, NARA. For acknowledgement of the value of French assistance by later-arriving Field Signal Battalions, see: »History of the 304th Field Signal Battalion during

This French influence extended into the second phase of Pershing's training programme, as field signal battalions gained first-hand experience of maintaining communications in a quiet sector of the frontline. In late October and early November 1917, the »Signal Corps novices« of the 1st Division »worked on the lines side by side with their French instructors« in the Luneville sector, east of Nancy.[130] Similarly, while the 101st Feld Signal Battalion (26th Division) trained alongside the French in the Soissons region in early 1918, »enlisted men were sent for instruction to the French earth telegraphy, radio, and pigeon stations«.[131] Although some historians have questioned whether the training received in these »live and let live« sectors adequately prepared the AEF for the challenges it would later face,[132] the evidence from Signal Corps records indicates that most units did experience hostile enemy action. Notwithstanding a number of German trench raids,[133] whilst working alongside its French instructors in the Vosges mountains in late February 1918, for example, the 117th Field Signal Battalion (42nd Division) had plenty of »opportunity to perform urgent work under shellfire«.[134]

Working in close proximity to the French Army also enabled the Signal Corps to establish a number of informal and interpersonal learning processes designed to acquire as much information as possible from its allied counterparts. These ranged from localised conferences, meetings, frontline visits and observations, to spontaneous face-to-face encounters between signal officers.[135] At the First Corps Signal School, »a system of ›get-together‹ meetings was held during each course [...] where not only students and instructors met over refreshments, but all officers it was possible to get from signal battalions in the line and in training areas«. As the School's Director observed, »this might seem a small matter, but I attribute much of the success of the American Signal Corps in the war to these social gatherings«.[136] The language barrier does not appear to have been a serious problem for the Signal Corps. As Russel later noted, »the Americans wanted to

Combat 1918«, n.d., RG120/270/3332, NARA; and, Hood, Dellman O. »History of the 307th Field Signal Battalion«, in *Official History of the 82nd Division American Expeditionary Forces, ›All America‹ Division, 1917–1919* (Indianapolis, IN: Bobbs-Merrill, 1919), 275f.

130 »History of the Signal Corps«, Vol. 2, 23, RG120/2041/42, NARA.

131 *Report of the Chief Signal Officer 1919* (see note 49), 377. This practice continued for later-arriving Field Signal Battalions. See, for example, »History of the 319th Field Signal Battalion«, n. d., RG120/443/708, NARA.

132 Faulkner, *Pershing's Crusaders* (see note 18), 334.

133 For example, »German Raid of Night of November 2–3, 1917«, 5 November 1917, *WWRFD*, Vol. 12.

134 »History of the Signal Corps«, Vol. 2, 37, RG120/2041/42, NARA.

135 *Report of the Chief Signal Officer 1919* (see note 49), 106, 369–377.

136 »Voris. Personal Narrative«, RG120/2041/43, NARA.

learn and the French were eager to teach, so difficulties of language soon were overcome«.[137] This may partly explain why Sibert was able to inform Pershing in October 1917 that »the work of the specialties [...] develop very much faster than the instruction in tactics proper«.[138]

These people-centred methods were rooted in the shared goals of the allies, as well as the historic and cultural ties between the US and French armies.[139] A sense of common identity among the specialists in their respective signal organisations also seems to have spurred cooperation. Within the higher, scientific arena, Lieutenant-Colonel Herbert Shreeve, Head of the Signal Corps' Research and Inspection Division, had already worked alongside Colonel Gustave-Auguste Ferrié, technical director of the French *Radiotelegraphie Militaire*, in his capacity as a Bell Company engineer during the 1915 trans-Atlantic radio experiments.[140] This cooperation endured throughout the war, with Shreeve remarking that Ferrié »never failed to assist our organisation in any way [...] His habitual mode of addressing us as ›Mes chers camarades‹, was no empty phrase«.[141] Indeed, the Radio Division of the Signal Corps acknowledged that its success during the war owed a great deal to the French Army:

> By furnishing equipment, by loaning the use of their experienced operators as instructors, and their radio stations, and especially by the personal assistance given by their officers, the foundation was laid that permitted efficient operation in a comparatively short time, a result that without this help would have been impossible [...] The cooperation of the French was not confined to the higher French officers, but an equal readiness to aid was shown by the non-commissioned officers and men. Frequently, American and French operators worked together in the same stations, side by side, by friendly rivalry and mutual inspiration achieving the utmost in efficiency [...] the interchange of views broadening the attitude of each.[142]

Such an observation would have been widely endorsed throughout the Signal Corps as a whole.

137 »History of the Signal Corps«, Vol. 2, 17, RG120/2041/42, NARA.

138 »Sibert to Pershing«, 8 October 1917, *WWRFD*, Vol. 12.

139 Bruce, *A Fraternity* (see note 12), 115–117.

140 Lavine, *Circuits* (see note 19), 160. For information on Ferrié, see Amoudry, Michel. *Le Général Ferrié et la naissance des Transmissions et de la Radiodiffusion* (Grenoble: Presses Universitaires de Grenoble, 1993). See also: Michel Amoudry, »Le Général Ferrié (1868–1932), un soldat au service de la radioélectricité«, in *Bulletin de la Sabix* [Online], 48, 2011, online since 24 April 2013, <http://journals.openedition.org/sabix/1003> [Accessed 20 October 2020].

141 »History of the Division of Research and Inspection«, RG120/2041/43, NARA.

142 »The Radio Section, Radio Division, Signal Corps, AEF«, RG120/2041/43, NARA.

IV. Conclusion

When discussing the training of the AEF in November 1917, French Premier Georges Clemenceau warned Pershing and Colonel Edward House, President Woodrow Wilson's envoy, that »if the Americans do not permit the French to teach them, the Germans will do so at great cost of life«.[143] The problem, as one French officer noted, was that the Americans »realise that they've got a lot to learn but don't want anyone to tell them so«.[144] This reluctance by the AEF to take on board allied tactical advice has been a dominant narrative within the historiography; employed initially by Pershing to justify the creation of an independent American Army, as well as evidence to support his post-war contention that the AEF had played a decisive role in the allied victory, it was later used by historians to castigate the American high command for the poor performance of the AEF and the heavy casualties it sustained between September and November 1918. More recently, though, some historians have begun to challenge this narrative by highlighting the AEF's acceptance of certain allied methods which were areas that the US Army either lacked any formal organisation before the war, such as armour, airpower, and intelligence, or had fallen behind in the technological changes that had transpired since 1914, such as in artillery. This article has sought to contribute to this important debate by examining the experiences of the AEF Signal Corps, an organisation whose role and influence historians of the AEF have largely overlooked and failed to fully appreciate, chiefly by asking two key questions. First, to what extent was there a genuine desire within the AEF, and the Signal Corps in particular, to learn from its allies, with regards to communications in modern warfare? Secondly, if there was a genuine desire to learn from the British and French, what form did this learning take? Answering these questions has important implications, not only for the aforementioned debate concerning the AEF's training and military operations, but also for our understanding of the neglected subject of inter-allied learning more broadly.

With regards to the first question, the case study of the AEF Signal Corps reinforces the general thrust of the argument made by Bruce, Grotelueschen, Beach, and Doty that the AEF was not completely opposed to all aspects of British and French military advice. When it came to communications, a factor that had a profound influence upon the battlefield performance of every army during the First World War, the Signal Corps proved very receptive to British and especially French practices. Any

143 *The Intimate Papers of Colonel House: Into the World War*, ed. by Charles Seymour (New York: Houghton Mifflin, 1928), 268.

144 Quoted in Kennett, Lee. »The A.E.F. Through French Eyes«, in *Military Review*, 52/11, 1972, 3–11, 6.

assessment of the AEF's communications experience, therefore, must begin with an understanding of its training and, in particular, the considerable influence exerted by the British and French. Despite the views held by many senior AEF officials, there is no doubt that Signal Corps training was influenced to a significant degree by its allies. This was especially true of the field signal battalions of the first four AEF divisions, whose training relied heavily upon French tutelage. Nevertheless, as Grotelueschen has contended, as significant as the allied influence upon training was, arguably the most important learning undertaken by the AEF occurred during combat itself.[145] As Major-General Robert Bullard, who replaced Sibert as commander of the 1st Division in December 1917, observed at the beginning of 1918, »the evident, patent need is not so much to be told or shown how to do but actually the doing ourselves«.[146] Yet, in light of doctrinal weaknesses and technological shortcomings, as well as the absence of first-hand operational involvement, between the US declaration of war in April 1917 and the AEF's first major offensive at Cantigny in late May 1918, the Signal Corps' experience was »largely a matter of schooling, more than anything else«.[147]

Crucially, by adopting an inter-organisational learning model to the case study of the Signal Corps, a fuller appreciation of the driving influences behind the AEF's willingness to embrace certain aspects of allied practices can be made. In particular, the Signal Corps' desire to draw upon British and French knowledge was shaped by three interconnecting factors: first, the Signal Corps was *susceptible* to allied communications practices because its own doctrine, technology and organisation had largely fallen behind the developments made by the British and French between 1914 and 1917; second, allied communications advances, information pertaining to which was made readily available by the British and French, were generally judged to offer a more successful and superior alternative to that which the Signal Corps possessed in 1917. This *infectiousness* was difficult to resist, particularly given the urgency with which the Signal Corps needed to be brought up to speed; third, and finally, the *social proximity* of the Signal Corps to its allied counterparts, measured both in terms of geographical propinquity as well as cultural and institutional similarities, facilitated the establishment of a variety of formal and informal learning processes designed to acquire and impart allied best practice. Running like a thread through these factors was an organizational culture within the Signal Corps that fostered cooperation, creativity, and

145 Grotelueschen, *The AEF Way* (see note 5), 350.

146 Robert Bullard to James G. Harbord (Chief of Staff, GHQ, AEF), 1 January 1918, 1st Division Orders and Reports on Meuse-Argonne, RG120/4/1, NARA; Rainey, »The Questionable Training« (see note 17), 97.

147 Lavine, *Circuits* (see note 19), 349.

open thinking. While Pershing, AEF GHQ, and other senior American commanders were wary of British and French tactical methods, there is little evidence that this way of thinking pervaded the Signal Corps. On the contrary, the case study of the AEF Signal Corps shows how individual branches within a large military organisation, particularly those responsible for developing, maintaining and operating some of the organisation's most important and cutting-edge technologies, can develop independently and often in contradiction to the official policy espoused by the high command.[148]

In response to the second question posed in this article, the Signal Corps appears to have employed a mixture of top-down, bottom-up, horizontal, formal, and informal learning methods, which suggests that the AEF's inter-organisational learning processes were just as complex and multi-faceted as the intra-organisational learning experiences of the other belligerents.[149] However, the case study of the Signal Corps serves to highlight the important observation that inter-allied learning should be viewed as a collaborative and reciprocal endeavour, rather than a simple one-way process. As much as the Signal Corps displayed a willingness to learn from its British and French counterparts, the latter also had to be open and transparent, patient and accommodating. In a memorandum outlining his thoughts on how French instructors should conduct themselves whilst assisting in the training of American units, for instance, the French Army commander-in-chief, General Phillipe Pétain, warned that »an attitude of superiority over them should be assiduously avoided«. He called upon French officers to »avoid also a doctrinal form of instruction; rather suggest and advise, citing existing examples; a method which will always be more effective and more valuable than a purely theoretical lecture«. In closing, Pétain remarked: »The main purpose of our collaboration in the instruction of American troops is to give our Allies the benefit of our dearly bought experience [...] Constant patience and extreme tact, together with application will serve to overcome all obstacles«.[150] The evidence presented within this article indicates that British and French signal officers and NCOs were more than willing to engage in an »intelligent, friendly, and even affectionate mode of collaboration« with their American counterparts.[151] Yet, while the Signal Corps predominantly played the role of the »learner firm« in its relationship with its allied counterparts, there was little it could learn from its allies with regards to telephonic

148 Raines, *Getting the Message Through* (see note 46), 201.

149 Fox, *Learning to Fight* (see note 31), 240–250; Foley, »Dumb Donkeys or Cunning Foxes? (see note 31), 296–298.

150 »Training of American Units with French«, 1 May 1918, *USAWW*, Vol. 3, 292–295.

151 Clemenceau, Georges. *The Grandeur and Misery of Victory*, trans. by F.M. Atkinson, (New York: Harcourt, Brace & Co, 1930), 71; Bruce, *A Fraternity* (see note 12), 143.

communication, a specialism that the Americans led world in in 1917. In fact, unlike Pershing's open warfare doctrine, which practically every senior Allied commander ridiculed,[152] the case of the Signal Corps' superior telephone methods provides a rare example of an aspect of the AEF that was identified by »competent French critics« as »one of the outstanding achievements of [the US] military effort which foreign services could copy to advantage«.[153]

Nevertheless, contrary to Ferdinand Foch's post-war contention that the issue of training the AEF had been »comparatively easy to handle«,[154] the Signal Corps' learning experience was certainly not smooth and without friction. Indeed, there is evidence to support Gabriel Szulanski's influential work on the barriers affecting corporate knowledge transfer that the AEF Signal Corps also experienced a degree of institutional »stickiness« when attempting to acquire and absorb the lessons of »best practice« from its European allies.[155] Notwithstanding the severely reduced and uneven training programmes undertaken by the field signal battalions that arrived in Europe during the course and aftermath of the 1918 German offensives, which limited the interaction they had with their British and French instructors, the fact that both British and French methods were embraced simultaneously, up until the formal adoption of *Liaison for All Arms* in June 1918, meant that there would undoubtedly exist a lack of uniformity in the practices of some field signal battalions. However, at the heart of the inter-allied learning process was the need to translate the knowledge acquired through the intra-organisational learning experiences of the British and the French into the information obtained through the inter-organisational learning experiences of the AEF Signal Corps.[156] Overall, this was successfully achieved, in part because of the »high transparency and receptivity« of the British and French,[157] and in part because the Signal Corps exhibited a fairly flexible, open and pragmatic approach to learning from its more experienced allies.

152 In May 1918, Pétain criticised AEF open warfare doctrine as »having but little relation to actual warfare [...] Americans dream of operating in open country, after having broken through the front. This results in too much attention being devoted to this form of operations, which the Americans consider as superior«. Similarly, at a conference of the Allied military commanders in late October 1918, Haig stated that the AEF »had suffered a great deal on account of its ignorance of modern warfare«. See: »Training of American Units with French«, 1 May 1918, *USAWW*, Vol. 3, 292–295; »Proceedings of Military Conference at Senlis«, 25 October 1918, *USAWW*, Vol. 10, Part 1, 20.

153 Taylor, *New England in France* (see note 102), 206.

154 Foch, Ferdinand. *The Memoirs of Marshal Foch*, trans. by Col. T. Bentley Mott (London: Heinemann, 1931), 354.

155 Szulanski, Gabriel. »Exploring Internal Stickiness: Impediments to the Transfer of Best Practice Within the Firm«, in *Strategic Management Journal*, 17, Winter, 1996, 27–43.

156 Holmqvist, »Experiential Learning« (see note 32), 72.

157 Larsson et al., » The Interorganizational Learning Dilemma« (see note 37), 300.