

COMBAT RECONSIDERED: A STATISTICAL ANALYSIS OF SMALL-UNIT
ACTIONS DURING THE AMERICAN CIVIL WAR

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Historians often emphasize the physical features of battle—terrain, weaponry, troop formations, earthworks, etc.—in assessments of Civil War combat. Most scholars agree that these external combat conditions strongly influenced battle performance. Other historians accentuate the ways in which the mental stresses of soldiering affected combat performance. These scholars tend to agree that fighting effectiveness was influenced by such non-physical combat conditions as unit cohesion, leadership, morale, and emotional stress. Few authors argue that combat's mental influences were more significant in determining success or failure than the physical features of the battlefield. Statistical analysis of the 465 tactical engagements fought by twenty-seven Federal regiments in the First Division of the Army of the Potomac's Second Corps throughout the American Civil War suggests that the mental aspects of battle affected fighting efficiency at least as much—and probably more than—combat's physical characteristics. In other words, the soldiers' attitudes, opinions, and emotions had a somewhat stronger impact on combat performance than their actions, positions, and weaponry.

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TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS	iii
LIST OF TABLES	v
LIST OF GRAPHS	vi
INTRODUCTION	vii
Chapter	
1. SOLDIERS, SCHOLARS, AND CIVIL WAR COMBAT	1
2. DATA AND METHODOLOGY	35
3. ENVIRONMENTAL AND BEHAVIORAL COMBAT ANALYSES	54
4. SPECIALIZED COMBAT ANALYSES	74
5. A NEW PERSPECTIVE	106
EPILOGUE	132
APPENDICES	137
BIBLIOGRAPHY	147

LIST OF TABLES

Table	Page
1. Distribution of Federal and Confederate Combat Outcomes, 1861-65	58
2. Comparison of Federal Tactical Actions and Federal Combat Outcomes.....	59
3. Comparison of Confederate Tactical Actions with Confederate Combat Outcomes	60
4. Comparison of each Model's Ability to Predict Federal Combat Results.....	108
5. Model of All Significant Environmental Variables Relative to Federal Outcome....	145
6. Model of All Significant Behavioral Variables Relative to Federal Outcome	145
7. Model of All Significant Variables Combined Relative to Federal Outcome	146

LIST OF GRAPHS

Graph	Page
1. Mean Number of Days Between Engagements Relative to Federal Outcome	90
2. Federal Combat Results by Battle Number	94

INTRODUCTION

“It is well that war is so terrible—we should grow too fond of it!”

General Robert E. Lee at Fredericksburg, December 13, 1862¹

“Your men have done all that men could do; the fault is entirely my own.”

General Robert E. Lee at Gettysburg, July 3, 1863²

“I regret this assault more than any one I have ever ordered.”

Lieutenant General Ulysses S. Grant at Cold Harbor, June 3, 1864³

No epoch in the history of the United States was more sanguine than that of the American Civil War. The nation was torn, families were broken, and brothers were pitted against one another in mortal combat. The fratricide continued for four years before Federal military success ended it. By that time, the whirlwind of war had taken more than 620,000 lives.⁴ In the 140 years that have elapsed since the war began, the quotations of Lee and Grant (above) have come to epitomize the tragic cost of Civil War combat. So great is the intellectual influence of these words that our understanding of Civil War combat is still shaped by them.⁵

¹ Douglas Southall Freeman, *R. E. Lee: A Biography*, 4 vols. (New York: Charles Scribner's Sons, 1934-35), 2:462.

² *Ibid.*, 3:130.

³ Horace Porter, *Campaigning with Grant* (New York: Century Company, 1897), 179.

⁴ The total number of soldiers who died during the Civil War is difficult to state with precision. The 620,000 men referred to here may be found in a widely used synthesis, James M. McPherson, *Battle Cry of Freedom: The Civil War Era* (New York: Oxford University Press, 1988), 854.

⁵ The most recent, and arguably the most complete, military history of the Civil War both literally and figuratively embodies the quotations of Generals Lee and Grant. See Russell F. Weigley, *A Great Civil War: A Military and Political History, 1861-1865* (Bloomington: Indiana University Press, 2000), 194, 251-56, 335-36.

The traditional approach to understanding Civil War combat was founded upon the opinions of soldiers like Lee and Grant and has developed into an imposing intellectual edifice that embodies most Civil War scholarship. The essence of this consensus view can be captured in a single sentence: Civil War combat proved futile and bloody because of the tactical advantage that entrenched defenders, armed with rifled muskets and supported by artillery, enjoyed over exposed attackers advancing in linear formation. Of course, this simplification overlooks nuances such as troop strengths, soldier quality, combat experience, etc. However, because most analyses of such nuances accept, rather than reject, the core assumptions of the traditional view, they offer little challenge to it.⁶

In light of the enduring strength of this interpretation, it would be an act of hubris to claim that my insight into the nature of the war is brighter, clearer, and more precise than those of the brave soldiers and talented scholars who have written about the Civil War. My goals are more modest. Through an analysis of Civil War combat, I hope to identify and explain those aspects of battle that most influenced combat performance. To do this I conducted a quantitative study of regimental combat tactics throughout the war.

The focal point of this study is the infantry regiment. Both the Federal and Confederate armies employed them as their most basic combat unit. Although regiments usually entered battle as part of a brigade, they frequently fought independently if the tactical situation warranted it. Perhaps no better example of regimental independent

⁶ The recent work of a leading Civil War scholar provides an excellent example of the subordination of combat nuances to the core assumptions of the traditional view. See James M. McPherson, *For Cause and Comrades: Why Men Fought in the Civil War* (New York: Oxford University Press, 1997).

action can be found than the moment at Gettysburg in which Major General Winfield Scott Hancock ordered the 260 men of the 1st Minnesota to attack an advancing Confederate brigade of over 1,600 soldiers. The Minnesotans battled to their deaths and gave Hancock the precious minutes he needed to organize his forces.⁷ Even when brigaded regiments fought side by side, their tactical experiences varied with the changing nature of the terrain or the uneven quality of enemy troops. Therefore, my goal is to interpret combat from the perspective of the regiment.⁸

Because of the greater availability of Federal versus Confederate regimental information, this study focuses on the Federal combat experience. Specifically, twenty-seven Federal regiments are used as the foundation for this study. The twenty-seven regiments are those units that engaged in any number of battles as part of the Army of the Potomac's First Division, Second Corps, between May 1864 and April 1865.⁹ The First Division was chosen as the initial subject for this study because of its reputation. It began the Overland Campaign in May 1864 as one of the most respected fighting forces in the Army of the Potomac. After some 100 days, however, it was reduced to a mere shadow

⁷ For a modern history of the 1st Minnesota, especially its fateful exploits during the Battle of Gettysburg, see Richard Moe, *The Last Full Measure: The Life and Death of the First Minnesota Volunteers* (New York: Henry Holt and Company, 1993), 258-97.

⁸ The infantry regiment served as the fundamental combat unit within the Federal armies, perhaps more so than in the Confederate armies. One author argues that the Confederates tended to employ brigades of three to six regiments as a single combat unit. In other words, the Confederates tended to use brigades as regiments and regiments as battalions. Nevertheless, Confederate regiments maintained their individual identities and deployed in combat as separate units within a brigade. See Hugh C. Rogers, *The Confederates and Federals at War* (New York: Hippocrene Books, 1973), 29-31; and Everette B. Long, *The Civil War Day by Day: An Almanac 1861-1865* (Garden City, NY: Doubleday, 1971), 716-18.

⁹ Throughout this study all references regarding combat units are to volunteer infantry regiments unless otherwise stated. The twenty-seven regiments included in this study are the 7th New York Veterans, 39th New York, 52nd New York, 57th New York, 61st New York, 63rd New York, 64th New York, 66th New York, 69th New York, 88th New York, 111th New York, 125th New York, 126th New York, 53rd Pennsylvania, 81st Pennsylvania, 116th Pennsylvania, 140th Pennsylvania, 145th Pennsylvania, 148th Pennsylvania, 183rd Pennsylvania, 2nd Delaware, 28th Massachusetts, 26th Michigan, 5th New Hampshire, 2nd New York Heavy Artillery, 4th New York Heavy Artillery, and 7th New York Heavy Artillery.

of its former self. The dangers and strains of combat had depleted its ranks and eroded its effectiveness. It was the rapid destruction of the First Division that initially captured my attention.¹⁰

Although membership in the First Division during the last year of the war was the criterion used for selecting the regiments, the scope of the study was broadened to include the entire war. Combat data were collected on each regiment's significant engagements throughout the war because combat experience affected combat performance.¹¹ By May 1864 many of the soldiers in the First Division were seasoned veterans. Their combat experiences could not be overlooked. Therefore, what began as a history of the First Division during the Overland Campaign became a longitudinal study of Civil War combat based on the fortunes of the twenty-seven regiments that constituted the Army of the Potomac's First Division, Second Corps, between May 1864 and April 1865.

This analysis of the combat effectiveness of the twenty-seven regiments is statistical in nature. Those aspects of combat that lend themselves to statistical categorization (e.g., terrain, formation, action, etc.) as well as those variables more quantitative in nature (e.g., strength, casualties, etc.) occupy center stage. I have also

¹⁰ For accounts of the rise and fall of the First Division, indeed the entire Second Corps, in 1864, see Gordon C. Rhea, *The Battle of the Wilderness, May 5-6, 1864* (Baton Rouge: Louisiana State University Press, 1994), 38; David M. Jordan, *Winfield Scott Hancock: A Soldier's Life* (Bloomington: Indiana University Press, 1988), 107-09, 159-64; Francis A. Walker, *History of the Second Army Corps in the Army of the Potomac* (New York: Charles Scribner's Sons, 1887), 598-99; and, John J. Hennessy, "I Dread the Spring: The Army of the Potomac Prepares for the Overland Campaign," in *The Wilderness Campaign*, ed. Gary Gallagher (Chapel Hill: University of North Carolina Press, 1997), 86-89.

¹¹ A "significant engagement" is defined as a battle that is either included in Frederick Phisterer's "Chronological Record of Engagements, Battles, Etc., in the United States, 1861 to 1865" or a clash determined by me to have had a profound impact on the Federal regiment, either in the number of casualties sustained or in the perceptions of the officers and men. See Frederick Phisterer, *Statistical Record of the Armies of the United States* (New York: Charles Scribner's Sons, 1883), 81-244.

categorized and quantified numerous non-combat aspects of regimental life that presumably influenced combat performance (e.g., recruitment, desertion, command change, time-in-service, etc.). These discrete pieces of information add texture, depth, and meaning to the overall picture of combat.

I will first offer a survey of Civil War combat analyses, beginning with the soldiers who fought the war and ending with the scholars who study it today. Second, I will discuss the data scrutinized in this work, detail their strengths and weaknesses, and summarize the analytical methodologies applied to them. Third, I will present a preliminary analysis of the data as a way to introduce their content and demonstrate their accuracy while simultaneously corroborating most scholarly tactical studies. Fourth, I will challenge the reliability of several atypical analyses of Civil War combat. Fifth, I will offer a statistical model that identifies those variables that most influenced combat, and rank them in order of their importance. Finally, I will conclude with a discussion of the possible ramifications of my results.

CHAPTER 1

SOLDIERS, SCHOLARS, AND CIVIL WAR COMBAT

In 1998 two prominent Civil War historians lamented the absence of a systematic analysis of Civil War combat. In *Writing the Civil War*, both James M. McPherson and William J. Cooper agreed that single-battle narratives and accounts of soldiers' motivations and experiences were too fragmented and disjointed to provide more than tactical vignettes of Civil War combat. The authors concluded that students of the war needed a longitudinal study of combat tactics that considered both the physical realities of the battlefield and the mental stresses that racked the minds of men under fire. Long before McPherson and Cooper challenged their colleagues to examine wartime tactics, however, both soldiers and scholars struggled to understand the tactical aspects of Civil War combat.¹

From the moment that Americans were first touched by the fire of Civil War combat, they began grappling with understanding the experience. The struggle continues today. Despite the multitude of voices that have since joined the dialogue begun by the soldiers, most Civil War combat analyses fit into one of two categories. The first interpretation began during the Civil War and dominated subsequent analyses until World War II. These works emphasize the physical conditions and circumstances

¹ James M. McPherson and William J. Cooper, Jr., ed., *Writing the Civil War: The Quest to Understand* (Columbia: University of South Carolina Press, 1998), 5.

surrounding men on the battlefield. In modern medical parlance, they may be described as taking an “environmental approach” to understanding combat. The second interpretation began with the close of World War II and has dominated the analysis of Civil War combat for the past twenty-five years. These studies emphasize the motivations, emotions, and reactions of soldiers on the battlefield. In modern medical terminology, they may be described as taking a “behavioral approach” to understanding combat.

The environmental method attempts to understand combat by analyzing the external, physical aspects of battle. In other words, writers concentrate on the nuts-and-bolts of the battlefield: casualties, duration, strength, tactics, terrain, weapons, weather, etc. The behavioral method, on the other hand, takes a personal approach to understanding combat. Scholars endeavor to understand combat from the soldier’s perspective. They emphasize the internal, mental forces affecting an infantryman as he struggles across the battlefield: cohesion, courage, discipline, fear, honor, leadership, morale, etc. Both groups of scholars exhibit varying degrees of deference toward the theories of the other. Most recognize that single-variable causal relationships rarely explain the complexities of human behavior. Still, their acknowledgments sometimes appear perfunctory and more a matter of protocol than sincere belief in the other’s argument.²

² For examples of the environmental approach, see Gerald F. Linderman, *Embattled Courage: The Experience of Combat in the American Civil War* (New York: Free Press, 1987); Perry D. Jamieson, *Crossing the Deadly Ground: United States Army Tactics, 1865-1899* (Tuscaloosa: University of Alabama Press, 1994); and Grady McWhiney and Perry D. Jamieson, *Attack and Die: Civil War Military Tactics and the Southern Heritage* (Tuscaloosa: University of Alabama Press, 1982). For examples of the behavioral method, see James M. McPherson, *For Cause and Comrades: Why Men Fought in the Civil*

Civil War combatants were the first to analyze their martial experiences. These soldiers' conceptual framework of the war was partly a product of the intellectual milieu in which they lived. Their understanding of warfare was indirectly influenced by post-Napoleonic military theorist Antoine Henri Jomini.³ Jomini's strategic theory advocated direct, concentrated approaches along interior lines. Similarly, his tactical doctrine advocated mass frontal assaults against vulnerable points in the enemy's line. Although Jomini acknowledged that maneuver was preferable to direct confrontation, he recognized that the difficulties associated with maneuver could be overcome only through the military genius of a commander like Napoleon, and even Napoleon had difficulty doing it. In the absence of Napoleonic genius, Jomini concluded, an army's best chance for success was through concentrated, direct approaches and assaults. In other words, Jomini overlooked the experiences of the common soldier and instead emphasized strategic movements and tactical articulations. Because of its influence, the Jominian conceptual framework shaped the soldiers' efforts to understand their experiences.⁴

War (New York: Oxford University Press, 1997); and Earl J. Hess, *The Union Soldier in Battle: Enduring the Ordeal of Combat* (Lawrence, University Press of Kansas, 1997).

³ Though few Civil War soldiers studied Jomini's writings, most were exposed to his tactical views. The Army's professional officers were educated in Jominian theory by Dennis Hart Mahan, a professor of military and civil engineering at the United States Military Academy at West Point from 1832 to 1870. Prior to being appointed to the faculty at West Point, Mahan spent four years in France studying French military theory and practice. Through Mahan's lectures, textbooks, and post-graduate courses, professional officers became familiar with Jomini's theories. The Army's enlisted soldiers received their Jominian education through their officers as they trained and fought during the Civil War. See Edward Hagerman, "From Jomini to Dennis Hart Mahan: The Evolution of Trench Warfare and the American Civil War," *Civil War History* 13 (September 1967): 197-220.

⁴ See Antoine Henri Jomini, *Summary of the Art of War*, trans. G. H. Mendell and W. P. Craighill (Philadelphia: J. B. Lippincott and Company, 1863), 185-220. Jomini's writings between 1804 and 1839 dominated American military thought until German victories in the Franco-Prussian War carried Karl von Clausewitz's theories forward. For an introduction to Jomini, Clausewitz, and the scholarly dialogue surrounding the impact of their theories, see Richard E. Beringer, Herman Hattaway, Archer Jones, and William N. Still, *Why the South Lost the Civil War* (Athens: University of Georgia Press, 1986), 39-52; and

Throughout the war the soldiers' analyses of their combat experiences focused on the physical, external aspects of the battlefield. Casualty figures served as the soldiers' most fundamental and universal measurement of a regiment's combat effectiveness. If a regiment suffered heavy casualties, the numbers generally pointed to one of two possible conclusions: either the unit fought well and enjoyed tactical success, or it fought poorly and was routed. Using casualty figures as the foundation for their combat analyses, Civil War soldiers added countless combinations of environmental variables in an effort to construct an intellectual understanding of their experiences. For example, various types of weapons, ranging from smoothbore muskets to rifled muskets to artillery batteries, were often considered influential in separating victor from vanquished. Similarly, the tactical positions held by the belligerents at the beginning of the engagement, their combat formations, the intervening terrain, and the duration of the fight were all included by the troops at one time or another in their calculus of success. The closest that Civil War soldiers would come to a consensus regarding the variables that most influenced combat outcome was their emphasis on the physical environment of the battlefield.⁵

By 1864 Civil War contemporaries began publishing formal analyses of the environmental aspects of Civil War combat. For example, one author argued that terrain

Edward Hagerman, *The American Civil War and the Origins of Modern Warfare* (Bloomington: Indiana University Press, 1988), 3-27.

⁵ It was not possible for Civil War soldiers to differentiate and weigh the influence of various physical variables on combat outcome because each soldier's analysis was limited to his own combat experiences. For a small sample of the soldiers' analyses of the environmental aspects of combat, see U. S. War Department, *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*, 128 vols. (Washington, D. C.: Government Printing Office, 1880-1901, ser. 1, vol. LI, pt. 1, pp. 20-23, 233-36; *ibid.*, vol. XI, pt. 1, pp. 798-801, 863-66, 1062-63; *ibid.*, pt. 2, pp. 213-14, 614-17, 622-30; *ibid.*, vol. XII, pt. 2, pp. 424-25; *ibid.*, vol. XIV, pp. 58-64; *ibid.*, vol. XXV, pt. 1, pp. 368-69; *ibid.*, vol. XXVII, pt. 2, pp. 664-68; *ibid.*, vol. XXIX, pt. 1, pp. 730-32; *ibid.*, vol. XXXVI, pt. 1, pp. 437-40, 455-58; *ibid.*, vol. XXI, pp. 236-38, 277-80, 368-70 (hereafter referred to as *OR*); and Charles G.

was the key to tactical success. The ground dictated positions, formations, articulations, and communications. In other words, “. . . every battle is determined and controlled largely by the character of the ground on which it is fought.” Another author, after witnessing the impact of artillery fire on infantry, ironclads, and fortifications, endeavored to bolster the soldiers’ general understanding of the “long arm” of the army by providing a simple history of artillery guns and the revolutionary ways in which they were used in the current conflict. Typical for the era, these writers emphasized various physical characteristics of the battlefield when discussing combat. Though their works seem simplistic by today’s standards, these authors deserve credit for taking the first steps in the historical analysis of Civil War combat.⁶

Although most Civil War veterans discussed the environmental aspects of combat, a small number explored its behavioral aspects. This minority included two groups, infantrymen and their medical officers. Infantrymen served in the ranks and frequently spoke of several behavioral aspects of combat. Specifically, they most frequently discussed leadership, morale, and cohesion. These soldiers believed that regimental leadership, as demonstrated through the commander’s personal courage and effective handling of his men, directly affected the success of the regiment. Similarly, some believed that the zeal and confidence of the men determined their fate in battle. Finally, others recognized the positive effects of the strong bonds that developed among them as they ate, slept, trained, and fought together. For example, when writing to his

Halpine, *The Life and Adventures, Songs, Services, and Speeches of Private Miles O’Reilly* (New York: Carleton, 1864), 12.

⁶ Quotation found in C. W. Tolles, “Army Movements,” *The United States Service Magazine* 3 (June 1865): 541. Also see Anonymous, “A Few Facts About Artillery,” *The United States Service*

wife in September 1861 regarding his regiment, the 14th Indiana, Lieutenant David Beem declared, “I shall stand by them [the men in his regiment] as long as I can, and be as faithful to them as possible.” Beem added, “I would rather be with them than anyone else.” Placing his regiment above everything else, Lieutenant Beem and his like-minded compatriots considered leadership, morale, and cohesion important components of an effective combat regiment.⁷

The other Civil War veterans who analyzed the behavioral aspects of combat were medical officers. These doctors were primarily concerned with “malingering” (i.e., homesickness and the resulting exaggeration of real illnesses by the men in hopes of being discharged from the army) because of the drain of manpower it created. As early as 1863 army surgeons had devised a treatment plan for such patients. They ordered that the “malingerer” be treated with kindness and that he be allowed to rest, bathe, exercise, and keep in touch with his comrades. The doctors believed that the sooner the patient returned to his regiment and endured combat alongside his compatriots, the sooner he would bond with his peers, develop a cohesiveness more powerful than his longing for home, and thus be cured of his “malingering.” Army medical professionals recognized

Magazine 1 (January 1864): 12-20; and John Gibbon, “Organization of United States Artillery,” *The United States Service Magazine* 1 (May 1864): 495-502.

⁷ For examples of soldiers’ analyses of the behavioral aspects of combat, see *OR*, ser. 1, vol. II, pp. 77-82, 357-61; *ibid.*, vol. XI, pt. 1, pp. 768-70, 775-79, 838-42; *ibid.*, pt. 2, pp. 60-62, 65-69; *ibid.*, vol. XIX, pt. 1, pp. 332-33; *ibid.*, vol. XXI, pp. 236-38; *ibid.*, vol. XXV, pt. 1, pp. 368-69, 381-83; *ibid.*, vol. XXIX, pt. 1, pp. 299-300; *ibid.*, vol. XXVIII, pt. 2, pp. 586-90; *ibid.*, vol. XXXVI, pt. 1, pp. 437-40; and *ibid.*, vol. XLII, pt. 1, pp. 218-21. Also see David Beem to Hala (wife), September 1 and 23, 1861, David Enoch Beem Papers, 1821-1954, Indiana Historical Society Library, Indianapolis. Similar affirmations of small-unit cohesion can be found in Otis J. Getshell to unknown, October 6, 1863, Civil War Miscellaneous Collection, U. S. Army Military History Institute, Carlisle, PA. For an ironic example of small-unit cohesion serving to bind a regiment *against* following orders and performing another attack at Petersburg, see John MacLachlan to wife, July 4, 1864, John MacLachlan Papers, State Historical Society of Wisconsin, Madison.

that the development of small-group cohesion was both vital in the treatment of mental casualties and in the creation of a successful combat unit.⁸

Though a small number of infantrymen and medical officers recognized the importance of the behavioral aspects of combat for assessing effectiveness, these men were a minority within the army. Their relative obscurity was likely the result of several circumstances. First, military tradition did not permit seemingly superfluous commentary regarding the collective state of mind of the men within official reports and communiqués. Second, when soldiers did discuss the mental stresses they experienced during combat, they generally did so privately, either in letters to family members or in personal diaries. In either case, the soldiers' comments were not intended for public consumption. Finally, the doctors who publicly discussed the mental aspects of combat did so in esoteric publications intended for a small group of like-minded medical professionals. Consequently, the analysis of Civil War combat, both during and after the war, continued to emphasize the environmental aspects of battle.

By 1870 the U. S. Army began its official analysis of Civil War combat. Brevet Major General Emory Upton led the effort and focused on both the environmental and behavioral aspects of battle. A West Point graduate who entered the army as a second lieutenant and retired a major general, during which time he served outstandingly in all

⁸ See DeWitt C. Peters, "The Evils of Youthful Enlistments and Nostalgia," *American Medical Times*, February 14, 1863, n.p.; J. Thomas Calhoun, "Nostalgia as a Disease of Field Service: A Paper Read Before the Medical Society of the 2nd Division, 3rd Corps, Army of the Potomac, February 10, 1864—Part 1," *Medical and Surgical Reporter* (February 27, 1864): 130-32; Calhoun, "Nostalgia as a Disease of Field Service: A Paper Read Before the Medical Society of the 2nd Division, 3rd Corps, Army of the Potomac, February 10, 1864—Part 2," *Medical and Surgical Reporter* (March 5, 1864): 150-52; and S. Weir Mitchell, George R. Morehouse, and W. W. Keen, "On Malingering, Especially in Regard to Simulation of Diseases of the Nervous System," *American Journal of Medical Science* 48 (October 1864): 367-94.

three branches of the service (infantry, cavalry, and artillery), Upton was perplexed by the ineffectiveness of traditional combat tactics during the war. Specifically, he believed that defensive firepower and field fortifications had dominated the battlefield and that offensive tactics had to change before offensive actions could be victorious. His search for ways to bring effectiveness back to offensive tactics culminated in the private publication of two drill manuals: *A New System of Infantry Tactics* (1867), and *Infantry Tactics* (1874). Upton's answer to the stifling dominance of defensive tactics on the battlefield was the combination of dispersion among, and cohesion within, attacking units. He called for the creation of "fours," or four-man squads, as the basic unit in the Army's infantry system. Each four-man squad would do almost everything together, including marching in column and deploying in line. Once in line of battle, the squad would disperse and fight, both offensively and defensively, in loose tactical formation. In Upton's opinion, combat effectiveness could be achieved through dispersed tactics. His tactics probably fostered cohesion within each four-man squad, though Upton never identified group cohesion as an objective of his system. Though neither publication was ever officially adopted by the U.S. Army, Upton's work became the Army's first intellectual step toward its current tactics.⁹

By the end of the nineteenth century, Civil War veterans had unleashed a deluge of regiment and brigade histories, personal memoirs, and battle histories. These works consistently omitted the soldiers' perspectives. That is to say, the authors chose not to

⁹ Emory Upton, *A New System of Infantry Tactics, Double and Single Rank, Adapted to American Topography and Improved Fire-Arms* (New York: D. Appleton, 1867); and Upton, *Infantry Tactics: Double and Single Rank* (New York: D. Appleton, 1874). For analyses of Emory Upton's career, see Stephen E. Ambrose, *Upton and the Army* (Baton Rouge: Louisiana State University Press, 1964); and

include their personal reactions to combat. Instead, they emphasized the commanding generals and their responsibility for inducing their troops to overcome the physical obstacles of the battlefield. Combat outcome depended on the commander's ability to inspire and lead his troops. When not on the battlefield, the commander's responsibilities were only slightly diminished. He was still expected to instill his martial virtues in the men through diligent training and strict discipline. The men, on the other hand, usually appear as brave, patriotic, heroic warriors, executing orders and dying for their cause. Major Generals John Gordon and John Gibbon both went so far as to compare soldiers to machines—impressionable and sentient though they may be, they were still nothing more than machines.¹⁰ Veteran John Bigelow further reduced the importance of the soldier with his history of the battle of Chancellorsville. "Say what one will about the man behind the gun," Bigelow wrote, "he is about what his officers make him. Good officers will make good soldiers of almost any kind of men; the best men under poor officers will make but indifferent soldiers." The men mattered little, the importance lay with their leaders, and nearly all physical aspects of the battlefield could be overcome.¹¹

David J. Fitzpatrick, "Emory Upton and the Citizen Soldier," *Journal of Military History* 65 (April 2001): 355-89.

¹⁰ See John B. Gordon, *Reminiscences of the Civil War* (New York: Charles Scribner's Sons, 1903), 289; John Gibbon, *Personal Recollections of the Civil War* (New York: G. P. Putnam's Sons, 1928), 19. Gordon's and Gibbon's machine metaphors carried both positive and negative connotations. For an insightful analysis of the intellectual impact of automation in late-nineteenth-century America, see Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (New York: Oxford University Press, 2000).

¹¹ See John Bigelow, *The Campaign of Chancellorsville: A Strategic and Tactical Study* (New Haven: Yale University Press, 1910), 377. For additional examples of late-nineteenth-century unit histories and soldiers' reminiscences that emphasize the commanding general and subsequent training and discipline, see James Fitz James Caldwell, *The History of a Brigade of South Carolinians, Known First as "Gregg's," and Subsequently as "McGowan's Brigade"* (Philadelphia: King and Baird, 1866); David Power Conyngham, *The Irish Brigade and Its Campaigns: With Some Account of the Corcoran Legion, and Sketches of the Principal Officers* (New York: William McSorley and Company, 1867); Samuel P. Bates, *History of Pennsylvania Volunteers, 1861-5*, 5 vols. (Harrisburg: B. Singerly, 1869-1871); Otis F. Waite, *New Hampshire in the Great Rebellion* (Claremont, NH: Tracy, Chase and Company, 1870); Willis

Veteran officer Francis Walker, in his history of the Army of the Potomac's Second Corps, praised its first commander, Edwin V. Sumner, with similar rhetoric: "Jupiter, shining full, clear, and strong in the midnight heavens, might be the disembodied soul of Edwin V. Sumner. In honor, in courage, in disinterestedness, in patriotism, in magnanimity, he shone resplendent." Walker acknowledged Sumner as the reason for the combat success of the Second Corps, even after Sumner relinquished command in October 1862. His position as the corps's first commander during "... that highly plastic state of mind which belong[ed] to the early months of the war ..." allowed Sumner to exert a special influence on the young officers and men under his command. It was Sumner's character, and the manner in which his character aptly shaped his style of leadership, that not only created the Second Corps but also transformed it into an elite combat unit.¹²

Americans were not the only people interested in their wartime experiences; military analysts in Europe also studied the Civil War. Prussian scholar Friedrich Karl scrutinized the war and understood the dynamic environment of the battlefield. In his

Brewer, *Alabama: Her History, Resources, War Record, and Public Men from 1540 to 1872* (Montgomery, AL: Barrett and Brown, 1872); J. Robertson, *Michigan in the War* (Lansing: W. S. George, 1882); J. Thomas Scharf, *History of Delaware, 1609-1888*, 2 vols. (Philadelphia: L. J. Richards, 1888); James L. Bowen, *Massachusetts in the War, 1861-1865* (Springfield, MA: Clark W. Bryan, 1889); Ulysses S. Grant, "The Battle of Shiloh," in *Battles and Leaders of the Civil War*, 4 vols., ed. Clarence C. Buel and Robert U. Johnson (New York: Century Company, 1887), 1:465-86; Frank A. Burr, *Life and Achievements of James Addams Beaver—Early Life, Military Services, and Public Career* (Philadelphia: Ferguson Brothers and Company, 1882); Ezra D. Simons, *A Regimental History: The One Hundred and Twenty-Fifth New York State Volunteers* (New York: E. D. Simons, 1888); Hyland C. Kirk, *Heavy Guns and Light: A History of the 4th New York Heavy Artillery* (New York: C. T. Dillingham, 1890); Clement A. Evans, ed., *Confederate Military History; A Library of Confederate States History, Written by Distinguished Men of the South*, 17 vols. (Atlanta: Confederate Publishing Company, 1899); and D. Augustus Dickert, *History of Kershaw's Brigade, With Complete Roll of Companies, Biographical Sketches, Incidents, Anecdotes, Etc.* (Newberry, SC: Elbert H. Aull, 1899).

¹² Francis A. Walker, *History of the Second Army Corps in the Army of the Potomac* (New York: Charles Scribner's Sons, 1887), 11, 13. Note the polysemous nature of Walker's reference to Jupiter.

book *The Influence of Firearms Upon Tactics* (1876), he recognized the tactical advantage enjoyed by the defense, due primarily to the widespread use of rifled muskets, artillery guns, and field fortifications. Despite these advantages, however, Karl argued that the tactical offensive could still carry the day on the battlefield, as long as the troops were properly trained. “The American infantry,” he scoffed, “were wanting in the tactical discipline and thorough training necessary to carry on a fight in the same manner as the Prussian infantry would.” Karl was not alone in his negative assessment of the combat effectiveness of American Civil War soldiers. His European counterparts drew similar condescending conclusions. Together, they unwittingly contributed to the unfortunate momentum that drove thousands of men into the bloody fields of northern France in World War I.¹³

Not everyone who studied the Civil War believed that the combination of elite leadership and hard training provided a solution to the tactical problems imposed by defensive firepower and field fortifications. John D. Young, in his post-war essay titled “A Campaign With Sharpshooters,” recognized the significance of a single behavioral

Jupiter is not only the fifth planet from the sun but was also one of the names given to the greatest deity in Roman mythology.

¹³ Friedrich Karl, *The Influence of Firearms Upon Tactics*, trans. E. H. Wickham (London: Henry S. King and Company, 1876), 120. For other examples of European military theorists who felt that well-trained soldiers executing offensive tactics still controlled the battlefield, see William Balck, *Modern European Tactics*, trans. Louis R. M. Maxwell (London: Sands and Company, 1899); and Jean Lambert Alphonse Colin, *The Transformations of War*, trans. L. H. R. Pope-Hennessy (London: Hugh Rees, 1912). For analysis of the impact of the American Civil War on European military theory, see Jay Luvaas, *The Military Legacy of the Civil War: The European Inheritance* (Chicago: University of Chicago Press, 1959). Finally, for an introduction to World War I, particularly the combination of forces that caused the conflict and shaped the nature of combat on the western front, see James Joll, *The Origins of the First World War* (Essex: Longman House, 1984); Martin Samuels, *Doctrine and Dogma: German and British Infantry Tactics in the First World War* (Westport, CT: Greenwood Press, 1992); Hubert C. Johnson, *Breakthrough: Tactics, Technology, and the Search for Victory on the Western Front in World War I* (Novato, CA: Presidio Press, 1994); Paddy Griffith, *Battle Tactics of the Western Front: The British Army and the Art of Attack, 1916-1918* (New Haven, CT: Yale University Press, 1994); and Bill Rawling,

variable in combat—small-group cohesion. Young examined the way in which Confederate General Robert E. Lee tapped into the power of small-group cohesion during the last twelve months of the war. Because Lee was constantly pitted against superior Federal strength, Young argued, the Virginian hoped to bolster his army by creating permanent, cohesive sharpshooter battalions. He ordered that each brigade form a battalion of sharpshooters (approximately 185 men), with the intent that these small units learn to fight with the effective force of two to three times their actual strength.¹⁴

Young compared these permanent battalions with their non-permanent forerunners and concluded that the short-lived sharpshooter units suffered from a lack of cohesion because both the enlisted men and the officers were only temporarily detached from the regiments within the brigade. Consequently, the troops were unfamiliar with each other, and individual soldiers sometimes refused to trust the man next to them with their lives. “. . . [I]f there is any one thing . . . that is well calculated to destroy the efficiency of a soldier,” Young stated, “it is the suspicion that his comrades are going to give way.” Therefore, the new sharpshooter battalions of 1864 were permanently separated from their original regiments and formed unique bodies of troops. They camped, trained, and marched together; they were exempted from all regimental and camp duty; and they performed picket duty only when facing the enemy. The new sharpshooters specialized in both loose-order and skirmish tactics and emphasized personal initiative. Young concluded that through the cohesiveness of the new,

Surviving Trench Warfare: Technology and the Canadian Corps, 1914-1918 (Toronto: University of Toronto Press, 1992).

¹⁴ John D. Young, “A Campaign With Sharpshooters,” in *Annals of the War: Written by Leading Participants North & South*, ed. Alexander K. McClure (Philadelphia: Philadelphia Times Weekly, 1879), 267-85.

permanent, tight-knit sharpshooter battalions, General Lee successfully increased the combat effectiveness of his outnumbered forces.¹⁵

Stephen Crane was another post-war author who emphasized small-group cohesion over other variables when considering combat effectiveness. In *The Red Badge of Courage* (1895), a fictitious account of Henry Fleming's experiences during an unnamed battle (presumably the Battle of Chancellorsville), Crane described the inexperienced soldier's doubts and fears regarding both the lethality of combat and his unpredictable reaction to it. During the chaos of battle, Fleming discovered that his anxiety disappeared. He was no longer an individual; rather, he was a member of a group. He was part of something bigger than himself. Crane described the newly discovered cohesion between young Fleming and his peers with this simple analogy: the soldier could not remove himself from the group any more than his small finger could detach itself from his hand. Though he did not label the force that bound the soldiers together, Crane recognized the power of small-group cohesion in combat.¹⁶

Despite the scholarship of late-nineteenth-century authors like Young and Crane, most analyses of Civil War combat continued to concentrate on the physical environment

¹⁵ Ibid., 268. An examination of both primary and secondary literature regarding the last year of the Civil War reveals the dangerous efficiency that both Confederate and Federal sharpshooters had achieved. See Wyman S. White, *The Civil War Diary of Wyman S. White, First Sergeant of Company "F" of the 2nd United States Sharpshooter Regiment (New Hampshire Men) in the Army of the Potomac, 1861-1865* (Hemet, CA: Russell C. White, 1979); James I. Robertson, Jr., ed., *The Civil War Letters of General Robert McAllister* (Baton Rouge: Louisiana State University Press, 1998), 502; John H. Rhodes, *The History of Battery B, First Regiment Rhode Island Light Artillery, in the War to Preserve the Union, 1861-1865* (Providence: Snow and Farnham, 1894), 325-33; William S. Dunlop, *Lee's Sharpshooters; or, The Forefront of Battle: A Story of Southern Valor That Never Has Been Told* (Little Rock, AR: Tunnah and Pittard, 1899); John Horn, *The Petersburg Campaign: The Destruction of the Weldon Railroad: Deep Bottom, Globe Tavern, and Reams Station, August 14-25, 1864* (Lynchburg, VA: H. E. Howard, 1991), 122-40; and Wiley Sword, *Hiram Berdan: His Famous Sharpshooters and Their Sharps Rifles* (Lincoln, RI: A. Mowbray, 1988).

¹⁶ Stephen Crane, *The Red Badge of Courage* (New York: Bantam Books, 1964), 32-33.

of the battlefield. By the turn of the century, several American intellectuals began to analyze statistically certain physical variables in Civil War combat—specifically, strength and casualty data. Frederick Phisterer, a German-born immigrant who earned the Congressional Medal of Honor for bravery and valor during the battle of Stones River, opened this avenue of inquiry with his study titled *Statistical Record of the Armies of the United States* (1883). He limited his analysis to the Federal armies, providing data ranging from their strengths and organizations, to their numbers of casualties per battle, to their commanders' service records. Despite his broad collection effort, Phisterer's study suffered from two weaknesses. First, his data were organized by army. No organizational unit below that of an army can be separated for more rigorous scrutiny. Second, Phisterer drew no conclusions from his data. He simply presented strength and casualty figures and expected the data to speak for themselves. Nevertheless, Phisterer deserves credit for pioneering statistical analysis of Civil War combat.¹⁷

It did not take long for another statistical analysis of Civil War combat to appear. Six years after Phisterer's study, William Fox published *Regimental Losses In The American Civil War, 1861-1865* (1889). Influenced both by Phisterer's data on the Civil War and by Ernst Engels's work on the Franco-Prussian War, Fox placed the regiment,

¹⁷ Frederick Phisterer, *Statistical Record of the Armies of the United States* (New York: Charles Scribner's Sons, 1883). Phisterer also published a five-volume compendium on New York regiments during the Civil War in which he traced their combat histories, emphasizing their losses in each battle. See Frederick Phisterer, *New York in the War of the Rebellion: 1861 to 1865*, 5 vols. (Albany: F. B. Lyon Company, 1912). Note that Phisterer lived in an intellectual milieu heavily influenced by scientific ideas and concepts. Truth and objectivity, scholars believed, were intellectually attainable through painstaking research and simple presentation of their findings. The facts would speak for themselves. The less historians interpreted their data, the better. This explains why Phisterer and his contemporaries consistently refused to interpret their combat data. For an introduction to the intellectual environment of late-nineteenth-century America, see Michael Kraus and Davis D. Joyce, *The Writing of American History* (Norman: University of Oklahoma Press, 1985), 136-63; and Peter Novick, *That Noble Dream: The*

not the army, at the center of his study. Like Phisterer, Fox used strength and casualty data to measure the fighting abilities of various Federal regiments, implying that those regiments that suffered more casualties fought harder and enjoyed greater success than their less-bloodied brethren. Taking his analysis one step further, however, Fox created a list of the top “Three Hundred Fighting Regiments.” It included all Federal regiments that either sustained a minimum of 130 men killed in combat, or whose percentage of killed, in Fox’s opinion, entitled them to a place in the list. Although chronologically second to Phisterer’s study, Fox’s compilation of the “Three Hundred Fighting Regiments” represents the first attempt to statistically quantify Civil War combat effectiveness at the regimental level.¹⁸

In 1901 Thomas Livermore joined the dialogue with his statistical combat analysis, *Numbers and Losses in the Civil War in America, 1861-65*. Using the army as his basic unit for analysis, Livermore compiled both strength and casualty data on both sides in most of the major battles of the war. However, Livermore recognized that strength and casualty data did not fully account for the martial capacity of the men. He therefore added the variables of “courage,” and “efficiency.” Though he never defined the new variables, Livermore attempted to measure the courage and efficiency of the

“Objectivity Question” and *the American Historical Profession* (Cambridge: Cambridge University Press, 1988).

¹⁸ Fox’s earliest work regarding Civil War casualty analysis was a short article published in 1884. His later monograph was an expansion of that article. See William F. Fox, “Regimental Losses: Killed in Battle or Died of Wounds,” *Grand Army Scout and Soldiers’ Mail* 3 (April 12, 1884): 6; and Fox, *Regimental Losses In The American Civil War, 1861-1865: A Treatise On The Extent And Nature Of The Mortuary Losses In The Union Regiments, With Full And Exhaustive Statistics Compiled From The Official Records On File In The State Military Bureaus And At Washington* (Albany, NY: Albany Publishing Company, 1889). Fox admitted being influenced by Ernst Engel’s work on casualty analysis of the Franco-Prussian War. See Ernst Engel, *Die Verluste der deutschen Armeen an Offizieren und Mannschaften im Kriege gegen Frankreich 1870 und 1871* (Berlin: Verlag des Königlichen Statistischen Bureaus, 1872).

opposing armies by conducting two calculations per battle: the number “Hit in 1000” and the number “Hit by 1000.” The former stated the number of casualties that an army sustained per 1,000 men; the latter stated the number of casualties that the same army inflicted per 1,000 men. At Fredericksburg, for example, Livermore showed that both the Federal and Confederate “Hit in 1000” were 103 and 64 respectively, and their “Hit by 1000” were 44 and 150 respectively. If these data are converted into simple percentages, they suggest that approximately 4 percent of the Union troops hit their targets during battle while 15 percent of the Confederates struck theirs. Similarly, the data show that approximately 10 percent of the Federal force was either killed or wounded as compared to only 6 percent of the Confederate force. In other words, the average Confederate soldier was over three times more effective with his weapon and only half as likely to be hit. Consequently, Livermore suggests that the Confederate army at Fredericksburg demonstrated greater combat effectiveness.¹⁹

Frederick Dyer was the last of the early Civil War historians to provide a statistical analysis of the conflict. His three-volume study, *A Compendium of the War of the Rebellion* (1908), is less analytical and more descriptive than Livermore’s. Dyer presented data ranging from numbers of Federal troops furnished by each state to historical synopses of many of the Federal regiments that fought in the war. Similar to Fox’s list of the “Three Hundred Fighting Regiments,” Dyer provided a list of the nine hundred regiments that suffered fifty or more men killed or mortally wounded in combat. Though never explicitly stated by the author, it is likely that Dyer’s list of nine hundred

¹⁹ Thomas L. Livermore, *Numbers and Losses in the Civil War in America, 1861-65* (Boston: Houghton, Mifflin and Company, 1901), 70-145.

regiments was his attempt to identify those regiments that experienced the hardest fighting and demonstrated the highest degree of combat effectiveness.²⁰

World War I forced a temporary lull in Civil War combat analysis. After the war, however, scholarly inquiry into the behavioral aspects of combat began. European historians led the way. In 1925, for example, British military historian J. F. C. Fuller offered a philosophical theory of warfare. Fuller focused on the role of the commanding general and divided his combat experience into three intersecting spheres of influence: mental, physical, and moral. The mental sphere represented the intellectual capacity of the general. The physical sphere represented the physical realities of the battlefield. The moral sphere represented the personality of the commander. Fuller believed that within the commanding general all three of these spheres converged, but that the moral sphere served as the bridge between the mental and physical sphere. In other words, both the general's decision-making ability and use of physical resources were affected by his character. Together, the interplay among these three spheres ultimately determined success or failure for the commander and his soldiers.²¹

Because of the nature of Fuller's aristocratic approach to understanding warfare, it is not surprising that when Fuller applied his theory to the American Civil War, he naturally focused on the war's leading figures—Grant and Lee. The few times that Fuller

²⁰ Frederick H. Dyer, *A Compendium of the War of the Rebellion Compiled and Arranged from Official Records of the Federal and Confederate Armies Reports of the Adjutant Generals of the Several States, the Army Registers and Other Reliable Documents and Sources*, 3 vols. (Des Moines, IA: Dyer Publishing Company, 1908).

²¹ This summary of Fuller's theory emphasizes the author's focus on the commanding general and his role in achieving military success. Fuller, on the other hand, claimed that his theory could be applied equally well to tactical situations (*i.e.*, regiments and infantrymen). However, he never developed the tactical ramifications of his ideas. John F. C. Fuller, *The Foundations of the Science of War* (London: Hutchinson and Company, 1925). Pioneering French psychologist Charles Coste offered similar insight

addressed tactical situations during the Civil War, he assumed the traditional approach to combat analysis: he emphasized the physical aspects of the battlefield. Specifically, Fuller acknowledged that the increased effective range of the rifled musket led to the supremacy of the defense over the offense and forced both sides to seek cover throughout most of the war.²² Although Fuller recognized the significance of both the physical and mental aspects of combat, he failed to apply them in a meaningful way to the opposing armies. Instead, he focused on the commanders and reiterated the traditional environmental interpretation of Civil War combat.²³

Several years later a German infantry officer echoed Fuller's sentiments regarding the complex nature of combat, but the Prussian placed greater emphasis on its behavioral components. In his book *Battle Leadership* (1933), Adolf Von Schell acknowledged that officers must heed the physical realities of the battlefield, but he added that the mental condition of the men was equally important. Only through a clear psychological understanding of his men, argued Von Schell, could a commander achieve success on the battlefield. "Unfortunately," Von Schell added, "we cannot formulate a set of psychological rules [for combat success]; human reactions can never be reduced to an exact science. War is governed by the uncertain and the unknown[,] and the least known factor of all is the human element." In his conclusion Von Schell lamented the pitiful

into the behavioral aspects of combat, particularly the relationship between courage, group cohesion, and combat effectiveness. See Charles Coste, *La Psychologie du Combat* (Paris: Berger-Levrault, 1929).

²² Most scholars would disagree with Fuller's claim that Civil War soldiers used field entrenchments throughout most of the war. Historians generally agree that Civil War soldiers did not begin to take cover during battle until either late 1862 or early 1863. See John F. C. Fuller, *The Generalship of Ulysses S. Grant* (London: J. Murray, 1929), 62.

²³ See John F. C. Fuller, *Grant and Lee: A Study in Personality and Generalship* (Bloomington: Indiana University Press, 1957), 242-83; and Fuller, *The Generalship of Ulysses S. Grant*, 47-66, 209-28, 356-81, 413-21.

state of combat psychology: “Long experience has taught us that we know too little of the small incidents of war. . . . In peace we learn how to lead companies, battalions, regiments, even divisions and armies. We learn in books and by maps how one fights and wins battles, but we are not instructed in the thoughts, the hopes, the fears that run riot in the mind of the front-line soldier.”²⁴

After the experience of World War II, American scholars began seriously studying human behavior in combat. Brigadier General Samuel Marshall’s classic study, *Men Against Fire* (1947), opened this avenue of inquiry and may be credited with establishing the behavioral approach to combat analysis. In his book Marshall argued that the primary motivating factor for men in combat was small-group cohesion. Because the men were mutually dependent upon one another for their survival, they understood that they had to perform their group function regardless of the situation. Likewise, they expected their comrades to do the same. The men understood that success rested squarely on their shoulders. “Men do not fight for a cause,” Marshall concluded, “but because they do not want to let their comrades down.”²⁵

The hypothesis that small-group cohesion was the tie that bound soldiers together in battle and maintained the effectiveness of the unit was validated in an exhaustive inquiry into the attitudes and opinions of World War II soldiers. Samuel Stouffer is

²⁴ Adolf Von Schell, *Battle Leadership: Some Personal Experiences of a Junior Officer of the German Army with Observations on Battle Tactics and the Psychological Reactions of Troops in Campaign* (Fort Benning, GA: The Benning Herald, 1933), 19, 25.

²⁵ Samuel L. Marshall, *Men Against Fire* (New York: William Morrow and Company, 1947), 161. For an excellent analysis of Samuel L. Marshall, his work, and his legacy, see Frederick D. Williams, *SLAM: The Influence of S. L. A. Marshall on the United States Army* (Fort Monroe, VA: Office of the Command Historian, U. S. Army Training and Doctrine Command, 1990). Two other scholars applied the behavioral paradigm to the German army in an attempt to understand why Germany lost World War II. See

generally credited with producing this study, *The American Soldier: Combat and Its Aftermath* (1949). It was based on numerous surveys of U. S. Army personnel during World War II. Using scientific methodologies, Stouffer reinforced what Marshall had argued two years earlier. Specifically, Stouffer discovered that small-group cohesion motivated soldiers, compelled them to fight not only for themselves but for their comrades, and created an effective fighting unit.²⁶

Bell Wiley was the first Civil War historian to examine the wartime experiences of both Confederate and Federal soldiers in an effort to understand the war from the common soldier's perspective. His books, *The Life of Johnny Reb* (1943) and *The Life of Billy Yank* (1952), detail aspects of the soldiers' lives ranging from enlistment to venereal disease. Regarding combat performance, Wiley focused on the behavioral aspects of their experiences. He found that both Confederate and Federal soldiers depended upon courage to overcome cowardice. If they acted courageously, they would fight effectively. According to Wiley, the men felt that it was better to die facing the enemy in battle than to flee and face the humiliation and shame of their cowardly acts. In other words, it was the mental force of courage, not external physical pressures, that compelled the soldiers to fight effectively.²⁷

Edward Shils and Morris Janowitz, "Cohesion and Disintegration in the Wehrmacht in World War II," *Public Opinion Quarterly* 12 (Winter 1948): 280-315.

²⁶ Stouffer is the name most commonly associated with this study, but he was only one of several psychologists, sociologists, and military analysts who contributed to the work. See Samuel A. Stouffer, Arthur A. Lumsdaine, Marion H. Lumsdaine, Robin M. Williams, Jr., M. Brewster Smith, Irving L. Janis, Shirley A. Star, and Leonard S. Cottrell, Jr., *Studies in Social Psychology in World War II*, vol. 2, *The American Soldier: Combat and Its Aftermath* (Princeton: Princeton University Press, 1949), 95-104.

²⁷ Bell I. Wiley, *The Life of Johnny Reb: The Common Soldier of the Confederacy* (Baton Rouge: Louisiana State University Press, 1943), 28-35, 68-89; and Wiley, *The Life of Billy Yank: The Common Soldier of the Union* (Baton Rouge: Louisiana State University Press, 1952), 66-95.

One prominent Civil War historian, however, challenged Wiley's thesis while remaining within the behavioral school of combat analysis. Bruce Catton, in his essay titled "Unit Discipline and Leadership in the Civil War" (1956), acknowledged that courage on the battlefield was important, but Catton did not believe that courage alone could explain combat effectiveness. Instead, Catton looked to leadership and small-group cohesion as the wellsprings for combat effectiveness. Because men were generally recruited from the same community, they knew each other and felt compelled to do their duty for fear of disgrace—disgrace among their peers in the army and among their families at home. The cohesion resulting from peer pressure, however, was not enough to ensure combat effectiveness. Leadership was the other vital ingredient. According to Catton, the type of leadership required was of the common-sense variety. Because the soldiers were citizens who lived in a strongly democratic society, they could not be coerced by small-minded dictators. Rather, courageous leadership through example was required. The men respected that. Through the combination of cohesion and leadership, Catton concluded, Civil War regiments became effective fighting units.²⁸

The centennial anniversary of the American Civil War marked an outpouring of scholarship. Civil War tactics became a rapidly expanding field of study as the environmental approach to combat analysis enjoyed a renaissance. Though not expressly addressing the question of combat effectiveness, these tactical historians discussed the physical realities of Civil War battlefields and attempted to understand the changing nature of infantry combat. John Mahon, in his essay titled "Civil War Infantry Assault

²⁸ Bruce Catton, "Unit Discipline and Leadership in the Civil War," *Marine Corps Gazette* 40 (January 1956): 18-25.

Tactics” (1961), examined the rifled musket and its impact on Civil War tactics. He found that by late 1862 rifled muskets had replaced smoothbore muskets, and because of the increased effective range of rifled muskets, defenders began to entrench whenever battle appeared imminent. Consequently, the tactical advantage shifted from offense to defense, leaving offensive-minded generals searching for less destructive combat tactics than linear frontal attacks against entrenched opponents armed with rifled-muskets. The continued high casualty rates suggest that no viable alternative was found. Mahon concluded by arguing that offensive combat effectiveness was nearly impossible to attain because of the increased use of the rifled musket and the development of tactical field fortifications.²⁹

Edward Hagerman’s dissertation expanded and refined Mahon’s thesis. In his work titled “The Evolution of Trench Warfare in the American Civil War” (1965), Hagerman agreed that the rifled musket significantly altered the nature of combat. Yet Civil War soldiers clung to the traditional belief that a strong frontal assault could carry almost any defensive position. Unfortunately, nearly every such assault resulted in total failure and chilling death for the attackers. In addition to the impact of the rifled musket, Hagerman added the impact of pre-war doctrine, tactics, logistics, military intelligence, combat experience, and nineteenth-century American democracy to his environmental calculus of Civil War combat. Combined with the increased lethality of the rifled musket,

²⁹ John K. Mahon, “Civil War Infantry Assault Tactics,” *Military Affairs* 25 (Summer 1961): 57-68. Fascination with the physical realities of Civil War combat existed outside the academy as well. For example, gun collector Jac Weller meticulously tested the accuracy of various Civil War muskets (both smoothbore and rifled) in an effort to discover their true lethality. He concluded that rifled muskets were far more accurate than smoothbore muskets and that sharpshooter rifles were the most accurate of all. See Jac Weller, “Shooting Confederate Infantry Arms: Part 1,” *The American Rifleman* 102 (April 1954): 42-

Hagerman concluded, these additional external forces transformed Civil War combat into a dismally bloody stalemate.³⁰

Two years later Thomas Moseley produced his own dissertation on Civil War tactics, “Evolution of American Civil War Infantry Tactics” (1967). Like his predecessors, Moseley believed that the rifled musket brought bloody changes to the tactical nature of mid-nineteenth-century warfare. However, Moseley also considered the behavioral aspects of Civil War combat. He argued that, “. . . it is extremely difficult to separate tactics from the existing state of morale and discipline of the men in the ranks, and the degree of leadership exerted by the officers and noncommissioned officers at a specific time.” Morale, discipline, and leadership were still vital components of combat effectiveness despite the tactical advantage enjoyed by the defense due to the rifled musket and field fortifications. In other words, Moseley reminded his colleagues that the behavioral aspects of combat should not be overlooked, despite the then current trend of emphasizing the environmental elements of the battlefield.³¹

The Vietnam War had a profound impact on many Americans, including Civil War scholars. As the resource-laden U. S. Army suffered setbacks at the hands of a smaller, poorer, weaker military force, some Civil War scholars became dissatisfied with the environmental approach to combat analysis. If such physical variables as strength, casualties, and weaponry could not be used as predictors for combat success, then some

44; *ibid.*, Part 2, (May 1954): 22-24; *ibid.*, Part 3 (June 1954): 41-42; and Weller, “Civil War Minie Rifles Prove Quite Accurate,” *The American Rifleman* 119 (July 1971): 36-40.

³⁰ Edward H. Hagerman, “The Evolution of Trench Warfare in the American Civil War” (Ph.D. diss., Duke University, 1965). For a summary of his dissertation, see Hagerman, “From Jomini to Dennis Hart Mahan: The Evolution of Trench Warfare and the American Civil War,” *Civil War History* 13 (September 1967): 197-220.

other variables must be used to explain America's combat experience in Vietnam.

Consequently, scholars shifted their analyses of combat from environmental to behavioral aspects.³²

Psychologists began the dialogue by dissecting such behavioral variables as courage, morale, cohesion, and leadership. However, the trend among mental health professionals was to associate combat effectiveness with small-group cohesion. These combat psychologists concluded that small-group cohesion was the soldier's best defense against the immense mental stress that fear inflicted upon him during battle. Through hours of working, training, and fighting, the soldiers gelled as a team and developed a bond of trust that only death could break. In other words, combat effectiveness depended more on the mental state of the soldiers than on the physical state of the battlefield.³³

British historian John Keegan is generally credited with bridging the intellectual gap between military history and psychology. His influential combat study, *The Face of Battle* (1976), marked the intellectual arrival of the behavioral approach to military

³¹ Thomas Vernon Moseley, "Evolution of American Civil War Infantry Tactics" (Ph.D. diss., University of North Carolina at Chapel Hill, 1967), 343.

³² Vietnam veterans frequently explained their combat experiences in terms of such behavioral factors as small-group cohesion and leadership. See James R. McDonough, *Platoon Leader* (Navato, CA: Presidio Press, 1985); and Harold G. Moore and Joseph L. Galloway, *We Were Soldiers Once . . . and Young: Ia Drang—The Battle That Changed the War in Vietnam* (New York: Random House, 1992). For analysis of the role of the media in shaping American public sentiment, see Ward S. Just, "Saigon and Other Syndromes—A Reporter Looks Back: December 1965-May 1967," in *Reporting Vietnam*, 2 vols., ed. Library Classics of the United States (New York: R. R. Donnelley and Sons, 1998), 1:348-70; and William M. Hammond, *Reporting Vietnam: Media and the Military at War* (Lawrence: University Press of Kansas, 1998).

³³ For an introduction to the combat psychology studies of the post-Vietnam era, see Lord Moran, *The Anatomy of Courage* (London: Constable Press, 1966); J. Baynes, *Morale: A Study of Men and Courage* (New York: Frederick A. Praeger, 1967); F. M. Richardson, *Fighting Spirit: A Study of Psychological Facets in War* (London: Leo Cooper, 1978); Sam C. Sarkesian, ed., *Combat Effectiveness: Cohesion, Stress, and the Volunteer Military* (Beverly Hills: Sage Publications, 1980); Anthony Kellett, *Combat Motivation: The Behavior of Soldiers in Battle* (Boston: Kluwer Publishing, 1982); Elmar Dinter, *Hero or Coward: Pressures Facing the Soldier in Battle* (London: Frank Cass, 1985); and Gregory Belenky, ed., *Contemporary Studies in Combat Psychiatry* (New York: Greenwood Press, 1987).

history, including Civil War history. As a respected British military historian, Keegan challenged his peers on both sides of the Atlantic to study warfare, not from the general's perspective but rather from the infantryman's perspective. Too much had been written about generals, strategies, and tactics. Instead, Keegan endeavored to “. . . catch a glimpse of the face of battle . . .” by examining weapons and the wounds they inflicted, leadership at the lowest level, small-group cohesion, and individual attitudes. In essence, Keegan believed that combat was a “moral conflict,” and discovering the mental forces that caused a man to stand and fight, despite his fear and survival instincts, was the most fundamental step toward understanding warfare in general.³⁴

By the late 1980s Civil War historians began to include the behavioral aspects of combat in their analyses of the war. Gerald Linderman opened the dialogue with *Embattled Courage* (1987). His pioneering work deserves credit, not only for being one of the first Civil War studies to examine the mental aspects of combat, but also for combining both the behavioral and environmental approaches in his analysis. He argued that courage was at the center of the soldier's mental world. Courage, the soldiers believed, would carry them safely through battle and lead them to victory. Technology, however, destroyed their faith in courage. Rifled muskets and defensive trenches twisted the soldiers' concept of courage. Instead of courage leading to victory, it led to death. The most gallant soldiers were the first to die in the futile frontal assaults common on

³⁴ John Keegan, *The Face of Battle: A Study of Agincourt, Waterloo and the Somme* (New York: Viking Press, 1976). In fairness to Pete Maslowski, it should be noted that his pioneering study of the behavioral aspects of Civil War combat, specifically morale, ideology, and leadership, preceded Keegan's monograph by six years. Though Maslowski was most interested in comparing Civil War soldiers with their World War II counterparts, the fact that he studied behavioral aspects of combat earlier than any of his peers foreshadowed the changing nature of Civil War scholarship on the topic. See Pete Maslowski, “A

Civil War battlefields. Linderman concluded that the physical realities of the battlefield had destroyed the men's mental armor. In essence, combat effectiveness depended on technology, not on the attitudes and feelings of the men.³⁵

Reid Mitchell followed one year later with his behavioral study titled *Civil War Soldiers* (1988). Mitchell concentrated on the mental aspects of the men and the ways in which their psyches changed as the war progressed. He argued that the realities of combat, especially the way in which both weapons technology and linear tactics reduced battles to indecisive bloodlettings, caused the men to create new identities better suited for the unanticipated horrors of war. Fundamentally, Mitchell agreed with Linderman. Both scholars felt that the physical aspects of the combat environment dominated Civil War battlefields, and the soldiers were forced to adjust in an effort to survive.³⁶

Simultaneous with the post-Vietnam outpouring of scholarship on the behavioral aspects of combat, there was a steady stream of combat analyses that continued in the traditional environmental pattern. Perry Jamieson's 1979 dissertation led the way. Simply titled "The Development of Civil War Tactics," this work argued that changes in weapons technology and combat tactics caused the bloody stalemates so often experienced by Civil War soldiers. He began by illustrating how the Mexican War fostered a dangerous trust in linear tactics among U. S. Army officers. With the

Study of Morale in Civil War Soldiers," *Military Affairs: The Journal of Military History, Including Theory and Technology* 34 (December 1970): 122-26.

³⁵ Gerald F. Linderman, *Embattled Courage*; and Linderman, "The Burden of Civil War Combat," *Northwest Ohio Quarterly* 62 (Winter, Spring 1990): 3-10.

³⁶ Reid Mitchell, *Civil War Soldiers: Their Expectations and Their Experiences* (New York: Viking Press, 1988).

development of the rifled musket, however, linear tactics became futile.³⁷ In an effort to escape the lethal firepower that dominated the battlefield, combatants entrenched. Thus the trenches that scarred the fields of northern Virginia presaged the trenches that would scar the fields of northern France fifty years later. Only after the Civil War, Jamieson concluded, would the U. S. Army attempt to reconcile its wartime experience with tactical doctrine. In the end, the Army had only limited success.³⁸

Perry Jamieson reiterated his thesis that the increased range of the rifled musket made Napoleonic tactics obsolete and deadly in his collaborative effort with Grady McWhiney titled *Attack and Die* (1982). By comparing army strength and casualty data from various battles throughout the war, the authors argued that the lethality of the rifled musket, coupled with the innate aggressive nature of most southerners due to their Celtic heritage, resulted in a regional offensive-mindedness that ultimately led to the defeat of the Confederacy. Linear offensive tactics employed against an entrenched opponent armed with rifled muskets resulted in casualty rates too high for the Confederacy to withstand. The authors concluded that, “. . . it was the rifle that won the war for the North—the rifle along with the refusal of Southerners to admit until they had bled

³⁷ The linear tactics used during both the Mexican War and Civil War were intended to keep the soldiers pressed closely together in order to maintain organization, concentrate firepower, and provide the tactical shock necessary for successful bayonet charges. This meant that the typical infantry regiment frequently deployed in a linear formation known as a “line of battle.” A line of battle usually consisted of two ranks (or lines) of soldiers, with the second rank spaced approximately thirteen inches behind the first. Within each rank the men were aligned elbow-to-elbow and instructed to maintain physical contact as they advanced.

³⁸ Perry D. Jamieson, “The Development of Civil War Tactics” (Ph. D. diss., Wayne State University, 1979); and Jamieson, *Crossing the Deadly Ground*. Steve Fratt, a graduate student at the University of California at Santa Barbara, indirectly refuted Jamieson’s argument that the rifled musket dominated Civil War battlefields by claiming that regimental articulations prescribed in William J. Hardee’s tactical manual proved effective in combat for the 22nd Massachusetts Volunteer Infantry Regiment. See Steve Fratt, “American Civil War Tactics: The Theory of W. J. Hardee and the Experience of E. C. Bennett,” *Indiana Military History Journal* 10 (January 1985): 4-17.

themselves nearly to death that the rifle's killing power could check even the most courageous charges." In other words, the Confederates attacked and died. Despite their best efforts, southern soldiers could not overcome the physical realities of the combat environment.³⁹

One year later Herman Hattaway and Archer Jones produced a military history of the Civil War titled *How The North Won* (1983). Included among the myriad issues they addressed is a limited quantitative analysis of Civil War combat. The authors' analysis was based on the belief that the physical realities of the battlefield most influenced combat outcomes. Specifically, they believed that the rifled-musket and defensive field fortifications rendered offensive tactics ineffective and costly. Working within the traditional environmental school of thought, Hattaway and Jones examined the strengths, casualties, tactics, and outcomes for both the Federal and Confederate armies in twenty-six major field engagements that took place during the first three years of the war. They used Frederick W. Lanchester's square law to compare strengths and casualties with tactics and outcomes. Hattaway and Jones concluded that the combat effectiveness of the Army of Northern Virginia was similar to that of other Confederate armies and that Robert E. Lee was a representative Confederate general, neither inflicting nor sustaining an unusual proportion of casualties. The authors admitted that their statistical analysis

³⁹ Grady McWhiney and Perry D. Jamieson, *Attack and Die*, 146. Jamieson again stressed the importance of the environmental aspects of Civil War combat in a recent article. See Perry D. Jamieson, "Background to Bloodshed: The Tactics of the U.S.-Mexican War and the 1850s." *North and South: The Official Magazine of the Civil War Society* 4 (August 2001): 24-31.

was superficial, and they closed by expressing hope that their work would inspire others to conduct a more complete quantitative analysis of Civil War combat.⁴⁰

The next step in the analysis of the environmental aspects of Civil War combat was taken by Edward Hagerman in his monograph, *The American Civil War and the Origins of Modern Warfare* (1988). Hagerman accepted the argument that the rifled musket dominated the Civil War battlefield by giving the entrenched defense supremacy over the exposed offense. However, he expanded his analysis of Civil War combat beyond that of the American struggle by attempting to place it within the context of the Industrial Revolution and the transition from Napoleonic warfare to modern warfare. While much of Hagerman's work is beyond the scope of this study, it is important to note that Hagerman's thesis rested upon the belief that the rifled musket altered combat to such an extent that Civil War tactics, casualties, and outcomes foreshadowed those of World War I rather than mirrored those of the Napoleonic Wars.⁴¹

Scholars were quick to respond to Hagerman's discovery of the origins of modern warfare in the tragic years of the American Civil War. With regard to combat effectiveness and combat outcome, the essence of the dialogue begun by Hagerman was whether Civil War combat was more like that of World War I or the Napoleonic Wars.

⁴⁰ Lanchester's square law states that the losses sustained per unit of time by two opposing forces on a battlefield is directly proportional to their numerical strengths. See Frederick W. Lanchester, *Aircraft in Warfare: The Dawn of the Fourth Arm* (New York : D. Appleton and Company, 1917), 39-66; Herman Hattaway and Archer Jones, *How the North Won: A Military History of the Civil War* (Urbana: University of Illinois Press, 1983), 721-32. One of the sources cited by Hattaway and Jones argued against the use of Lanchester's square law for predicting combat outcomes for large-scale actions—exactly what Hattaway and Jones did. The author concluded that, "Lanchester's square law is the poorest among poor alternative choices of deterministic laws. . . ." See Daniel Willard, *Lanchester as Force in History: An Analysis of Land Battles of the Years 1618-1905* (McLean, VA: Research Analysis Corporation, 1962), 4. Hattaway recently reiterated his environmental approach to Civil War combat analysis. See Herman Hattaway, "The Changing Face of Battle," *North and South: The Official Magazine of the Civil War Society* 4 (August 2001): 34-43.

This limited, and arguably esoteric, debate continues today. The debate itself is not central to this study. The fact that the dialogue rests upon the assumption that the rifled musket revolutionized the physical nature of Civil War battlefields is important. The authors involved began their studies by accepting the theory that the increased lethality of Civil War combat was due to the deadly range and accuracy of the rifled musket. In their minds, the environmental aspects of Civil War battlefields dominated combat and dictated results.⁴²

James McPherson's theories regarding Civil War soldiers in combat dominated the behavioral interpretation throughout the 1990s. In his books on the subject, *What They Fought For* (1994) and *For Cause and Comrades* (1997), McPherson accepted the traditional argument regarding the superiority of defensive firepower and field fortifications over offensive tactics and argued that the impulses of courage, self-respect, group cohesion, and ideology were the main sources of combat motivation for the troops. These mental aspects of combat, coupled with the metaphysical bonds of personal religion and hometown community, transformed the volunteers from citizen-soldiers to warriors. Combat was the catalyst; it synthesized their emotions and galvanized their

⁴¹ Hagerman, *The American Civil War and the Origins of Modern Warfare*.

⁴² Jay Luvaas, "Tactical Exercises: From Drill Field To Battlefield," *MHQ: The Quarterly Journal of Military History* 1 (Spring 1989): 90-91; Mark E. Neely, Jr., "Was the Civil War a Total War?" *Civil War History* 37 (March 1991): 5-28; R. L. Cody, Allyn R. Vannoy, and Chris Perelle, "Fire vs. Shock," *Command: Military History, Strategy, and Analysis* 24 (September-October 1993): 68-79; James M. McPherson, "From Limited War to Total War in America," and Earl J. Hess, "Tactics, Trenches, and Men in the Civil War," in *On the Road to Total War: The American Civil War and the German Wars of Unification, 1861-1871*, ed. Stig Forster and Jorg Nagler (New York: Cambridge University Press, 1997), 295-309, 481-96; and Michael Marino, "Attack and Destroy: Lee, Napoleon, and the Civil War," *Columbiad: A Quarterly Review of the War Between the States* 1 (Winter 1998): 75-92.

spirit. Whatever the physical hardships, the metaphysical strength of the men maintained their effectiveness and helped them cope with the realities of war.⁴³

The end of the twentieth century was flush with scholarship regarding Civil War combat. Historians continued to employ both the environmental and behavioral approaches in their examinations of the war. Because of the behavioral paradigm's relative youth as an avenue of intellectual inquiry, it drew the attention of more late-twentieth-century scholars than the longer-lived environmental interpretation. Despite the recent disproportionate intellectual vitality of the two schools, the millennium would close with challenges arising in both schools of thought. One historian, working within the behavioral school, would question the accepted explanatory preeminence given to the environmental paradigm. Two other historians would challenge the internal consensus within each of their respective analytical approaches to understanding Civil War combat.

In *Lee's Miserables* (1998), J. Tracy Power argued that the metaphysical aspects of battle most influenced combat results. Through his examination of morale, cohesion, and leadership in the Army of Northern Virginia during the last year of the war, Power credited two behavioral variables for having the greatest impact on combat effectiveness.

⁴³ See James M. McPherson, *What They Fought For, 1861-1865* (Baton Rouge: Louisiana State University Press, 1994), and McPherson, *For Cause and Comrades*. For examples of Civil War historians who echo McPherson's sentiments, see Joseph A. Frank and George A. Reaves, "*Seeing the Elephant*": *Raw Recruits at the Battle of Shiloh* (New York: Greenwood Press, 1989); Larry J. Daniel, *Soldiering in the Army of Tennessee: A Portrait of Life in a Confederate Army* (Chapel Hill, University of North Carolina Press, 1991); Robert H. Bouilly, "Civil War Added NCO Roles," *The NCO Journal* 2 (Winter 1992): 20-21; Reid Mitchell, *The Vacant Chair: The Northern Soldiers Leaves Home* (New York: Oxford University Press, 1993); Gregory Coco, *The Civil War Infantryman: In Camp, on the March, and in Battle* (Gettysburg, PA: Thomas Publications, 1996); Earl J. Hess, *The Union Soldier in Battle*; Mark H. Dunkelman, "'A Just Right to Select Our Own Officers': Reactions in a Union Regiment to Officers Commissioned from Outside Its Ranks," *Civil War History* 44 (March 1998): 24-34; Jeffrey D. Wert, *A Brotherhood of Valor: The Common Soldiers of the Stonewall Brigade, C.S.A., and the Iron Brigade, U.S.A.* (New York: Simon and Schuster, 1999); Joseph C. Fitzharris, "'Our Disgraceful Surrender': The

“The success or failure of almost any offensive or defensive action undertaken,” Power argued, “no matter how complex or simple it might be, no matter how large or small, was often determined by two basic criteria: the performance of battlefield commanders and the extent of unit cohesion.” With full acknowledgment of environmental influences, Power asserted that combat leadership and small-group cohesion determined tactical success or failure during the Civil War. In his opinion, tactical actions, positions, and weaponry were incidental to leadership and cohesion.⁴⁴

The greatest challenge to the consensus within the behavioral approach was issued by Gerald Prokopowicz. In both his dissertation and a journal article, Prokopowicz argued that small-group cohesion proved a double-edged sword. Although the interdependence within a regiment accounted for a unit’s combat effectiveness and tactical resilience, it simultaneously limited a regiment’s ability to blend into its brigade, division, corps, and army. The result was a force capable of hard fighting in small-unit actions but incapable of harmonizing its effort with that of a higher organizational unit (e.g., brigade or division) when engaged in large-scale battles. Ironically, though the regiment may perform well under fire, its brigade or division may disintegrate into pockets of spasmodic, isolated, ineffective troops.⁴⁵

Similarly, the century closed with internal dissent among scholars working within the environmental school. In his monograph titled *Rally Once Again* (1987), British

Third Minnesota Infantry’s Disintegration and Reconstruction in 1862-1863,” *Military History of the West* 30 (Spring 2000): 1-20.

⁴⁴ J. Tracy Power, *Lee’s Miserables: Life in the Army of Northern Virginia from the Wilderness to Appomattox* (Chapel Hill: University of North Carolina Press, 1998), 295.

⁴⁵ See Gerald J. Prokopowicz “All for the Regiment: Unit Cohesion and Tactical Stalemate in the Army of the Ohio, 1861-1862” (Ph. D. diss., Harvard University, 1994); and Prokopowicz, “Tactical

military historian Paddy Grffith took aim at two targets. First, he argued that the rifled musket did not significantly affect Civil War combat tactics because the terrain upon which many of the battles were fought was so uneven or wooded that it negated the potential tactical advantages offered by the rifled musket's increased accuracy and range. He added that Civil War soldiers lacked the necessary training to employ their rifled muskets effectively at ranges beyond 150 yards. Second, Griffith concluded that the Civil War was not a modern precursor to World War I. Rather, it was tactically similar to the Napoleonic Wars. In essence, Griffith challenged both the intellectual consensus regarding the impact of the rifled musket on Civil War combat and the belief that the Civil War foreshadowed World War I.⁴⁶

Despite recent intellectual challenges, the environmental interpretation of Civil War combat has dominated most tactical analyses of the war. Whether writing after-action reports, letters to loved ones, personal memoirs, military biographies, campaign studies, small-unit histories, leadership analyses, soldier studies, or complete war histories, both soldiers and scholars frequently used the assumptions of the environmental school as their foundation for discussing Civil War combat. They emphasized the tactical dominance of defensive firepower over offensive shock tactics. In those studies that include the behavioral aspects of combat, the authors usually subordinated the mental condition of the soldiers to the physical realities of the battlefield. In other words, most

Stalemate: The Battle of Stones River," *North & South: The Magazine of Civil War Conflict* 2 (September 1999): 10-21, 24-28.

⁴⁶ Paddy Griffith, *Rally Once Again: Battle Tactics of the American Civil War* (Ramsbury, Marlborough, Wiltshire: Crowood Press, 1987); reprint, *Battle Tactics of the Civil War* (New Haven: Yale University Press, 1989).

historical studies that touched upon the nature of Civil War combat accepted the interpretation encapsulated in the environmental school of thought.⁴⁷

⁴⁷ Recent works by several prominent Civil War historians illustrate the wide acceptance of the environmental paradigm. See Brooks D. Simpson, *Ulysses S. Grant: Triumph over Adversity, 1822-1865* (Boston: Houghton Mifflin, 2000), 322-32; Gordon C. Rhea, *To the North Anna River: Grant and Lee, May 13-25, 1864* (Baton Rouge: Louisiana State University Press, 2000), 294-303; Wert, *A Brotherhood of Valor*, 124-25, 145-55, 206-8, 304-5; Thomas B. Buell, *The Warrior Generals: Combat Leadership in the Civil War* (New York: Crown Publishers, 1997), 330-38; McPherson, *For Cause and Comrades*, 3-5; and Russell F. Weigley, *A Great Civil War: A Military and Political History, 1861-1865* (Bloomington: Indiana University Press, 2000), 32-35.

CHAPTER 2

DATA AND METHODOLOGY

Any attempt to understand human behavior based on historical records requires the historian to make countless decisions regarding the pertinence, accuracy, and reliability of the information he or she collects. Traditional historians rely on their expertise and knowledge to determine what types of information to consider. The task is the same for quantitative historians. These researchers sift through documents and make the same decisions regarding each piece of information. It is in analyzing the collected information that traditional and quantitative historians differ. Whereas traditional historians use their knowledge and expertise to understand and discuss their subjects, quantitative historians use their knowledge, expertise, and statistical methods to understand and discuss their subjects. Quantitative researchers take the additional analytical step of pouring their data through various mathematical formulae, searching for patterns, trends, and correlations that may not otherwise be apparent. Despite their differences, both methodologies aim to reap the same rewards. They attempt to illuminate the past in meaningful ways for the present.¹

¹ Traditional and quantitative historians do not always agree on the appropriateness of each other's methodologies. For example, one historian argued that Civil War combat was too complex and varied to measure with rules and describe with numbers, and a quantitative researcher stated that Civil War combat was too complex and varied to be understood through non-quantitative methods. Ironically, each pointed to the multifaceted nature of combat as the reason for the other's failure. See William B. Hanke, "Fire and Maneuver at the Battle of Booneville," *Military Review* 53 (March 1973): 8-16; and Herbert K. Weiss, "Combat Models and Historical Data: The U.S. Civil War," *Operations Research: The Journal of the Operations Research Society of America* 14 (September-October 1966): 759-90.

Although traditional and quantitative historical studies share many similarities, extra caution is in order when examining quantitative studies. The absolute nature of numbers compared to the ambiguous nature of language can easily seduce the reader into placing too much reliance on numerical measurements. For example, the number used to describe a regiment's strength before going into battle is often an estimate of the unit's strength based on numerous conflicting sources. Whereas the traditional writer may deflect criticism of his or her strength estimate by using adverbs such as "approximately," "nearly," or "almost," the quantitative historian must select a single value in order for subsequent statistical analyses to have meaning. Rigorous research usually enables the quantitative historian to meet the demands of data precision with confidence. In certain cases, however, the accuracy implied by a number may be misleading. Therefore, a measure of skepticism on the reader's part is justified.

The fundamental building blocks for this work are the complete combat histories of the twenty-seven Federal regiments that happened to constitute the Army of the Potomac's First Division, Second Corps, from May 1, 1864, through the end of the war. The data have been divided into the following four data sets: Roster, Command, Armament, and Combat. Roster data detail the arrivals and departures of soldiers within each regiment. Command data describe each regiment's chain of command. Armament data delineate each regiment's weaponry. Combat data relate battle information for every significant engagement in which each of the twenty-seven regiments participated.² These

² A "significant engagement" is defined as an engagement that was either included in Frederick Phisterer's list of the 2,261 most significant battles during the Civil War, or an engagement understood by the Federal participants to have significance. See Frederick Phisterer, *Statistical Record of the Armies of the United States* (New York: Charles Scribner's Sons, 1883), 81-212.

four data sets offer a multifaceted account of each regiment's personnel and martial exploits throughout the war.

After the war most northern states compiled rosters of the men who served in their regiments. Delaware is the single exception.³ From these rosters, information regarding the arrival and departure of each soldier may be gleaned. Specifically, the rosters detail each man's name, when and how he joined the regiment, and when and how he separated from the regiment. All arrival and departure information fell into one of the following thirteen categories: deserted, died, discharged, executed, killed in action, missing in action, mustered in, mustered out, resigned, transferred to Veteran Reserve Corps, wounded in action, and miscellaneous inbound and miscellaneous outbound. These categories became the variables used to organize the roster information.⁴

To ascertain the influence that personnel changes may have had on a regiment's combat effectiveness, each unit's arrival and departure information was divided into segments. Each segment represented the period of time between the regiment's previous engagement and its subsequent engagement. In other words, the Roster data provide each regiment's between-battle personnel changes.⁵ Two distinct measurements mark these

³ One of the twenty-seven regiments included in this study is the 2nd Delaware. Because no regimental roster is available, all analyses of roster information will be based on the other twenty-six Federal regiments. The regimental rosters are available either in print at various research libraries or via the Internet through a private company, Historical Data Systems. After obtaining copies of several rosters from differing states, I compared the printed regimental rosters with their online counterparts and found that the electronic versions were so accurate that they maintained the same typographical mistakes found in the original rosters. Therefore, I used the electronic rosters to collect the regimental information. See "American Civil War Research Database," in the Historical Data Systems page on the Internet's World Wide Web at <http://www.civilwardata.com/>.

⁴ The died category includes all soldiers who died from either accidents or illnesses. Both the miscellaneous inbound and miscellaneous outbound categories include soldiers who transferred between regiments or branches of the military.

⁵ The between-battle personnel changes assigned to each regiment's first battle reflects all personnel changes that occurred between the organization of the unit and its first engagement.

changes. The first is the total number of soldiers represented in each circumstance. For example, if a regiment had two men desert between its second and third engagements, the regiment's *number deserted* variable assigned to the third engagement would have a value of "2," indicating that two men deserted some time between the regiment's second and third battles. The second measurement is the average number of days between the personnel changes and the regiment's subsequent battle. Continuing the above example, if one of the two deserters bolted ten days prior to battle and the other fled the morning of battle, then the regiment's *time between desertion and combat* variable would be the mean of the two values, or "5" days.

In addition to the between-battle data culled from the rosters, combat casualty information was also collected. When a soldier was either killed, wounded, missing, or taken prisoner during battle, the loss was usually included in the published roster entry pertaining to that particular soldier. Thus, the rosters provided three valuable bits of combat information: dates of casualties, number of casualties, and types of casualties. Cross-referencing these data with each soldier's date of entry into the regiment provides the "time-in-service" for each combat casualty. For example, during the Battle of Reams' Station on August 25, 1864, the 26th Michigan lost 15 men—2 killed, 3 wounded, and 10 missing or captured. From the regimental roster it was possible to identify each of these men, determine the number of days each served in the regiment prior to becoming a casualty, and calculate the soldiers' average time in service within each casualty type. In the case of the 26th Michigan, the 2 killed soldiers averaged 365 days in service, the 3 wounded men averaged 742 days in the regiment, and the 10 missing or captured soldiers

averaged 719 days in service.⁶ Time-in-service casualty data relative to each battle throws light on the relationship between time in service and combat performance.

Although the rosters were a rich source of information, their overall completeness varied. Some accounted for every man who served in the unit. These were exceptional. Most rosters contained varying numbers of soldiers' records with either "unknown date of entry," "unknown date of separation," or "unknown reason for separation." The missing data, however, were not enough to invalidate the use of the rosters. Of the nearly 50,000 men who served in the twenty-six regiments whose rosters were available, approximately 4,500 men (9 percent) had information missing in their service records. Of the 4,500 soldiers whose records were incomplete, some 3,400 men were missing information pertaining only to the *separation* of the soldiers from their regiments. In other words, the rosters provided complete *arrival* and *separation* information for approximately 45,500 men (91 percent) and complete *arrival* information for nearly 46,600 men (93 percent).⁷

The second data set includes all known personnel changes within the command hierarchy of each regiment throughout the war. Timelines for each regiment's commanding officers, as well as each regiment's respective brigade, division, corps, and army commanders, were created in an effort to understand the impact of command continuity on combat performance. Similar to the Roster data, the Command data were segmented into intervals of time. Unlike the Roster data, however, the segments of time

⁶ See "26th Michigan Personnel Listing" in "American Civil War Research Database [online database]."

⁷ The U.S. War Department's Compiled Military Service Records were not used to fill in roster data gaps because the gaps were not large enough to invalidate statistical analysis of the data.

used for the Command data began with the conclusion of each regiment's previous engagement and ended with the conclusion of each regiment's subsequent engagement. In other words, the Command data were divided in such a way as to describe the continuity or change in each regiment's chain of command from the end of one battle *through* the end of the next battle. Whereas the Roster data were segmented into between-battle periods of time, the Command data were segmented into periods of time stretching from the unit's previous battle through its subsequent battle.

Each segment of time includes both the total number of command changes at every level of a regiment's command hierarchy, as well as the average number of days between the various changes at each level of the command hierarchy and the conclusion of a regiment's next battle. For example, during the period of time between the battles of Antietam and Fredericksburg, the regimental commanding officer of the 28th Massachusetts was replaced on October 18, 1862. Therefore, the unit's regimental command values for the Battle of Fredericksburg were "1" (number of regimental command changes that occurred from September 17, 1862, through December 13, 1862) and "56" (average number of days before the conclusion of the Battle of Fredericksburg that the regimental command change occurred).⁸ Through these measurements, the effect of command continuity and change at each level of a regiment's command hierarchy can be measured against the regiment's combat performance.

⁸ See U. S. War Department, *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*, 128 vols. (Washington, D. C.: Government Printing Office, 1880-1901, ser. 1, vol. XIX, pt. 1, pp. 169-80, 184-203, *ibid.*, vol. XXI, pp. 48-61, 129-45 (hereafter referred to as *OR*); James L. Bowen, *Massachusetts in the War, 1861-1865* (Springfield, MA: Clark W. Bryan, 1889), 423-24; Lawrence F. Kohl and Margaret C. Richard, eds., *Irish Green and Union Blue: The Civil War Letters of Peter Welsh, Color Sergeant, 28th Regiment Massachusetts Volunteers* (New York: Fordham

The greatest weakness in the Command data set is the gaps that appear in some regimental data from May through June 1864. For example, in several regiments the exact date when a new regimental commander assumed command is not known. The new commander's name simply appears as the commanding officer in the monthly returns for the unit. Therefore, the date assigned to such changes in command may be in error by as much as thirty days. Despite these shortcomings, approximately 2,050 (90 percent) of the names and dates within the Command data are accurate, with the remaining 227 (10 percent) accurate to within thirty days of the actual date of command change.⁹

The third data set contains information on weaponry. It includes each regiment's type of weapon and date of issue. It also chronicles changes in each regiment's armament throughout the war. For example, the 148th Pennsylvania used three different types of weapons during its three years of service. On September 14, 1862, the men were issued Vincennes rifled muskets, dilapidated Belgian-made copies of the French flintlock rifled musket. On February 8, 1863, the troops received Springfield rifled muskets, single-shot, muzzle-loading weapons manufactured in Massachusetts. On October 7, 1864, they were issued Spencer rifles, breech-loading repeating rifles also manufactured in Massachusetts.¹⁰ The types of weapons that each of the regiments used in battle possibly

University Press, 1986), 24-25; and "28th Massachusetts Personnel Listing" in "American Civil War Research Database [online database]."

⁹ The command changes at the grand division level were combined with the command changes at the army level because the grand division was such a short-lived institution within the Army of the Potomac. Major General Ambrose Burnside organized the Army of the Potomac into grand divisions on November 14, 1862. Major General Joseph Hooker eliminated the army's grand divisions on February 5, 1863. See Everette B. Long, *The Civil War Day by Day: An Almanac 1861-1865* (Garden City, NY: Doubleday, 1971), 287, 318.

¹⁰ See Joseph W. Muffly, ed., *The Story of Our Regiment: A History of the 148th Pennsylvania Volunteers* (Des Moines, IA: Kenyon Printing, 1904), "The Itinerary," by Joseph W. Muffly and T. P. Meyer, 15-22; *ibid.*, "The Colonel's Story," by James A. Beaver, 58-140; *ibid.*, "The Story of Company D: Part I," by William Gemmill, 616-38; *ibid.*, "The Surgeon's Story: Part I," by A. T. Hamilton, 166-80;

influenced Federal combat performance. Detailed weapon information for the numerous Confederate regiments included in this study was not available. Consequently, analysis of the impact of weaponry in combat is limited to Federal regiments.

It was possible to chronicle the weaponry changes for most of the Federal regiments. However, information regarding the armaments of four regiments (the 145th Pennsylvania, 183rd Pennsylvania, 2nd New York Heavy Artillery, and 7th New York Heavy Artillery) was incomplete. Sources indicate that the 145th Pennsylvania fought with smoothbore muskets through the Battle of Gettysburg. From July 1863 through the end of the war, however, no additional information regarding the regiment's weaponry was found. Therefore, I estimated that the 145th Pennsylvania exchanged its smoothbore muskets for Springfield rifled muskets before the Battle of Reams' Station (August 25, 1864), the same time that another regiment within the brigade had upgraded its weaponry from smoothbore to rifled muskets.¹¹ The 183rd Pennsylvania was probably armed with rifled muskets because of its late muster-in date. It entered into service and joined the First Division in March 1864, at which time most newly organized Federal regiments

ibid., "The Lieutenant Colonel's Story: And Incidentally the Story of Company B," by James F. Weaver, 143-64; John W. Busey and David G. Martin, *Regimental Strengths and Losses at Gettysburg* (Hightstown, NJ: Longstreet House, 1994), 35, 203, 242; W. Springer Menge and J. August Shimrak, eds., *The Civil War Notebook of Daniel Chisholm: A Chronicle of Daily Life in the Union Army, 1864-1865* (New York: Ballantine Books, 1989), 46, 70-1; *OR*, ser. 1, vol. XLV, pt. 1, pp. 210-11; Mark M. Boatner, *The Civil War Dictionary*, rev. ed. (New York: David McKay Company, 1988), 782, 860-61; and Ian V. Hogg, *Weapons of the Civil War* (New York: Military Press, 1987), 32-61.

¹¹ The other regiment to upgrade its weaponry at this time was the 116th Pennsylvania, a former unit of the Irish Brigade and a diehard proponent of the smoothbore musket. By August 1, 1864, Lieutenant Colonel K. Oscar Broady, the commanding officer of the 4th Brigade, ordered the 116th Pennsylvania to exchange its smoothbore muskets for Springfield rifled muskets. It is likely that Broady also ordered the 145th Pennsylvania to do the same. See Menge and Shimrak, *The Civil War Notebook of Daniel Chisholm*, 135; Joseph G. Bilby, *Remember Fontenoy! The 69th New York and the Irish Brigade in the Civil War* (Hightstown, NJ: Longstreet House, 1995), 115, 163-66; and St. Clair A. Mulholland, *The Story of the 116th Regiment, Pennsylvania Volunteers in the War of the Rebellion: The Record of a Gallant Command* (Philadelphia: F. McManus, Jr. and Company, 1903), 280.

were being armed with rifled muskets. Therefore, I assigned the 183rd Pennsylvania rifled muskets. Similarly, because of the late date upon which both heavy artillery regiments joined the Army of the Potomac (May 1864), and because most of the heavy artillery regiments garrisoned around Washington, D. C., were armed with rifled muskets, it was likely that the soldiers in both the 2nd New York Heavy Artillery and the 7th New York Heavy Artillery carried rifled muskets when they joined the Army of the Potomac as infantry units near Spotsylvania Court House.¹²

At the heart of this study lies the fourth data set—Combat data. This data set contains forty-three distinct variables for each of the 465 engagements fought by the twenty-seven Federal regiments included in this work. The forty-three combat variables fall into one of three categories: Universal data, Federal data, and Confederate data. Universal data include information regarding those aspects of each battle that affected both the Federals and the Confederates. The two remaining data sets, Federal data and Confederate data, provide details regarding each side during battle.

¹² There is a consensus among Civil War historians that by 1864 most soldiers, both Federal and Confederate, were armed with rifled muskets. See James M. McPherson, *Battle Cry of Freedom: The Civil War Era* (New York: Oxford University Press, 1988), 475; Paddy Griffith, *Rally Once Again: Battle Tactics of the American Civil War* (Ramsbury, Marlborough, Wiltshire: Crowood Press, 1987); reprint, *Battle Tactics of the Civil War* (New Haven: Yale University Press, 1989), 76-86 (page citations are to the reprint edition); Edward Hagerman, *The American Civil War and the Origins of Modern Warfare: Ideas, Organization, and Field Command* (Bloomington: Indiana University Press, 1988), 253-74; Richard E. Beringer, Herman Hattaway, Archer Jones, and William N. Still, *Why the South Lost the Civil War* (Athens: University of Georgia Press, 1986), 468-70; Grady McWhiney and Perry D. Jamieson, *Attack and Die: Civil War Military Tactics and the Southern Heritage* (Tuscaloosa: University of Alabama Press, 1982), 69-80; Bruce Catton, *The Army of the Potomac: A Stillness at Appomattox* (Garden City, NY: Doubleday and Company, 1953), 154-55; J. F. C. Fuller, *The Generalship of Ulysses S. Grant* (London: J. Murray, 1929), 62-63; Gerald F. Linderman, *Embattled Courage: The Experience of Combat in the American Civil War* (New York: Free Press, 1987), 134-39; Russell F. Weigley, *A Great Civil War: A Military and Political History, 1861-1865* (Bloomington: Indiana University Press, 2000), 32-35; and Howard M. Madaus, "Arms, Weapons, and Ammunition: Army Ordnance," in Richard N. Current, ed., *Encyclopedia of the Confederacy*, 4 vols. (New York: Simon and Schuster, 1993), 1:59-62.

Universal data include the following variables: duration, weather, and terrain. The *duration* variable indicates the elapsed time of each engagement. Because of the inherent confusion associated with combat, the historical record occasionally yields conflicting information regarding combat duration. In those cases where a reliable measurement of combat duration was unattainable, an estimate was used. It was based on the combatants' references to measurable moments within a day, such as dawn, sunrise, midday, sunset, and dark. Using Mark M. Boatner's table for converting such language into specific hours and minutes, a reasonable estimate of battle duration was calculated. Though such calculations fall short of perfection, they are as accurate an estimate as allowed by the historical record.¹³

The last Universal variables are *weather* and *terrain*. Both these variables are divided into categories based on the adjectives used by the soldiers to describe them. For example, *weather* categories vary from "hot" to "cold" to "rain," while *terrain* categories vary from "open field" to "woods" to "swamp." From the soldiers' accounts of their combat experiences, it was possible to ascertain the weather conditions and terrain types for each battle.

The second category of Combat data includes Federal battle information. The details regarding the Federal regiments in combat were captured in the following variables: regiment, time between battles, engagement order, battle number, strength, casualty, killed, wounded, missing, strength ratio, casualty ratio, percent lost, colors captured, colors lost, artillery support, action, outcome, position, formation, quality,

¹³ Boatner states that his calculations are accurate to within one or two minutes to the actual time during the Civil War. See Boatner, *Civil War Dictionary*, 819-21.

prebattle 0-12, prebattle 12-24, prebattle 24-36, and prebattle 36-48. Three of these variables (*regiment*, *colors captured*, and *colors lost*) require minimal explanation. Respectively, they identify the Federal regiment engaged in the battle, the number of Confederate colors captured by the Federal regiment, and the number of colors lost by the Federal regiment.¹⁴ Rarely did the source materiel leave any doubt on these matters.

The *time between battles* variable measures the number of days between engagements for a regiment. For example, after the 5th New Hampshire concluded its actions on June 3, 1864, the regiment did not enter into its next battle until June 16, 1864. Therefore, the value of the *time between battles* variable for the 5th New Hampshire's June 16 engagement is "13," representing the number of days between June 3 and June 16.¹⁵

The *engagement order* variable provides the chronological order of a Federal regiment's engagements when that regiment participated in multiple engagements on the same day. For example, on October 14, 1863, the 126th New York engaged in two distinct clashes. The first occurred shortly after sunrise when the New Yorkers drove the 1st North Carolina cavalry from the flank and rear of the Second Corps near Auburn, Virginia. The second occurred later that day when the 126th successfully repulsed an

¹⁴ Typically, both Federal and Confederate regiments carried three types of flags into battle: their national flag, their regimental flag, and numerous guidons (small flags used by the companies within a regiment to identify and guide the unit).

¹⁵ See *OR*, ser. 1, vol. XXXVI, pt. 1, pp. 370-72, 375-76; *ibid.*, vol. XL, pt. 1, pp. 332-34, 338-40; William Child, *A History of the Fifth Regiment New Hampshire Volunteers in the American Civil War, 1861-1865* (Bristol, NH: R. W. Musgrove, 1893), 253-61, 269-73; Otis F. Waite, *New Hampshire in the Great Rebellion* (Claremont, NH: Tracy, Chase and Company, 1870), 288-89; Military Historical Society of Massachusetts, comp., *Papers of the Military Historical Society of Massachusetts*, 6 vols. (Boston: Military Historical Society of Massachusetts, 1905), 4:341-62; R. Wayne Maney, *Marching to Cold Harbor: Victory and Failure, 1864* (Shippensburg, PA: White Mane Publishing, 1995), 138-45; Ernest B. Furgurson, *Not War But Murder: Cold Harbor 1864* (New York: Alfred A. Knopf, 2000), 136-48; and

attack by the 15th North Carolina infantry at Bristoe Station. In this example, the morning engagement is designated as *engagement order* “1” and the afternoon fight is designated as *engagement order* “2.” Because it is sensitive to the date, the *engagement order* variable is meaningful only when a Federal regiment engaged in multiple battles in a single day.

The *battle number* variable maintains an overall chronology of the engagements fought by each Federal regiment. Instead of placing each regiment’s engagements in chronological order relative to the dates upon which they occurred, the *battle number* variable places each regiment’s engagements in chronological order regardless of the date they occurred. In other words, if we wanted to study the fourth battle in which each Federal regiment participated, regardless of when the battles occurred, we can simply use the *battle number* variable to quickly identify the desired engagements.

Information regarding the strength of a Federal regiment when it entered combat was usually available. However, there were occasions in which no clear statement of unit strength was available. In these circumstances, a regiment’s strength was extrapolated from detailed information regarding the brigade in which the regiment served. Beginning with the total strength of the brigade, the number of soldiers serving in regiments whose strengths were known was subtracted from the brigade’s total. The remainder represented the total number of soldiers in the brigade belonging to regiments whose strengths were not known. The remainder was then divided by the total number of regiments whose strengths were not known, resulting in an estimated average strength for each of the

Thomas J. Howe, *The Petersburg Campaign: Wasted Valor, June 15-18, 1864* (Lynchburg, VA: H. E. Howard, 1988), 75-9.

unknown regiments. To corroborate the accuracy of such an estimate, it was compared with the regiment's nearest known strengths, both preceding and following the date of the estimated strength. The strength estimate was also cross-referenced with the arrivals and departures of the men within the regiment as stated in the regimental roster.¹⁶

The *casualty* variable represents the total number of casualties sustained by a Federal regiment in combat. Unlike regimental strength data, casualty data have been analyzed more carefully by previous scholars. Therefore, it was not a question of finding the data; it was a question of determining whose data were most reliable. For example, there are numerous reports of the casualties sustained by the 61st New York during the Seven Days' battles. No two of them agree. The range of the 61st New York's total number of casualties is 110-145. The range of the number killed is 10-49. The range of the number wounded is 57-86. The range of the number missing is 4-21.¹⁷ In a case such as this, the various sources were measured for accuracy and reliability, with the greatest weight placed on the official casualty reports and the after-action reports from both the regiment and brigade commanders. To further ensure the accuracy of the data, the

¹⁶ To measure the accuracy of this method for estimating and corroborating regimental strength, the calculations were conducted on several regiments when their strengths were known. In each case the strength estimates were within 10 percent of the regiment's actual strength. The practice of taking a superior organizational unit's strength and averaging it across the constituent parts in an effort to estimate the strength of one of the constituent parts has a long history among Civil War scholars. See Daniel H. Hill, "The Battle of South Mountain, or Boonsboro," found in Clarence C. Buel and Robert U. Johnson, eds., *Battles and Leaders of the Civil War*, 4 vols. (New York: Century Company, 1887), 2:559-81.

¹⁷ See *OR.*, ser. 1, vol. XI, pt. 2, pp. 24, 60-2, 65-69; Frederick Phisterer, *New York in the War of the Rebellion: 1861 to 1865*, 5 vols. (Albany, NY: F. B. Lyon Company, 1912), 3:2554-73; William F. Fox, *Regimental Losses In The American Civil War, 1861-1865: A Treatise On The Extent And Nature Of The Mortuary Losses In The Union Regiments, With Full And Exhaustive Statistics Compiled From The Official Records On File In The State Military Bureaus And At Washington* (Albany, N.Y.: Albany Publishing Company, 1889), 31, 201; and "61st New York Personnel Listing" in "American Civil War Research Database [online database]."

casualty figures were contrasted with the losses detailed in the regimental roster. Finally, if a casualty figure was still in doubt, the average of the conflicting numbers was used.

The *killed* variable includes the number of men killed or mortally wounded. These values were combined because, regardless of the soldier's classification, he would not return to the regiment for subsequent engagements. The *wounded* variable includes those soldiers who were wounded during combat, but not mortally wounded. Finally, the *missing* variable represents the sum of the number of men reported as either "missing" or "taken prisoner." These categories were combined because often within the primary source material the number "missing" and "taken prisoner" were either combined or unreliably separated.

The next three variables are calculations based on the relative strengths and casualties of the opposing forces. *Strength ratio* is the ratio of Federal soldiers to Confederate soldiers. It was calculated by dividing the strength of the Federal regiment by the strength of its Confederate opponent. *Casualty ratio* was derived in an identical fashion. Instead of comparing regimental strengths, however, *casualty ratio* compares their respective casualties. It represents the total number of Federal casualties divided by the total number of Confederate casualties.¹⁸ The last of these calculated variables is *percent lost*. This variable describes a Federal regiment's combat casualties as a

¹⁸ In 21 of the 465 engagements, either the Federals or Confederates sustained no casualties. In these instances, the *casualty ratio* variable was either zero or null. A multiple regression model was used to estimate the casualty ratios for these 21 engagements. Using both the Federal *missing* and *percent lost* variables as "predictor variables" in the regression procedure, 95 percent of the variance in the variable *casualty ratio* was explained. Therefore, I accepted the model's "predicted values" for the 21 missing cases and entered them into the Federal *casualty ratio* variable. The model's R Square value and Adjusted R Square value were both .946, with an analysis of variance (ANOVA) *F* statistic of 3891.408 and *p* < .0005. Finally, the mean *casualty ratio* before entering the regression estimates was 14.4464 with a standard error of 3.944 and a range of 979.99. After entering the regression estimates, the mean value was 13.8342 with a

percentage of its combat strength. For example, if a regiment of 100 soldiers lost 10 men in battle, the regiment's *percent lost* would be 10 percent.

Ascertaining the number of Federal cannon that supported each infantry regiment during battle required careful analysis of the source material. For example, when the 140th Pennsylvania engaged the Confederates at Corbin's Bridge on May 8, 1864, the regiment was supported by an artillery battery composed of six cannon. Although it was not possible to learn the identity of the artillery unit, various sources revealed that the battery comprised six guns.¹⁹ By applying the same research methodology to each Federal regiment, reasonable artillery strength estimates were possible.

The remaining Federal variables are categorical. These variables are meant to describe those aspects of combat that were not numeric in nature but are believed to have influenced combat performance. To determine their values, the regiment's combat perspective was assumed. For example, if a northern regiment defeated its opponent but was forced to retreat because of Federal setbacks on its flanks, the regiment's combat performance was considered a success despite the ultimate defeat of its brigade. Therefore, the accounts of battles included in this study may differ from official or other scholarly descriptions of these engagements. Because one of the goals of this work is to

standard error of 3.7679 and a range of 979.99. In other words, the estimated values had a minimal effect on the *casualty ratio* variable.

¹⁹ See *OR.*, ser. 1, vol. XXXVI, pt. 1, pp. 329-30, 370-72, 378-81, 383-85, 507-13, 1040-42; *ibid.*, pt. 2, pp. 536, 941, 970-71; *ibid.*, pt. 3, p. 79; Francis A. Walker, *History of the Second Army Corps in the Army of the Potomac* (New York: Charles Scribner's Sons, 1887), 441-46; Robert L. Stewart, *History of the One Hundred and Fortieth Regiment Pennsylvania Volunteers* (Philadelphia: Franklin Bindery, 1912), 180-84; Andrew G. White, *History of Co. F., 140th Regiment Pa. V.* (Greenville, PA: Beaver Printery, 1908), 18; William D. Matter, *If It Takes All Summer: The Battle of Spotsylvania* (Chapel Hill: University of North Carolina Press, 1988), 77-78; and Gordon C. Rhea, *The Battles for Spotsylvania Court House and the Road to Yellow Tavern, May 7-12, 1864* (Baton Rouge: Louisiana State University Press, 1997), 74-76.

understand the nature of Civil War combat at the regimental level, the regiment's perspective was used as the guiding criterion when collecting and evaluating information.

The first of these categorical variables is *action*. This variable describes the tactical action taken by the Federal regiment during battle. The variable has only three possible values: "1 = offense," "2 = mixed" (offense and defense), and "3 = defense." Each regiment's action was determined by examining its tactical objective and its efforts to achieve that objective. Both "offense" and "defense" are self-explanatory. Mixed actions were those instances in which a Federal regiment began in either an offensive or defensive posture but, because of circumstances, switched from its original action to the opposite action. Although *action* is a categorical variable, by giving each tactical posture a numeric value, *action* can also be used as a continuous variable. Because of its double nature as both a categorical and continuous variable, *action* can be included in numerous statistical procedures.

The *outcome* variable is similar to the *action* variable. It is both categorical and continuous. It too has only three possible values: "1 = lose," "2 = stalemate," and "3 = win." Like *action*, *outcome* is based on the tactical mission of the regiment and the degree to which the regiment successfully fulfilled its mission. From the information available regarding the battles in which the Federal regiments participated, their respective outcomes were usually clear. Occasionally discrepancies arose, but they were mediated by a careful assessment of the accuracy and reliability of the conflicting sources.

Both the *position* and *formation* variables are strictly categorical. The *position* variable describes the area in which a Federal regiment deployed into its combat

formation before entering the fray; the *formation* variable describes the tactical formation used by the regiment as it engaged in combat. Typical positions included areas such as open fields, woods, or behind breastworks. Typical formations included line, column, or a tactically dispersed formation called skirmish.

Federal *quality* is the next variable. It is an estimate of certain behavioral characteristics of each regiment. Specifically, the variable is an amalgam of a unit's morale, cohesion, and leadership. Each regiment's quality fell into one of three categories. Inferior units were assigned "1 = low" quality. Superior regiments were assigned "3 = high" quality. Those units that were neither inferior nor superior were assigned "2 = average" quality. Despite the subjective nature of these estimates, careful research provided adequate information from which to judge the quality of the regiments. For example, during the Battle of Antietam, the 61st New York proved that it was a superior combat unit. Its officers were praised for their exemplary leadership during fighting along the Bloody Lane. Both Colonel Francis Barlow and Lieutenant Colonel Nelson Miles maintained command and control of their troops as they turned the Confederate right flank and pursued the fleeing enemy soldiers. The officers praised the men for their discipline, courage, and steadiness under such trying circumstances. The men pointed to the two Confederate flags that they captured as a measure of their effectiveness. Based on this information, the quality of the 61st New York at Antietam was estimated as "high."²⁰

²⁰ See *OR.*, ser. 1, vol. XIX, pt. 1, pp. 281, 284-87, 289-92; *ibid.*, vol. LI, pt. 1, p. 866; Thomas B. Buell, *The Warrior Generals: Combat Leadership in the Civil War* (New York: Crown Publishers, 1997), 108-09; Fox, *Regimental Losses*, 201; Josiah Marshall Favill, *The Diary of a Young Officer Serving with the Armies of the United States during the War of the Rebellion* (Chicago: R. R. Donnelley and Sons, 1909), 187; Walker, *History of the Second Army Corps*, 112-15; Stephen W. Sears, *Landscape Turned*

The final four Federal variables describe the activities of a regiment prior to entering combat. They are *prebattle 0-12*, *prebattle 12-24*, *prebattle 24-36*, and *prebattle 36-48*. Each *prebattle* variable encompasses a twelve-hour period and describes the regiment's primary activity during that period. *Prebattle 0-12* describes a regiment's actions during the twelve hour period just prior to combat, *prebattle 12-24* describes the regiment's actions during the twelve hour period preceding *prebattle 0-12*, and so on. For example, prior to the Battle of Morton's Ford on February 6, 1864, the 126th New York was in its winter quarters. Despite the miscellaneous duties carried out by one or two of its companies, the majority of the New Yorkers were quietly encamped until the day of battle. On February 6 the regiment was roused at dawn and marched into the afternoon before engaging the Confederates at Morton's Ford. In this scenario, the *prebattle* variables were assigned as follows: *prebattle 0-12* = "march," *prebattle 12-24* = "camp," *prebattle 24-36* = "camp," and *prebattle 36-48* = "camp." The combined effect of these four variables is an account of the New Yorkers' actions in twelve-hour increments for the two days prior to battle.²¹

Red: The Battle of Antietam (New York: Ticknor and Fields, 1983), 216-54; and James V. Murfin, *The Gleam of Bayonets: The Battle of Antietam and the Maryland Campaign of 1862* (New York: Thomas Yoseloff, 1965), 243-66.

²¹ During each of the three twelve-hour increments labeled "camp," the soldiers of the 126th New York were involved in routine regimental activities like roll call, guard duty, drill, and inspection. However, the soldiers rarely mentioned such commonplace activities in their letters, diaries, and reports. Because the soldiers did not feel that such activities were worthy of mention, and because they frequently described their time spent in winter quarters as "comfortable" and "quiet," it is difficult (and perhaps unnecessary) to attempt to categorize their actions with greater precision than with the label "camp." See John D. Billings, *Hardtack and Coffee, Or, The Unwritten Story of Army Life* (Boston: George M. Smith, 1887), 164-97; Charles H. Porter, "Opening of the Campaign of 1864," in Military Historical Society of Massachusetts, *Papers of the Military Historical Society of Massachusetts*, 4:1-24; Bell I. Wiley, *The Life of Billy Yank: The Common Soldier of the Union* (Baton Rouge: Louisiana State University Press, 1952), 45-65; *OR.*, ser. 1, vol. XXXIII, pp. 132-34, 137; Walker, *History of the Second Army Corps*, 394-95; Arabella M. Willson, *Disaster, Struggle, Triumph: The Adventures of 1000 'Boys in Blue' from August, 1862, to June 1865* (Albany: Argus Company, 1870), 232-35; Martin, F. Graham and George F. Skoch, *Mine Run: A Campaign of Lost Opportunities: October 21, 1863 - May 1, 1864* (Lynchburg, VA: H. E.

The final portion of the Combat data set is Confederate data. This subset contains many of the same variables as the Federal data subset. The Confederate data variables are regiment, strength, casualty, killed, wounded, missing, percent lost, colors captured, colors lost, artillery support, action, outcome, position, formation, and quality. These variables are identical to those in the Federal data subset.

After collection and collation of the Roster, Command, Armament, and Combat data, the data were merged into a single file consisting of over 2 million datapoints. Once the between-battle information was synthesized and segmented, the data file became more manageable. It consisted of 465 unique cases, each representing a single engagement for one of the twenty-seven Federal regiments. Each of the 465 cases consisted of 85 variables. Therefore, the final data file was reduced from an unwieldy 2 million datapoints to a more functional 40,000 datapoints.

The Statistical Package for the Social Sciences (SPSS for Windows, version 10.0) was used to analyze the data in three steps. The first involved applying simple statistical procedures to the data and comparing the results with those predicted by both the environmental and behavioral schools of thought. The second involved duplicating the unique combat analyses of several historians in an effort to measure the reliability of their methodologies. The final analytical step involved the creation of a statistical model designed to predict battle results for Federal infantry regiments.

Howard, 1987), 91-100; Wayne Mahood, *“Written in Blood”: A History of the 126th New York Infantry in the Civil War* (Hightstown, NJ: Longstreet House, 1997), 213-18; and Ezra D. Simons, *A Regimental History: The One Hundred and Twenty-Fifth New York State Volunteers* (New York: E. D. Simons, 1888), 189-93.

CHAPTER 3

ENVIRONMENTAL AND BEHAVIORAL COMBAT ANALYSES

Preliminary analysis of the data reveals patterns and trends consistent with the environmental approach to understanding Civil War combat. The data corroborate the theory that the physical aspects of battle significantly influenced combat performance. However, the data also suggest that the behavioral aspects of battle may have affected combat performance more than previously believed. While the analyses in this chapter cannot determine whether combat performance was influenced more by the physical or mental characteristics of battle, the tests clearly indicate that both aspects significantly affected the combatants' ability to fight.

A brief examination of the Federal regiments included in this study is in order. Of the twenty-seven regiments analyzed, twenty-four were volunteer infantry units, and the remaining three were heavy artillery regiments temporarily serving as infantry regiments.¹ The majority of the regiments were recruited in New York. The Empire State

¹ In March 1864 General Ulysses S. Grant began studying the feasibility of transferring heavy artillery units from garrison duty around Washington, D. C., and Baltimore to infantry duty with the Army of the Potomac. The 4th New York Heavy Artillery joined the Second Corps' First Division on March 29, 1864. The 2nd New York Heavy Artillery and the 7th New York Heavy Artillery arrived on May 16, 1864. Though some of the artillery soldiers felt that their conversion from artillery to infantry service was a betrayal of their terms of enlistment, they limited their protests to messmate chatter, family correspondence, and personal diaries. See U. S. War Department, *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*, 128 vols. (Washington, D. C.: Government Printing Office, 1880-1901, ser. 1, vol. XXXIII, pp. 721, 760-61, 829, 879-80, 887-88; *ibid.*, vol. XXXVI, pt. 1, pp. 70, 72, 192, 337-38; *ibid.*, pt. 2, pp. 595-96, 627-28, 652, 695-96, 736, 784, 798-99, 828-29, 844, 849-50; *ibid.*, vol. LI, pt. 1, p. 1165 (hereafter referred to as *O.R.*); Hyland C. Kirk, *Heavy Guns and Light: A History of the 4th New York Heavy Artillery* (New York: C. T. Dillingham, 1890), 137; James D. Lockwood, *Life and Adventures of a Drummer-Boy; Or, Seven Years A Soldier* (Albany, NY: John Skinner, 1893), 8, 56; Augustus C. Brown, *The Diary of a Line Officer* (New York: n.p., 1906), 16-17, 35; George A. Armes, *Ups and Downs of an Army Officer* (Washington, D.C.: n.p., 1900), 84; Wyman S.

provided thirteen of the twenty-four infantry units and all three of the heavy artillery regiments. New York's contribution of manpower was followed most closely by Pennsylvania's. The Keystone State contributed seven infantry regiments to the First Division. Finally, the states of Delaware, Massachusetts, Michigan, and New Hampshire provided one regiment each.

These Federal regiments' collective combat history spanned nearly four years of fighting. Their first battle occurred on July 21, 1861, at the Battle of First Manassas (Bull Run), and their last battle occurred on April 7, 1865, at the Battle of Farmville. Throughout their forty-six months of combined service, the regiments participated in 465 distinct engagements. The 111th New York and the 126th New York fought the greatest number of engagements (twenty-four each), and the 7th New York Veteran fought the least (only six). The 39th New York served the longest, fighting with the Army of the Potomac throughout the entire war. The 7th New York Veteran regiment, on the other hand, participated in only the final year of the war. Overall, the Federal units averaged ten engagements each in slightly over three years of service.

When analyzing Civil War combat, many historians have adopted the same intellectual model. They agree that combat performance was largely based on the influence of the environmental conditions present on the battlefield. This scholarly consensus maintains that battles often resulted in futile carnage because of the tactical

White, *The Civil War Diary of Wyman S. White, First Sergeant of Company "F" of the 2nd United States Sharpshooter Regiment (New Hampshire Men) in the Army of the Potomac, 1861-1865* (Hemet, CA: Russell C. White, 1979), 129; L. Van Loan Naisawald, *Grape and Canister: The Story of the Field Artillery of the Army of the Potomac, 1861-1865* (New York: Oxford University Press, 1960), 463-65; William D. Matter, *If It Takes All Summer: The Battle of Spotsylvania* (Chapel Hill: University of North Carolina Press, 1988), 302-03; and Gordon C. Rhea, *To the North Anna River: Grant and Lee, May 13-25, 1864* (Baton Rouge: Louisiana State University Press, 2000), 96-7.

advantage enjoyed by well-armed, entrenched defenders when pitted against exposed attackers advancing in linear formation. This conception, explicitly or implicitly, usually depends on sixteen variables: Federal and Confederate outcome, action, position, formation, terrain, weaponry, artillery support, and casualties. Many historians use the interactions of these variables to explain the nature of Civil War combat.

The most significant variable within this environmental approach to understanding Civil War combat is *outcome*. Battlefield results were undoubtedly influenced by the remaining variables. Therefore, the first step when using the environmental analytical approach to examine the data collected for this study is to review battlefield results. A glance at the Federals' collective combat record indicates that they did not enjoy much success. They won only 24 percent of their engagements, lost almost 60 percent, and fought to a stalemate in the remaining 16 percent. The Confederates' collective results were nearly opposite those of the Federals. Southern troops won approximately 61 percent of their battles, lost only 25 percent, and were stalemated in the remaining 14 percent.

The distribution of results indicates that Federal and Confederate outcomes had an inverse relationship. Federal victories were associated with Confederate defeats just as Federal defeats were associated with Confederate victories. When either side fought to a tactical stalemate, however, the opposite side frequently stalemated as well. The seemingly inverse relationship between victories and defeats, however, was not always symmetrical. Occasionally, engagements occurred in which both sides claimed victory. For example, on February 6, 1864, Brigadier General Joshua T. Owen's brigade of four regiments (39th New York, 111th New York, 125th New York, and 126th New York)

waded across the icy Rapidan River at Morton's Ford in northern Virginia and drove back an enemy picket line. The Federals secured their foothold on the opposite side by advancing three-fourths of a mile beyond the river and falling to the ground in line of battle. From their forward positions, the northern troops could see the main line of Confederate breastworks and feel the heat of their guns. Rifle and artillery fire was incessant. While the Federals positioned themselves, the Confederates prepared a counterattack. Nearly six hours after the Federals had initiated the engagement, the Confederates seized the initiative and struck. Under a hail of rifle and artillery fire, the Confederates bellowed their rebel yell and charged directly at Owen's brigade. Despite making several assaults, the Confederates failed to break the Federal line. They did, however, threaten to turn the Federals' right flank. In light of the protracted struggle and the fact that the Federals were ordered merely to demonstrate against the Confederate forces at Morton's Ford, Major General Gouverneur K. Warren, commander of the Second Corps, ordered his advanced units to retire across the river.²

Based on the orders, expectations, and accomplishments of the opposing forces, both sides felt that they had been successful. The Federals crossed the Rapidan in front of

² *O.R.*, ser. 1, vol. XXXIII, pp. 114-18, 121-37, 141-43, 625; Arabella M. Willson, *Disaster, Struggle, Triumph: The Adventures of 1000 'Boys in Blue' from August, 1862, to June 1865* (Albany: Argus Company, 1870), 232-35, 327-28; Robert L. Stewart, *History of the One Hundred and Fortieth Regiment Pennsylvania Volunteers* (Philadelphia: Franklin Bindery, 1912), 172; William F. Fox, "The Garibaldi Guard and Its Services," in New York Monuments Commission for the Battlefields of Gettysburg and Chattanooga, comp., *Final Report on the Battlefield of Gettysburg*, 3 Vols. (Albany: J. B. Lyon, 1902), 1:282-86; Catherine Catalfamo, "The Thorny Rose: The Americanization of an Urban Immigrant, Working Class Regiment in the Civil War: A Social History of the Garibaldi Guard: 1861-1864" (Ph.D. diss., University of Texas, 1989), 347-48; Francis A. Walker, *History of the Second Army Corps in the Army of the Potomac* (New York: Charles Scribner's Sons, 1887), 394-95; Martin F. Graham and George F. Skoch, *Mine Run: A Campaign of Lost Opportunities: October 21, 1863 - May 1, 1864* (Lynchburg, VA: H. E. Howard, 1987), 91-100; Wayne Mahood, *"Written in Blood": A History of the 126th New York Infantry in the Civil War* (Hightstown, NJ: Longstreet House, 1997), 213-18; and Ezra D.

the enemy, drove its pickets back, and held the field until ordered to retire. The Confederates, on the other hand, rallied when their pickets indicated an impending attack, stopped the Federal advance, counterattacked, and forced the Federals to retreat. Under these circumstances, both sides were justified in claiming victory. Unique engagements like this explain why the distribution of Federal and Confederate outcomes is not inversely symmetrical. Overall, the outcomes of only eighteen engagements (4 percent) failed to demonstrate an inverse relationship (see Table 1).

Table 1
Distribution of Federal and Confederate Combat Outcomes, 1861-65³

<u>Combatant</u>	<u>Win</u>		<u>Stalemate</u>		<u>Lose</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%
Federal	113	24.3	76	16.3	276	59.4	465	100.0
Confederate	282	60.6	66	14.2	117	25.2	465	100.0

Perhaps the most striking characteristics of the outcome data are the discrepancies between Federal and Confederate victories and defeats. If the environmental school is correct, then the other variables included in the model should account for the variance in battlefield results. When tactical actions and combat outcomes are analyzed together, a significant relationship between the two variables emerges.⁴ Federal regiments enjoyed more tactical success when fighting defensively than offensively. Throughout the war the Federals attacked in 305 engagements, winning only 21 percent, while losing over 58 percent. On defense, however, the Federals enjoyed greater success. They fought

Simons, *A Regimental History: The One Hundred and Twenty-Fifth New York State Volunteers* (New York: E. D. Simons, 1888), 189-93.

³ All percentages in this, and subsequent tables, are rounded to the nearest one-tenth of one percent.

defensively in 100 battles, of which 42 resulted in victory and 51 ended in defeat.

Whenever the Federals employed mixed tactics, however, the results were disastrous. Of the 60 battles in which the Federals fought mixed actions, they lost over 78 percent of them. In other words, northern soldiers doubled their chances of victory by fighting defensively versus offensively, they lost with near equal frequency when fighting either offensively or defensively, and they rarely won when fighting mixed actions (see Table 2).

Table 2
Comparison of Federal Tactical Actions and Federal Combat Outcomes

<u>Action</u>	<u>Win</u>		<u>Stalemate</u>		<u>Lose</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%
Offense	66	21.6	61	20.0	178	58.4	305	100.0
Mixed	5	8.3	8	13.3	47	78.3	60	100.0
Defense	42	42.0	7	7.0	51	51.0	100	100.0

The relationship between Confederate actions and outcomes was similar.

Defensive actions resulted in victory more often than offensive actions. When seizing the initiative and attacking, the Confederates won nearly 55 percent of the time and lost 37 percent. When fighting defensively, they won over 68 percent of their engagements and lost only 18 percent. Unlike the Federals, however, the Confederates were more than twice as likely to win versus lose when fighting mixed tactical actions. In other words, analysis of the Confederate data not only supports the notion that defense dominated the Civil War battlefield, but it suggests that Confederate soldiers enjoyed more success than their Federal counterparts regardless of the tactics they employed. Possible explanations

⁴ For a discussion of the statistical tests used throughout this chapter see Appendix A, pp. 138-41.

for the differences in combat outcomes relative to tactical actions must be sought in the analyses of the remaining variables (see Table 3).

Table 3
Comparison of Confederate Tactical Actions with Confederate Combat Outcomes

<u>Action</u>	<u>Win</u>		<u>Stalemate</u>		<u>Lose</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%
Offense	93	54.7	14	8.2	63	37.1	170	100.0
Mixed	27	47.4	19	33.3	11	19.3	57	100.0
Defense	162	68.1	33	13.9	43	18.1	238	100.0

Examination of the data regarding prebattle tactical positions and combat outcomes reveals a statistically significant association between positions and outcomes.⁵ The environmental view of Civil War combat suggests that the impact of tactical positions on combat performance was felt primarily when units fought defensively. The prebattle position assumed by a defensive force was the position from which that force engaged its opponent, thereby granting the defensive force whatever tactical advantages its position afforded. Inversely, the prebattle position assumed by an offensive force had negligible influence on its combat performance because the attacking force was required to abandon its position as it advanced toward the enemy. Therefore, analysis of the positional data relative to combat actions should show that defensive positions significantly affected outcome.

⁵ Pearson's chi-square test was used to analyze the possible relationship between outcome and position. The results suggest that the positions from which combatants entered battle significantly affected their chances for victory. Pearson's chi-square statistic for the Federals was 108.495 with 12 df and $p < .0005$. Pearson's chi-square statistic for the Confederates was 57.082 with 6 df and $p < .0005$. Analysis of variance provides another measure of the relationship between the outcome and position. Similar to the chi-square test, analysis of variance for both combatants' position and outcome data suggest that tactical positions significantly affected battlefield results. The Federal F statistic was 14.638 with 6 df and $p < .0005$. The Confederate F statistic was 11.994 with 3 df and $p < .0005$.

Analysis of those engagements in which one combatant attacked while the other defended suggests that defensive tactical positions did indeed affect combat outcomes. When the Federals attacked, they lost approximately 70 percent of the time, and either won or stalemated approximately 15 percent of the time each. The Confederate defensive tactical position that most frustrated Federal assaults was an entrenched position. Federal units attacked entrenched positions 129 times. They lost approximately 90 percent of these engagements, and won less than 10 percent. The Federals attacked weaker defensive positions, such as enemy troops positioned in wooded areas or behind temporary breastworks, 109 times. Against these softer defensive positions, the Federals reduced their failure rate from 90 percent to 40 percent, and they more than doubled their success rate, increasing it to approximately 20 percent.⁶

Despite the dominant role that Confederate defensive positions appear to have played on the battlefield, the impact of Federal defensive positions is less clear. Because the Federals fought defensively against attacking Confederates only ninety-eight times, it is difficult to measure the possible relationship between Federal defensive positions and Federal combat results.⁷ The data imply that the stronger the defensive position, the more

⁶ Both chi-square analysis and analysis of variance indicate a significant relationship between Confederate defensive positions and Federal battlefield performance. Pearson's chi-square statistic was 57.546 with 4 df and $p < .0005$. Analysis of variance produced an F statistic of 26.827 with 2 df and $p < .0005$.

⁷ Grady McWhiney and Perry Jamieson have argued that southern forces took the tactical offensive in nearly 70 percent of the "major battles" during the first three years of the war. The data used in this study indicate that the Confederates attacked only 47 percent of the time during these "major battles." However, McWhiney and Jamieson defined tactical action based on the overall posture of an army. At Antietam, for example, the authors found that the Federals were the aggressors. At the army command level, they certainly were. At lower levels of command, however, tactical actions were not so clearly divided. Federal regiments attacked 72 percent of the time, and Confederate regiments attacked 52 percent of the time. Though the Federals still may be considered the aggressors at Antietam, the data suggest that it may be inaccurate to describe the battle simply as a Federal offensive action. Much of the difference between the tactical action data used in this study and that used by McWhiney and Jamieson may be

likely the chances that the defender would win. For example, when northern troops fought defensively from an exposed position, they lost 60 percent of their engagements and won less than 40 percent. When they defended from behind improvised breastworks or within a wooded area, the Federals lost only 50 percent of their engagements and won over 40 percent. When they fought defensively from an entrenched position, the Federals lost one-third of their engagements, winning the other two-thirds. Though the data failed to show a statistically significant relationship between Federal defensive positions and combat outcomes, they do demonstrate an increased likelihood for success when the soldiers in blue fought from a strong defensive position.⁸

Tactical formations changed only slightly during the war. Both the Federals and the Confederates consistently used linear formations. That is to say, their infantrymen usually deployed in compact, rigid, lines before entering battle.⁹ The Federals formed

attributed to the differing criteria used to determine which side attacked and which defended. The tactical posture of an army often differed from that of its constituent regiments. See Grady McWhiney and Perry D. Jamieson, *Attack and Die: Civil War Military Tactics and the Southern Heritage* (Tuscaloosa: University of Alabama Press, 1982), 7-9.

⁸ Because of the limited number of engagements in which Federal forces defended against attacking Confederate forces, the defensive tactical positions assumed by the Federals were consolidated into three categories. The first category, "1 = No Cover or Concealment," included the twenty-nine engagements in which the Federals fought defensively from an unobstructed position. The second category, "2 = Limited Cover or Concealment," included the sixty-three engagements in which the Federals fought defensively either within wooded areas or behind temporary breastworks. The third category, "3 = Full Cover or Concealment," included the six engagements in which the Federals fought defensively from entrenched positions. Both chi-square analysis and analysis of variance failed to find a statistically significant relationship between Federal defensive positions (using the three generic categories outlined above) and Federal outcome. Pearson's chi-square statistic was 2.739 with 4 df and $p = .602$. Analysis of variance produced an F statistic of .709 with 2 df and $p = .495$. Finally, by using the numerical characteristics of both Federal *outcome* and Federal *position* variables, it was possible to examine the data using Pearson's correlation coefficient. Like the previous statistical tests, Pearson's correlation coefficient failed to find a statistically significant relationship between the two variables. However, the test did show a positive correlation between Federal outcome and Federal defensive positions. In other words, the more that the Federals used cover and concealment when fighting defensively, the more likely their chances for victory. Pearson's correlation coefficient was $r = .118$ with $p = .248$.

⁹ Civil War regiments generally formed a line of battle by dividing into two or three equal ranks (or lines) of men. Within a rank, the soldiers crowded together to such an extent that their shoulders and elbows touched. The rear rank maintained a distance of approximately thirteen inches from the front rank.

lines of battle over 78 percent of the time, and the Confederates fought in line nearly 93 percent of the time. When the Federals deployed in line, they won approximately 28 percent of their engagements, lost 64 percent, and stalemated the remaining 8 percent. When the Confederates deployed in line, on the other hand, they won nearly 64 percent of the time, lost 27 percent, and stalemated the remaining 9 percent.

Rarely did either side experiment with non-linear tactics. When they did, the combatants usually deployed in either column or skirmish formations. The typical column formation required that the lines of battle created by the individual regiments within a single brigade be tightly stacked directly behind one another. The Federals fought in column formation only 10 percent of the time, and the Confederates never attempted it in battle. When the Federals fought in column, they were defeated 54 percent of the time, stalemated 46 percent of the time, and were never victorious. Both belligerents employed skirmish formations in battle with similar frequency and results. The typical skirmish formation required that the soldiers within a regiment disperse along a single rank at intervals of approximately five yards. The Federals fought in skirmish formation 12 percent of the time; the Confederates used the formation 8 percent of the time. When deployed in skirmish formation, the Federals won 18 percent of their engagements, lost 34 percent, and stalemated in the remaining 48 percent. When the

See William J. Hardee, *Hardee's Rifle and Light Infantry Tactics, For the Instruction, Exercises and Maneuvers of Riflemen and Light Infantry* (New York: J. O. Kane, 1862), 5-9; Ian Drury and Tony Gibbons *The Civil War Military Machine: Weapons and Tactics of the Union and Confederate Armed Forces* (New York: Smithmark Publishers, 1993), 24; Paddy Griffith, *Rally Once Again: Battle Tactics of the American Civil War* (Ramsbury, Marlborough, Wiltshire: Crowood Press, 1987); reprint, *Battle Tactics of the Civil War* (New Haven: Yale University Press, 1989), 91-92, 99 (page citations are to the reprint edition); and Rory Muir, *Tactics and the Experience of Battle in the Age of Napoleon* (New Haven: Yale University Press, 1998), 69-70.

Confederates fought in skirmish formation, they won 23 percent of the time, lost 3 percent, and stalemated 74 percent of the time.¹⁰

The relationship between formations and outcomes appears statistically significant. The data suggest that skirmish formations usually resulted in tactical stalemates. Similarly, column formations often led to stalemates, but were slightly more likely to end in defeat. The data regarding linear formations, however, is less clear. The uneven distribution of Federal and Confederate combat outcomes when deployed in lines of battle suggests that combat results were influenced not only by tactical formations, but also by other factors. Variables such as *action*, *terrain*, or *position* may account for the difference in outcome when fighting in lines of battle. However, the combatants' limited success when deployed in nonlinear formations suggests that these formations negatively influenced combat results. In other words, the relationship between linear formations and battlefield effectiveness is less obvious because of the wide-spread use of linear formations. The relationships between non-linear formations and battle results, however, is more apparent. Non-linear formations frequently resulted in either stalemate or defeat.¹¹

The data suggest that terrain played a significant role in Civil War battles. Northern soldiers fought across broken ground (an uneven killing zone where limited protection from enemy fire was available) 25 percent of the time, up hill over broken

¹⁰ For descriptions of either column or skirmish formations, see respectively, Jeffrey D. Wert, *A Brotherhood of Valor: The Common Soldiers of the Stonewall Brigade, C.S.A., and the Iron Brigade, U.S.A.* (New York: Simon and Schuster, 1999), 177; or White, *The Civil War Diary of Wyman S. White*, 14.

¹¹ Analysis of *formation* and *outcome* suggests that a significant relationship between the two variables existed. Pearson's chi-square statistic for the Federals was 97.698 with 4 df and $p < .0005$. Pearson's chi-square statistic for the Confederates was 112.689 with 2 df and $p < .0005$.

ground 23 percent of the time, across open ground 17 percent of the time, in wooded areas 9 percent of the time, and on various other types of terrain 26 percent of the time. Surprisingly, the Federals gained nearly 50 percent of all their victories while fighting on either open ground or broken ground. They were least effective when fighting up hill on either open or broken ground. Of the twenty-six times that the Federals were engaged on a smooth incline, they lost every time. When they fought on an uneven hillside, the Federals lost eighty-three engagements and won only twenty-two. Other than the Federals' success when fighting on open or broken ground, their experience appears consistent with the environmental view that the force positioned on high ground had a tactical advantage.¹²

The data regarding Confederate combat performance relative to terrain are more consistent with scholarly theory. The distribution of terrain types experienced by Confederate units mirrored that of the Federals. The southerners fought on broken ground 25 percent of the time, down hill over broken terrain 23 percent of the time, over open ground 17 percent of the time, in wooded fields 9 percent of the time, and on various other terrain types 26 percent of the time. Confederate units were most effective when fighting down hill over uneven ground. They won almost 83 percent of the time. They were least effective when fighting on open ground. Under these conditions, they lost 37 percent of the time. Similar to the Federal data regarding terrain and outcome, the

¹² Analysis of *terrain* and Federal *outcome* suggests that a significant relationship between the two variables existed. Pearson's chi-square statistic was 196.605 with 18 df and $p < .0005$. Analysis of variance produced an F statistic of 6.199 with 9 df and $p < .0005$.

Confederate data suggest that the slope of a hill may have had greater impact on combat than the surface characteristics of the ground.¹³

Indeed, further analysis of terrain data confirms that the pitch of the battlefield, not the foliage on it, significantly affected combat performance. The optimum tactical scenario was to fight down hill; the second-best was to fight on level ground; the worst was to fight up hill. The slope of the ground also appears to have dispelled any doubt as to who won or who lost. The combatants never fought to a stalemate when engaged on a hillside. All seventy-six tactical stalemates included in this study occurred on level terrain. In other words, not only did the slope of the ground influence combat performance far more than the surface of the ground, the slope also made combat more decisive.¹⁴

The type of infantry arms used in battle appears to have had only a slight effect on combat performance. Unfortunately, accurate weapon data were available only for the

¹³ Analysis of *terrain* and Confederate *outcome* suggests that a significant relationship between the two variables existed. Pearson's chi-square statistic was 190.410 with 18 df and $p < .0005$. Analysis of variance produced an F statistic of 7.076 with 9 df and $p < .0005$.

¹⁴ To analyze the influence that the surface characteristics of the ground had on combat outcome, the *terrain* variable was recoded. First, terrain was classified by its surface characteristics. Each battlefield was categorized as either "1 = Open Ground," "2 = Broken Ground," or "3 = Wooded Ground." Using these terrain categories, both analysis of variance and Pearson's correlation coefficient procedures were applied to the data. Analysis of variance of Federal combat performance produced an F statistic of .342 with 2 df and $p = .710$; Pearson's correlation coefficient was $r = -.016$ with $p = .727$. Analysis of variance of Confederate combat performance produced an F statistic of .896 with 2 df and $p = .409$; Pearson's correlation coefficient was $r = -.001$ with $p = .990$. In other words, both statistical tests found that the relationships between terrain surface and both Federal and Confederate combat performance were far from significant. Next, terrain was classified by its slope. Each battlefield was categorized as either "1 = Down Hill," "2 = Level Ground," or "3 = Up Hill." Using these terrain categories, both analysis of variance and Pearson's correlation coefficient procedures were applied to the data. Analysis of variance of Federal combat performance produced an F statistic of 17.787 with 2 df and $p < .0005$; Pearson's correlation coefficient was $r = -.149$ with $p = .001$. Analysis of variance of Confederate combat performance produced an F statistic of 18.035 with 2 df and $p < .0005$; Pearson's correlation coefficient was $r = -.182$ with $p < .0005$. In other words, both statistical tests found that the slope of the battlefield significantly affected the combat efficiency of the combatants, and that fighting downhill greatly increased their likelihood for success.

Federal regiments. Therefore, all analyses regarding the impact of shoulder arms on combat performance must be limited to the northern units. A comparison of combat results in which the Federals used either rifled or non-rifled shoulder arms suggests that Federal units were more likely to lose those engagements in which they used smoothbore muskets. When armed with smoothbore muskets, northern units lost 63 percent of their engagements and won only 17 percent. When armed with rifled weapons, however, the Federals' combat performance improved. They still lost 60 percent of the time, but their percentage of victories rose from 17 to 26. Furthermore, the data suggest that among the various rifled weapons used by the Federals, the Spencer repeating rifle gave them their greatest tactical advantage. When Federal regiments used the Spencer rifle, they won 67 percent of the time, fought to a stalemate 33 percent of the time, and never lost a battle.¹⁵

The data regarding the use of artillery during combat support the belief that cannon played an important role on Civil War battlefields. Overall, the Confederates enjoyed an advantage in the number of cannon employed during battle.¹⁶ They averaged

¹⁵ Caution should be used when interpreting the relationship between weapon types and combat performance. Uneven sample sizes make drawing any conclusions problematic. Of the 465 engagements analyzed, smoothbore muskets were used in 72 battles while rifled weapons were used in the remaining 393 engagements. Of the 393 battles in which rifled weapons were used, Spencer repeating rifles were used in only 3 engagements. Although the distribution of Federal combat results suggests that weaponry affected outcome, more careful analyses reveal that the relationship between weaponry and outcome was not statistically significant. For example, by categorizing the types of weapons used by the Federal regiments as either rifled or non-rifled and then examining the relationships between weaponry and outcome, statistical analyses reveal that the two variables were not significantly associated. Pearson's chi-square statistic was 3.236 with 2 df and $p = .198$. Analysis of variance produced an F statistic of 1.385 with 1 degree of freedom and $p = .24$. Pearson's correlation coefficient was $r = .055$ with $p = .240$. Though Pearson's correlation analysis indicates that the relationship between the variables was not statistically significant, it shows that the relationship was positive. This positive relationship means that Federal regiments were more likely to win when armed with rifled weapons, but the relationship was not strong enough to meet the requirements of statistical significance. Finally, when all the categories within the Federal *weapon* variable were analyzed, the results showed no statistically significant relationship between weapon and outcome. Pearson's chi-square statistic was 12.686 with 8 df and $p = .123$.

¹⁶ Most Civil War historians agree that the Confederacy suffered from a lack of cannon throughout much of the war. This study found that the southerners frequently enjoyed a numerical

thirteen guns against the Federals' ten. Regardless of outcome, the Confederates consistently averaged two to three more cannon than the Federals.¹⁷ Interestingly, the Federals usually won when artillery use by both sides was low. As the combatants increased their number of cannon, the Federals tended to lose or fight to a stalemate. Because Federal regiments usually fought offensively, and because artillery was used primarily as a defensive weapon, it is not surprising that the northern troops enjoyed more success when southern troops used fewer artillery guns.¹⁸

The final type of information usually included in environmental analyses of Civil War combat is casualty data. The environmental school of thought maintains that high casualty rates were associated with tactical defeat because of the deadly effect that concentrated defensive rifle and artillery fire had against advancing lines of infantry. A comparison of the mean number of casualties with battlefield results indicates that defeat was more costly than victory or stalemate. The Federals lost an average of thirty-two men per regiment when they were victorious, forty-one men when they fought to a stalemate, and forty-nine men when they were defeated. Similarly, the Confederates averaged ten casualties when they were victorious, twenty casualties when they stalemated, and sixty-

advantage in cannon because they usually fought defensively. The Confederates often remained in defensive tactical positions near their artillery batteries. The Federals, however, often took the tactical offensive, thereby advancing away from their artillery support and toward that of their opponent. For discussions regarding Confederate artillery, see John R. Elting, "An Overview"; Russ A. Pritchard, "Confederate Artillery"; Pritchard, "Captured U.S. Artillery"; and C. A. Huey, "Imported English Artillery"; in Richard N. Current, ed., *Encyclopedia of the Confederacy*, 4 vols. (New York: Simon and Schuster, 1993), 1:91-96, 96-99, 99-102, 102-103 respectively.

¹⁷ The mean number of Federal versus Confederate cannon per Federal outcome were: Win = 6 v. 9, Lose = 11 v. 13, Stalemate = 14 v. 16, respectively.

¹⁸ Analysis of variance between both Federal and Confederate artillery strength and Federal combat outcome reveals statistically significant relationships. Specifically, the Federal *F* statistic was 14.189 with 2 df and $p < .0005$. The Confederate *F* statistic was 10.129 with 2 df and $p < .0005$.

eight casualties when they were defeated. Despite similar trends, only the changes in the mean number of Confederate casualties proved statistically significant.¹⁹

Based on the preceding analyses of the sixteen variables included in most tactical studies of Civil War combat, it appears that the data used in this study are consistent with the environmental school of thought. Entrenched infantry and artillery enjoyed a tactical advantage when fighting defensively against an exposed, advancing line of soldiers. The defensive force usually suffered fewer casualties and won the engagement, and the offensive force often suffered heavy casualties and lost the engagement. Furthermore, the data suggest that the use of rifled weaponry was more strongly associated with tactical success than non-rifled weaponry, though in this data set neither category of weaponry demonstrated a statistically significant association with battlefield results.

One notable gap in many environmental combat analyses is the omission of the behavioral aspects of battle. The original sixteen variables describe only the physical characteristics of the battle. Recently, however, scholars have found that soldier quality was also an important variable in the calculus of combat effectiveness. Behavioral characteristics such as soldier morale, small-group cohesion, and leadership quality played important roles on the battlefield. Though few scholars would argue that the behavioral aspects of combat were more influential than the environmental aspects, most would agree that the attitudes and opinions of the soldiers affected their martial performance.

¹⁹ Analysis of variance between Confederate casualties and outcomes produced an *F* statistic of 97.174 with 2 df and $p < .0005$. Pearson's correlation coefficient for the same variables was $r = -.523$ with $p < .0005$. The same statistical tests failed to find a significant relationship between Federal casualties and Federal outcomes. Analysis of variance produced an *F* statistic of 1.471 with 2 df and $p = .231$. Pearson's correlation coefficient for the same variables was $r = -.08$ with $p = .087$.

A comparison of the overall quality of the Federal and Confederate infantry units suggests that the belligerents possessed nearly equal levels of martial skill. By averaging each side's quality rating in all 465 engagements, mean quality ratings were derived. The mean Confederate quality was 2.0, precisely "average," and the mean Federal quality was 1.9, slightly less than "average."²⁰ The nearly identical mean quality values of the two sides, coupled with the fact that the Confederates won at least two engagements for each battle won by the Federals, raise a question: How could two equally skilled forces produced such lopsided combat results? Part of the answer lies in a more careful analysis of the quality data.

The distribution of Federal and Confederate quality ratings indicates that Confederate soldiers frequently displayed higher levels of quality than their opponents. The northerners fought 40 percent of their engagements with low quality troops, 36 percent with average quality men, and 24 percent with high quality soldiers. The southerners, however, fought 25 percent of their engagements with low quality troops, 50 percent with average quality men, and 25 percent with high quality soldiers. In other words, the Confederates exhibited low quality less frequently than the Federals, and they demonstrated both average and high quality more frequently. In each quality category, the Confederates had the advantage.

Having the advantage in soldier quality appeared decisive. Southern soldiers enjoyed the advantage of confronting inferior opponents more often than did northern soldiers. Confederate troops engaged lower-grade Federal troops in 213 of 465

²⁰ Note that the Federal and Confederate *quality* variables were both categorical and continuous: "1 = Low," "2 = Average," and "3 = High".

engagements. Consequently, the Federals won only 5 percent of these engagements, stalemated in 9 percent, and lost 86 percent. The Federals, however, engaged lesser-quality opponents in only 117 engagements. With the advantage in soldier quality, the Federals won 58 percent of their engagements, stalemated in 11 percent, and lost 31 percent. Put another way, when the Federals fought a Confederate force of inferior quality, the northerners increased their percentage of victories from 5 to 58 and decreased their percentage of defeats from 86 to 31.²¹

These battle results become even more compelling when considered in light of the environmental aspects of the engagements. When the Confederates enjoyed an advantage in soldier quality, a majority of the engagements occurred in a slightly uneven field with both sides fighting in lines of battle from positions with limited concealment. On the other hand, when the Federals had an advantage in quality, a majority of the engagements occurred on the same type of terrain (broken field) with both sides using the same types of formations and positions (lines of battle with limited concealment). In other words, despite the differences in soldier quality, most of the environmental characteristics of these engagements were similar.

The only environmental aspects of these engagements that did not remain constant were the combatants' tactical actions. Surprisingly, when higher quality soldiers used either offensive or defensive tactics, they achieved victory in a majority of their

²¹ Statistical tests also indicate that soldier quality influenced combat performance. Analysis of Federal *outcome* and *quality* suggests that a significant, positive relationship between the two variables existed. Pearson's chi-square statistic was 66.111 with 4 df and $p < .0005$. Analysis of variance produced an F statistic of 30.519 with 2 df and $p < .0005$. Pearson's correlation was $r = .334$ with $p < .0005$. Analysis of Confederate *outcome* and *quality* also suggests that a significant relationship between the two variables existed. Pearson's chi-square statistic was 139.9 with 4 df and $p < .0005$. Analysis of variance

engagements. Specifically, when the Confederates fought an inferior Federal force, they won over 83 percent of their offensive actions and nearly 92 percent of their defensive actions. Likewise, when the Federals enjoyed an advantage in soldier quality, they won over 52 percent of their offensive actions and more than 94 percent of their defensive actions. While these data corroborate most scholars' opinions regarding the tactical advantage enjoyed by defensive forces, they challenge the popular notion that offensive tactics were a recipe for defeat. The data suggest that disparity in soldier quality was the true determinant of combat performance rather than the tactical actions taken by either side.

From these preliminary analyses of both the environmental and behavioral aspects of Civil War combat, it appears that the data included in this study support the view that both physical and mental characteristics influenced battle outcome. However, the data also indicate that the traditional subordination of combat's mental aspects to its physical aspects maybe misleading. An advantage in soldier quality appeared crucial in enabling a regiment to overcome many of the theoretical tactical disadvantages traditionally associated with Civil War combat.

Unfortunately, the limitations of the statistical procedures used here make it impossible to determine whether combat performance was more heavily influenced by the environmental or the behavioral aspects of the contest. The tests are incapable of comparing the impact of a battle's physical features with the influence of its mental characteristics. They can only indicate whether or not a significant relationship existed

produced an *F* statistic of 67.203 with 2 df and $p < .0005$. Pearson's correlation was $r = .417$ with $p < .0005$.

between any given variable and combat outcome. Therefore, any conclusions drawn regarding the influence of environmental versus behavioral variables on combat performance would be premature. Such a comparison will appear later in this study, after more sophisticated statistical procedures are applied to the data. Before introducing these advanced statistical procedures, however, an examination of several specialized combat analyses is necessary.

CHAPTER 4

SPECIALIZED COMBAT ANALYSES

Some scholars have taken specialized approaches to understanding Civil War combat. Instead of relying on the core variables included in most conventional analyses, these historians have turned to specific combinations of diverse variables for tactical insights. Though many of these scholars appear to agree with the environmental interpretation of Civil War combat, they suggest that a small number of specific variables, carefully analyzed, may provide added insight into the nature of the fighting.

Most of these analyses fall into one of two categories. They concentrate on either specific environmental variables or explicit behavioral aspects of combat. Those scholars who emphasize the physical characteristics of the fighting generally focus on strength and casualty information, believing that combat effectiveness can be assessed by comparing the battle strengths and casualty rates of two opposing forces. Those historians who emphasize the mental component of combat often examine the soldiers' varying levels of combat experience, believing that battle performance can be understood by measuring the positive and negative effects of combat experience on the men's ability to fight.

The specialized environmental approach, specifically the use of strength and casualty data to measure combat effectiveness, is as old as the war. During its first year, some Americans believed that one southern soldier could single-handedly defeat several northern soldiers in battle. A common perception at that time was that southern men

possessed martial qualities superior to those of their northern counterparts. This belief was based on the stereotypical images of southerners as hard outdoorsmen and northerners as soft urbanites. The impression that southerners were better fighters was reinforced by early Confederate victories at First Manassas (Bull Run) on July 21, 1861, Wilson Creek on August 10, 1861, and Ball's Bluff (Leesburg) on October 21, 1861. Confederate bravado swelled as some inexperienced soldiers and patriotic journalists boasted that each southern soldier could whip three, then five, then ten, Federal soldiers. After the war, as southerners struggled to come to terms with their defeat, the former braggarts among them were forced to reframe their view of southern combat effectiveness. If one Confederate soldier had been able to defeat several Federal soldiers, then the South should have won the war. Therefore, they concluded that they lost because the Federals wore them down with greater quantities of men and materiel. In other words, the Confederacy lost the war by bleeding itself white through victorious actions on the battlefield.¹

Few scholars subscribe to this "lost cause" interpretation of combat effectiveness. Rather than exaggerate one side's fighting abilities over that of the other, most historians

¹ See C. Vann Woodward, ed., *Mary Chesnut's Civil War* (New Haven: Yale University Press, 1981): 109-10, 147, 166, 170-71, 182, 194, 219; B. G. Humphreys, "Recollections of Fredericksburg," in Southern Historical Society, comp., *Southern Historical Society Papers*, 52 vols. (Richmond: Virginia Historical Society, 1876-1959), 14:415-28 (hereafter referred to as *SHSP*); Edward McCrady, Jr., "Address of Colonel Edward McCrady Jr.," *SHSP*, 16:246-60; M. C. Butler, "Southern Genius," *SHSP*, 16:281-85; Dabney H. Maury, "A Remarkable Victory," *SHSP*, 19:51-54; J. B. Moore, "Sharpsburg," *SHSP*, 27:210-19; Anonymous, "The First Manassas," *SHSP* 30:269-73; John McGrath, "In A Louisiana Regiment," *SHSP*, 31:103-20; Bennett H. Young, "Zollicoffer's Oak," *SHSP*, 31:165-72; William S. Hammond, "The Battle of Dranesville, Va.," *SHSP*, 35:69-77; R. A. Goodwin, "Memorial Sermon," *SHSP*, 37:338-47; and Edward A. Pollard, *The Lost Cause* (New York: E. B. Treat, 1867, reprint, New York: Gramercy Books, 1994), 133, 152-53 (page citations are to reprint edition); and Everette B. Long, ed., *Personal Memoirs of U. S. Grant* (Cleveland: World Publishing Company, 1952), 445, 453-54. For an analysis of northern perceptions of southern martial abilities, see Michael C. C. Adams, *Our Master the Rebels: A Speculation on Union Military Failure in the East, 1861-1865* (Cambridge: Harvard University Press, 1978).

agree that southerners probably entered the war with a slight martial advantage, especially in the area of horsemanship. Scholarly comparisons of the soldiers' fighting abilities, however, usually emphasize their similarities, and such studies often conclude that the men were equally capable on the battlefield. When explaining why the South lost the war, historians usually include the superior resources of the Union states as a contributing factor, but they rarely point to it as the only one. Still the romantic image of the gritty southern soldier dominating the battlefield through personal bravery, while terrorizing his enemy with his infamous "rebel yell," lingers in American memory.²

The three variables upon which this sectional discussion of combat effectiveness is based are *outcome*, *strength*, and *casualties*. Descriptive analysis of these variables may indicate whether the Confederates did indeed fight with greater efficiency. Based on the assumption that the more capable force usually defeated the less capable force, the distribution of wins and losses should favor the more effective soldiers. Combat outcome data suggest that the Federals were considerably less effective than the Confederates. Northern regiments lost nearly 60 percent of their battles while winning only 24 percent.

² See Bell I. Wiley, *The Life of Johnny Reb: The Common Soldier of the Confederacy* (Baton Rouge: Louisiana State University Press, 1943), 89, 123-24, 312-13, 347; E. Merton Coulter, *The Confederate States of America, 1861-1865* (Baton Rouge: Louisiana State University Press, 1950), 453; Richard N. Current, "God and the Strongest Battalions," in David Donald, ed., *Why the North Won the Civil War* (Baton Rouge: Louisiana State University Press, 1960), 15-32; Adams, *Our Master the Rebels*, 46, 178-79; Emory M. Thomas, *The Confederate Nation: 1861-1865* (New York: Harper and Row, 1979), 118; Bertram Wyatt-Brown, *Southern Honor: Ethics and Behavior in the Old South* (New York: Oxford University Press, 1982); Grady McWhiney and Perry D. Jamieson, *Attack and Die: Civil War Military Tactics and the Southern Heritage* (Tuscaloosa: University of Alabama Press, 1982); Herman Hattaway and Archer Jones, *How the North Won: A Military History of the Civil War* (Urbana: University of Illinois Press, 1983), 721-32; Richard E. Beringer, Herman Hattaway, Archer Jones, and William N. Still, *Why the South Lost the Civil War* (Athens: University of Georgia Press, 1986), 458-81; James M. McPherson, *Battle Cry of Freedom: The Civil War Era* (New York: Oxford University Press, 1988), 346-48; Reid Mitchell, "The Perseverance of the Soldiers," in Gabor S. Boritt, ed., *Why the Confederacy Lost* (New York: Oxford University Press, 1992), 109-32; Russell F. Weigley, *A Great Civil War: A Military and Political History, 1861-1865* (Bloomington: Indiana University Press, 2000), 23-35, 62-63; and Gordon

The least successful Federal units lost almost three-fourths of their engagements, while the most successful northern regiments won only half their battles. The distribution of Confederate results was just the opposite. Southern regiments lost only 25 percent of their engagements and won over 60 percent. This simple comparison of combat outcomes suggests that Confederate soldiers may have been more effective on the battlefield than their northern counterparts.³

Strength data also suggest that southern soldiers may have been more capable than northern soldiers. When the Confederates succeeded, they often did so by overcoming a Federal force of equal strength. The mean southern regimental strength was 280 men, and the mean northern regimental strength was 282 men. When the Federals won, however, they averaged approximately 20 percent more men than the Confederates. The boys in blue averaged 325 troops per regiment versus 262 gray-clad men. These data suggest that the Confederates frequently won when fighting against an opponent of equal strength. The Federals, on the other hand, tended to win only when fighting a numerically inferior opponent.

Casualty data also support the hypothesis that the Confederates may have been more effective than the Federals. When the Confederates won, they averaged 10 men per

Rhea, Richard Rollins, Stephen Sears, and John Y. Simon, "What Was Wrong With the Army of the Potomac?," *North & South: The Official Magazine of the Civil War Society* 4 (March 2001): 12-18.

³ The distribution of Federal combat results was as follows: Win = 113 engagements, or 24 percent; Stalemate = 76 engagements, or 16 percent; Lose = 276 engagements, or 60 percent. The least successful Federal regiments were the 2nd Delaware (lost 8 of 11 engagements, or 73 percent), the 2nd New York Heavy Artillery (lost 10 of 14 engagements, or 71 percent), the 52nd New York (lost 14 of 20 engagements, or 70 percent), and the 7th New York Heavy Artillery (lost 8 of 11 engagements, or 73 percent). The most successful Federal regiments were the 57th New York (won 6 of 14 engagements, or 43 percent), the 64th New York (won 9 of 20 engagements, or 45 percent), and the 7th New York Veteran (won 3 of 6 engagements, or 50 percent). Because this study is limited to the combat histories of twenty-seven Federal regiments, the combat results of their Confederate opponents cannot be separated by

regiment either killed, wounded, or missing, versus the Federals' 48. When the Federals won, they lost approximately 32 soldiers versus the Confederates' 54. Regardless of which side won, the victor inflicted more casualties than the vanquished. However, the ratios of casualties suggest the Confederates fought with greater efficiency. When the southerners won, they inflicted almost five times the number of casualties that they sustained. When the Federals won, they inflicted less than double the number of casualties that they sustained.

The preceding comparisons of combat outcomes, strengths, and casualties suggest that the boisterous rhetoric of wartime Confederates and post-war southerners may have contained a kernel of truth. The data indicate that southern forces won over 60 percent of their engagements by inflicting almost five times the number of casualties that they sustained while fighting an opponent of near equal strength. Northern combat performance pales in comparison. Federal forces won only 24 percent of their engagements by inflicting less than twice the number of casualties that they sustained despite fighting an opponent approximately four-fifths their size.

Before concluding that one Confederate soldier was equal to several Federal soldiers, the hypothesis of southern superiority must be analyzed more carefully. Rigorous statistical analysis of the strength, casualty, and outcome data suggests that it is difficult to draw reliable conclusions from them regarding combat effectiveness. Analysis indicates that neither side's regimental strength significantly influenced the results of

regiment. The distribution of Confederate combat results was as follows: Win = 282 engagements, or 61 percent; Stalemate = 66 engagements, or 14 percent; Lose = 117 engagements, or 25 percent.

small-unit actions.⁴ Similarly, only the total number of Confederate casualties demonstrated a significant relationship with combat outcomes; Federal casualty data were not significantly associated either Federal or Confederate combat results.⁵ These results suggest that only Confederate casualty data should be used when trying to assess battle outcomes. In other words, the argument that “Southerners made better soldiers because they won more battles by inflicting more casualties on opponents of equal strength,” may be misleading—the reference to opposing strengths appears superfluous.⁶

Careful examination of the Federal and Confederate strength data reveals why strength did not appear to influence outcome significantly. The Federal data indicate that

⁴ A comparison of Federal and Confederate strengths reveals that the difference in strength of the opposing forces was not large enough to significantly influence combat outcome. When the Federals won, they outnumbered the Confederates 2 to 1. When the Federals were stalemated, they outnumbered the Confederates 1.5 to 1. When the Federals lost, they outnumbered the Confederates 2.4 to 1. Analysis of variance and Pearson’s correlation were used to examine the relationships between both Federal and Confederate strength and outcome data. The tests revealed that Federal strength did not significantly influence either Federal or Confederate combat results. When Federal outcome was analyzed relative to Federal strength, analysis of variance produced an *F* statistic of 1.479 with 2 degrees of freedom (df) and *p* = .229, and Pearson’s correlation was *r* = .072 with *p* = .119; when Confederate outcome was analyzed relative to Federal strength, analysis of variance produced an *F* statistic of 1.375 with 2 df and *p* = .254, and Pearson’s correlation was *r* = -.064 with *p* = .169. Similarly, when Federal outcome was analyzed relative to Confederate strength, analysis of variance produced an *F* statistic of .808 with 2 df and *p* = .446, and Pearson’s correlation was *r* = -.040 with *p* = .390; when Confederate outcome was analyzed relative to Confederate strength, analysis of variance produced an *F* statistic of .652 with 2 df and *p* = .522, and Pearson’s correlation was *r* = .048 with *p* = .305.

⁵ Analysis of variance and Pearson’s correlation were used to examine the relationships between both Federal and Confederate casualty and outcome data. The tests revealed that Federal casualties were not significantly associated with either Federal or Confederate combat results. When Federal outcome was analyzed relative to Federal casualties, analysis of variance produced an *F* statistic of 1.471 with 2 df and *p* = .231, and Pearson’s correlation was *r* = -.080 with *p* = .087; when Confederate outcome was analyzed relative to Federal casualties, analysis of variance produced an *F* statistic of 1.228 with 2 df and *p* = .294, and Pearson’s correlation was *r* = .055 with *p* = .234. When both Federal and Confederate combat outcomes were analyzed relative to Confederate casualties, however, the tests indicated that the total number of southern casualties significantly affected both side’s combat performance. When Federal outcome was analyzed relative to Confederate casualties, analysis of variance produced an *F* statistic of 52.793 with 2 df and *p* < .0005, and Pearson’s correlation was *r* = .423 with *p* < .0005; when Confederate outcome was analyzed relative to Confederate casualties, analysis of variance produced an *F* statistic of 97.174 with 2 df and *p* < .0005, and Pearson’s correlation was *r* = -.523 with *p* < .0005.

⁶ The reference to casualties cannot be discounted because the Confederate casualty data were significantly associated with both sides’ outcome data. However, because the Federal casualty data were

when the northerners won, they averaged 20 percent more men than their opponent; when they lost, they averaged the same number of men as their opponent. Relative to Federal battle results, these strength data make sense. When the northerners outnumbered their opponent, they won; when they merely matched the strength of their opponent, they lost. It is the inclusion of the third possible outcome (stalemate) that invalidates Federal strength information as a predictor of combat performance. Specifically, when the Union men enjoyed their greatest numerical advantage, they frequently fought to a stalemate. They averaged 26 percent more men than their opponent when stalemated. In other words, when the Federals enjoyed their greatest strength advantage, they were frequently stalemated; when they had a small numerical advantage, they usually won; and when their strength equaled that of the Confederates, the Federals tended to lose.

Analysis of the Confederate strength data reveals a similar pattern. The relationship between strength and outcome appears logical when analysis is limited to either victory or defeat. When the southerners won, their average strength equaled that of their opponent; when they lost, their strength was approximately 20 percent less than that of the Federals. Once again, it is the inclusion of those engagements that ended in stalemate that render Confederate strength data unreliable for predicting combat results. When the southerners averaged 26 percent fewer men than their opponent, they were usually stalemated. In other words, when the Confederates deployed a force equal to their opponent's, they won; when they fought with a force smaller than their opponent's, they

not significantly associated with the outcome data, it is difficult to draw any conclusions regarding the overall analytical reliability of casualty data when assessing combat performance.

lost; and when they deployed their smallest force relative to that of the Federals, they were stalemated.

The two preceding analyses of combat effectiveness appear to contradict each other regarding the usefulness of strength data. The descriptive analysis suggested that the Confederates were more effective under fire because they won by defeating an enemy force of equal strength, and the Federals won by defeating an enemy force of lesser strength. The statistical analysis, however, indicated that it is difficult to draw reliable conclusions regarding combat effectiveness from strength data because large numbers did not insure victory and small numbers did not guarantee defeat.

The reason for the discrepancy in analyses is simple: The descriptive analysis of the strength, casualty, and outcome data was limited to a single category in the outcome variables—victory; all data pertaining to stalemates and defeats were omitted. The statistical procedures, however, were not limited by outcome; they included all 465 engagements. It is this inconsistency in analysis that has caused the conflicting conclusions regarding the relationship between strength and outcome information.

By limiting their analyses of strength, casualty, and outcome data, some authors may draw unreliable conclusions regarding the combat performances of two opposing forces. Unfortunately, limited descriptive analyses of strength and outcome data frequently appear in Civil War studies. Historians often use strength comparisons to frame their combat narratives, pointing to disproportionate strengths when discussing the heroic fighting of a weaker force or the overwhelming power of a stronger force. Those authors who use such comparisons when analyzing tactical actions may inadvertently mislead their readers. Nevertheless, strength comparisons shall continue. Despite

statistical findings to the contrary, the perceived significance of tactical strength information will ensure that future scholars continue to use these data in their analyses of Civil War combat.⁷

Returning to the hypothesis that initiated the preceding analyses of strength, casualty, and outcome data, the question regarding which side fought more effectively remains. Based on the three variables used to argue southern martial superiority, it is difficult to draw any reliable conclusions. One of the three variables (strength) provides little useful information regarding either side's fighting effectiveness. The two remaining variables (casualties and outcomes) offer a glimpse into the nature of the fighting, but it would be dubious to claim that the complexities of battle can be adequately understood through two variables. Perhaps the only conclusion that can be drawn is that the limited data upon which the hypothesis of southern martial superiority has been built can not adequately support it.⁸

⁷ Though strength comparisons are commonplace in campaign (strategic) studies, it is their use in combat (tactical) studies that is considered here. For examples, see John Q. Imholte, *The First Volunteers: History of the First Minnesota Volunteer Regiment, 1861-1865* (Minneapolis: Ross and Haines, 1963), 114-25; John Hennessy, *Return to Bull Run: The Campaign and Battle of Second Manassas* (New York: Simon and Schuster, 1993), 251; Harry W. Pfanz, *Gettysburg: The Second Day* (Chapel Hill: University of North Carolina Press, 1987), 314-414; William D. Henderson, *The Road to Bristoe Station: Campaigning With Lee and Meade, August 1 - October 20, 1863* (Lynchburg, VA: H. E. Howard, 1987), 163-91; Peter Cozzens, *This Terrible Sound: The Battle of Chickamauga* (Urbana: University of Illinois Press, 1992), 144, 338-41; Wiley Sword, *Embrace an Angry Wind: The Confederacy's Last Hurrah: Spring Hill, Franklin, and Nashville* (New York: HarperCollins Publishers, 1992), 190-94; Gordon C. Rhea, *The Battle of the Wilderness, May 5-6, 1864* (Baton Rouge: Louisiana State University Press, 1994), 172-76; Terry L. Jones, "Twice Lost: The 8th Louisiana Volunteers' Battle Flag at Gettysburg," *Civil War Regiments* 6, no. 3 (1999): 89-105; W. Keith Alexander, "Fought Them Like Tigers': Colonel Clark Moulton Avery and the 33rd North Carolina Infantry, May 5-6, 1864," *Civil War Regiments* 6, no. 4 (1999): 67-69; Trevor N. Dupuy, *Understanding War: History and Theory of Combat* (New York: Paragon House, 1987), 81-89, 174-80; and H. John Poole, *The Last Hundred Yards: The NCO's Contribution to Warfare* (Emerald Isle, NC: Posterity Press, 1994), 17-18.

⁸ The hypothesis of southern martial superiority will be reexamined later in this study using broader, more dependable, statistical procedures.

A similar environmental approach for measuring combat effectiveness was introduced almost one hundred years ago by Frederick W. Lanchester. In his study titled *Aircraft in Warfare*, Lanchester outlined a mathematical formula that allowed historians to estimate the fighting values of two opposing forces based on their respective battle strengths and casualties. According to Lanchester's formula, if two combatants were equally effective, their respective fighting values should equal 1. If one side was more effective, its value would be greater than 1. If one side was less effective, its value would be less than 1. For example, at Gettysburg on July 2, 1863, the 140th Pennsylvania engaged the 2nd South Carolina on the slopes of Stony Hill northwest of the Wheatfield. The Pennsylvanians, 515 soldiers strong, threw themselves against the 412 South Carolinians aligned in the woods near the crest of the hill. After nearly sixty minutes of close combat, the Federals' right flank was turned and they were forced to retire. In the wake of this sharp engagement, the 140th Pennsylvania lost 241 men while the 2nd South Carolina sustained 170 casualties. When Lanchester's formula is applied to the data, the derived fighting values appear consistent with the known tactical results of the battle. The fighting value of the 140th Pennsylvania was .58 while that of the 2nd South Carolina was 1.71. In other words, the Federals were approximately one-third as effective as their opponents, and the Confederates were nearly three times as effective as the Federals. According to Lanchester, therefore, it should not be surprising that the Federals lost the engagement.⁹

⁹ See Frederick W. Lanchester, *Aircraft in Warfare: The Dawn of the Fourth Arm* (New York : D. Appleton and Company, 1917), 39-66; Hattaway and Jones, *How the North Won*, 721-32; Beringer, Hattaway, Jones, and Still, *Why the South Lost the Civil War*, 470-73; and Daniel Willard, *Lanchester as Force in History: An Analysis of Land Battles of the Years 1618-1905* (McLean, VA: Research Analysis Corporation, 1962), 1-37.

Application of Lanchester's formula to the strength and casualty data included in this study produced opposing fighting values that appear to support previous analyses of Civil War combat effectiveness. When the Federals had a high fighting value, they usually won the battle. When their value was low, they often lost. Specifically, the Federals' mean fighting value peaked at 12.0 when they won, dropped to 3.1 when they were stalemated, and sank to 1.3 when they lost. The Confederate fighting values followed the same trend. When the southerners won, their mean fighting value was 76.5. When they were stalemated, it fell to 17.7. When they lost, the Confederate mean fighting value dropped to 5.1. The data indicate a direct relationship between Lanchester's measurement of combat effectiveness and combat outcome.¹⁰

Before accepting the validity of Lanchester's formula, a closer examination of the fighting values is necessary. Most troubling is the fact that when either the Federals or the Confederates lost, their mean fighting values were still greater than 1.0. In other words, despite demonstrating greater combat effectiveness than their opponents, they still lost the engagements. Also troubling is the extreme variation found in the Federal and Confederate mean fighting values. The results appear to disregard Lanchester's index value of 1.0. There are two probable explanations for these discrepancies. First, perhaps the scale of the engagements being analyzed distorts Lanchester's calculations. When

¹⁰ Both analysis of variance and Pearson's correlation indicate statistically significant associations between the combat performances of the Federal regiments and their respective fighting values. Analysis of variance produced an F statistic of 13.425, with 2 df, and $p < .0005$. Pearson's correlation was $r = .225$ with $p < .0005$. When the Confederate data were examined, however, only Pearson's correlation indicated the presence of a significant relationship. Analysis of variance failed to show a statistically significant association between Confederate combat outcomes and Confederate fighting values. Analysis of variance produced an F statistic of 2.683, with 2 df, and $p = .069$. Pearson's correlation was $r = .104$ with $p = .025$.

Herman Hattaway and Archer Jones used Lanchester's formula, they measured the combat effectiveness of two opposing armies in twenty-six battles. Based on this approach, their results appeared logical. They found that the armies' fighting values ranged from 0.5 to 2.5, that defensive actions proved more effective than offensive actions, and that Confederate forces appeared more effective than Federal forces.¹¹

When Lanchester's calculations were used to measure the combat performance of opposing regiments in the 465 engagements included in this study, the results appeared less dependable. Fighting values ranged from .01 to 260, and only Confederate defensive actions proved more effective than their offensive actions. However, the tactical fighting values did support Hattaway and Jones' conclusion that southern forces generally fought with greater efficiency than northern forces. The discrepancies between these two applications of Lanchester's methodology may be attributed to their differing scales of combat.

When measuring combat performance with Lanchester's formula, the scale of the fighting proved significant. Engagements at the tactical level were occasionally one-sided affairs. In such cases, Lanchester's fighting values may be surprisingly high or low. However, when combat was examined at the operational level, imbalances in regimental combat performance were effectively smoothed by the measurement of an army's overall fighting performance. Considering the inability of Civil War armies to annihilate their opponents, army fighting values do not exhibit the same degree of variation found in regimental fighting values. Therefore, while Lanchester's model may be appropriate for

¹¹ Hattaway and Jones, *How the North Won*, 721-32

measuring combat performance at the operational level, it appears unreliable for analyzing combat performance at the tactical level.

A second plausible explanation for the discrepancies between the belligerents' tactical fighting values and their respective combat performances may be the assumption upon which Lanchester's formula is based—it leaves his model vulnerable to an inestimable margin of error. Lanchester's formula assumes that each soldier could strike each opposing soldier at every moment during battle. If, for example, terrain, positions, or formations limited some of the soldiers' field of fire, than Lanchester's calculations would contain an immeasurable margin of error. Therefore, despite Lanchester's sophisticated mathematical model, it appears that combat outcome cannot be accurately predicted from strength and casualty data. These variables do not provide an adequate framework for forming hypotheses regarding Civil War combat effectiveness.

While some historians examined certain environmental data in their efforts to understand battle performance, a second group of scholars turned to various behavioral data. Specifically, these historians stressed the relationship between combat experience and combat performance. They found that as inexperienced soldiers became seasoned combat veterans, they passed along a learning curve. Early in their combat careers, the abilities of the men improved with each moment spent under fire. At some point, however, combat experience no longer served to sharpen their martial skills. Instead, the soldiers' combat effectiveness decreased with continued exposure to enemy fire. Despite the intuitive appeal of this hypothesis, few scholars have scientifically examined the relationship between combat experience and combat performance, and even fewer have

ventured to estimate the point at which combat experience became a detrimental influence on combat performance.¹²

Several historians have argued that when Civil War soldiers fought numerous battles in rapid succession, their combat effectiveness declined. These scholars believe that after the first twenty-five days of continuous combat, the soldiers' combat skills began to dull, lessening their unit's overall combat effectiveness.¹³ The data collected for this study appear to support this hypothesis. The only phase of the war during which the Federal regiments engaged in continuous fighting for over twenty-five days was during the Overland Campaign in May and June, 1864. Through the first twenty-five days of fighting, the Federals engaged in eighty-four engagements. Of these, they won 6 percent,

¹² For a sample of both soldiers and scholars who have recognized the relationship between combat experience and combat effectiveness, see Niccolo Machiavelli, *The Art of War*, trans. Neal Wood (Indianapolis: Bobbs-Merrill, 1965), 29, 68, 202; S. L. A. Marshall, *Men Against Fire* (New York: William Morrow and Company, 1947), 123-24; Rory Muir, *Tactics and the Experience of Battle in the Age of Napoleon* (New Haven: Yale University Press, 1998), 193-98; Frank Holsinger, "How It Feels to be Under Fire," in Henry Steele Commager, ed., *The Blue and the Gray*, 2 vols. (Indianapolis: Bobbs-Merrill, 1950), 1:306-08; Jeffrey D. Wert, *A Brotherhood of Valor: The Common Soldiers of the Stonewall Brigade, C.S.A., and the Iron Brigade, U.S.A.* (New York: Simon and Schuster, 1999), 145-54, 172, 313-14; Joseph G. Bilby, *Remember Fontenoy! The 69th New York and the Irish Brigade in the Civil War* (Hightstown, NJ: Longstreet House, 1995), 28; Josiah M. Favill, *The Diary of a Young Officer Serving with the Armies of the United States during the War of the Rebellion* (Chicago: R. R. Donnelley and Sons, 1909), 114, 273; Gilbert Frederick, *The Story of a Regiment, Being a Record of the Military Services of the Fifty-Seventh New York State Volunteer Infantry in the War of the Rebellion, 1861-1865* (Chicago: C. H. Morgan Company, 1895), 71-73, 262-67; Paul Fatout, ed., *Letters of a Civil War Surgeon* (West Lafayette, IN: Purdue University Press, 1961), 38; John Gibbon, *Personal Recollections of the Civil War* (New York: G. P. Putnam's Sons, 1928), 100-01, 257-60; Michael D. Doubler, *Closing with the Enemy: How GIs Fought the War in Europe, 1944-1945* (Lawrence: University Press of Kansas, 1994), 25, 40, 57, 227; John A. Shaw, "Psychodynamic Considerations in the Adaptation to Combat," in Gregory Belenky, ed., *Contemporary Studies in Combat Psychiatry* (New York: Greenwood Press, 1987), 117-32; Roy L. Swank and Walter E. Marchand, "Combat Neuroses: Development of Combat Exhaustion," *Archives of Neurology and Psychiatry* 55 (1946): 236-47; J. W. Appel and G. W. Beebe, "Preventive Psychiatry," *Journal of the American Medical Association* 131 (August 1946): 1469-75; Stephen E. Ambrose, *D-Day, June 6, 1944: The Climactic Battle of World War II* (New York: Simon and Schuster, 1994), 48-51; and Reid Mitchell, "The Infantryman in Combat," *North and South: The Official Magazine of the Civil War Society* 4 (August 2001): 12-21.

¹³ See James M. McPherson, *For Cause and Comrades: Why Men Fought in the Civil War* (New York: Oxford University Press, 1997), 44-45; Paddy Griffith, *Rally Once Again: Battle Tactics of the American Civil War* (Ramsbury, Marlborough, Wiltshire: Crowood Press, 1987); reprint, *Battle Tactics of*

stalemated 37 percent, and lost 57 percent. Though their combat record for the first twenty-five days of fighting was dismal, the Federals performed even worse during the next twenty-five days. During this phase of the campaign, the Federals participated in 155 engagements. Of these, they failed to win a single encounter, they were stalemated 15 percent of the time, and they lost 85 percent.

Though the performance of the Federals during the first twenty-five days of continuous fighting was better than their performance during the subsequent twenty-five days, it is difficult to view their effectiveness as anything other than dismal. Considering that the northerners won over 24 percent of all their engagements throughout the war, and that in 1864 they won 11 percent of all their fights, their mere five victories in May and June (2 percent of their engagements those months) indicate that something had blunted their martial edge. However, the lack of sharp contrast in Federal results during each of the twenty-five-day periods suggests that the twenty-five-day rule may not be a dependable method for understanding combat performance.

Another reason for doubting the reliability of the twenty-five-day rule is the fact that during the same period of time, and while enduring similar campaign hardships, the Confederates won 75 percent of their engagements. During the first twenty-five days, they won 45 percent of their engagements, and during the second twenty-five days they won 100 percent. Despite being exposed to similar combat conditions, the Confederates appear to have improved over time. Based on these data, the twenty-five-day rule appears

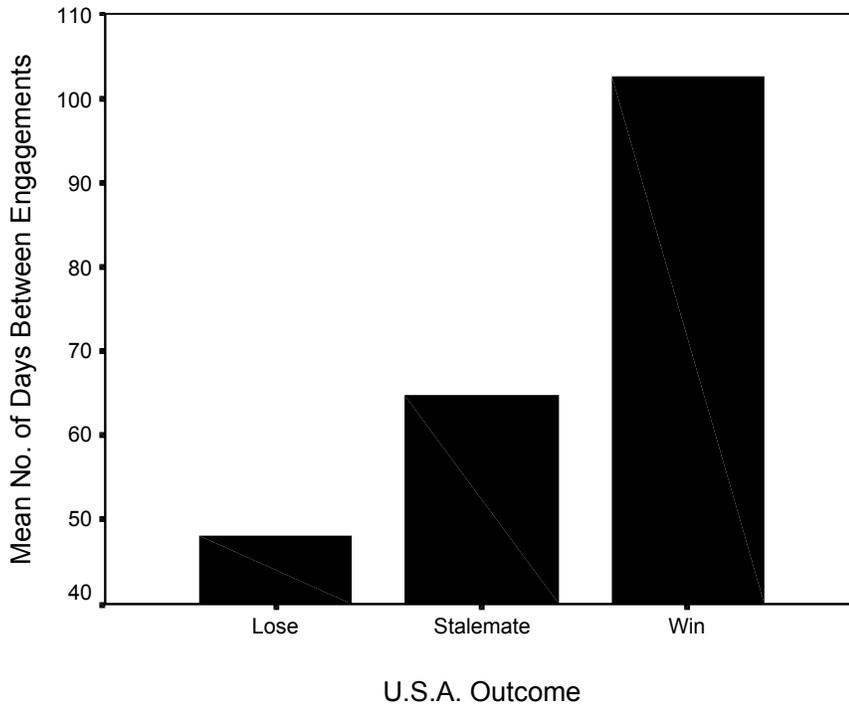
the Civil War (New Haven: Yale University Press, 1989), 50 (page citations are to the reprint edition); and Richard Holmes, *Acts of War: The Behavior of Men in Battle* (New York: Free Press, 1985), 213-18.

unreliable. Something other than prolonged combat exposure probably lessened the Federals' martial prowess.¹⁴

Perhaps a better way to analyze the possible relationship between combat experience and combat performance is to examine the number of days that elapsed between battles and the outcomes of the subsequent engagements. Using this approach, the data suggest that time between battles and combat performance were directly related. The greater the number of days between engagements, the greater the probability that the Federals would win their next fight. The mean number of days between battles prior to Federal victories was 103. However, that number fell to 48 prior to Federal defeats. When they fought to a stalemate, the Federals averaged 65 days between engagements (see Graph 1).

¹⁴ The Confederate data cannot be directly compared with the Federal data because they are inconsistent with the Federal data. Whereas the Federal data describe the continuous combat records of twenty-seven northern regiments, the Confederate data describe only those southern units that happened to engage one of these Federal regiments. In other words, the Confederate data lack the continuity necessary to fully assess southern regimental combat performance.

Graph 1
Mean Number of Days Between Engagements Relative to Federal Outcome



Analysis of the *time between battles* and *outcome* variables supports the hypothesis that protracted campaigns of continuous combat caused Federal regiments to lose their fighting edge. However, the data neither support nor refute the contention that twenty-five days of continuous fighting was the maximum number of days that a regiment could endure before losing its combat effectiveness. The data merely suggest that experience and outcome were related, and that Federal combat effectiveness decreased as the frequency of battles increased.¹⁵

A third possible approach for understanding the relationship between experience and effectiveness is to examine the impact that regimental prebattle activities may have

¹⁵ Analysis of variance suggests that the number of days between battles for the Federal regiments and their subsequent battlefield performance were related. The test produced an F statistic of 9.529 with 2 df and $p < .0005$. Pearson's correlation Federal outcome and the number of days between battles was $r =$

had on combat performance. According to several studies regarding Confederate Major General Thomas Jonathan “Stonewall” Jackson and his troops during the Shenandoah Valley and Peninsular campaigns in 1862, the constant grind of marching and fighting numbed the mind of Jackson and blunted the martial edge of his men. Consequently, Jackson and his troops failed to perform as expected when they were called to join General Robert E. Lee’s Army of Northern Virginia and attack the flank of the Federal army as it approached the Confederate capital. If analysis of the number of days of continuous fighting does not fully explain the relationship between experience and outcome, perhaps analysis of the soldiers’ prebattle activities will.¹⁶

The activities carried out by the northern regiments during the two days preceding battle appear to have affected their combat performance. Analysis indicates that the Federals’ actions during each of the four twelve-hour segments of time prior to battle have statistically significant associations with combat outcome.¹⁷ The distribution of

.196 with $p < .0005$, indicating that the greater the number of combat-free days enjoyed by the Federals before entering battle, the greater the likelihood that they would be victorious in battle.

¹⁶ See Henry Kyd Douglas, *I Rode With Stonewall: Being Chiefly the War Experiences of the Youngest Member of Jackson’s Staff from the John Brown Raid to the Hanging of Mrs. Surratt* (Chapel Hill: University of North Carolina Press, 1940), 100-01; James I. Robertson, Jr., *Stonewall Jackson: The Man, The Soldier, The Legend* (New York: MacMillan Publishing, 1997), 458-84; Robert G. Tanner, *Stonewall in the Valley: Thomas J. “Stonewall” Jackson’s Shenandoah Valley Campaign, Spring 1862* (New York: Doubleday and Company, 1976. Reprint, Mechanicsburg, PA: Stackpole Books, 1996), 438-39, 485-87 (page citations are to the reprint edition); Frank E. Vandiver, *Might Stonewall* (New York: McGraw-Hill, 1957), 299-301; George Francis Robert Henderson, *Stonewall Jackson and the American Civil War* (New York: Grosset and Dunlap, 1943), 339-95.

¹⁷ Both analysis of variance and Pearson’s chi-square analysis for each of the four prebattle variables (*prebattle 0-12*, *prebattle 12-24*, *prebattle 24-36*, and *prebattle 36-48*) relative to the Federal *outcome* variable indicate statistically significant relationships between them. Analysis of variance for *prebattle 0-12* produced an F statistic of 11.009 with 6 df and $p < .0005$, while Pearson’s chi-square statistic was 79.452 with 12 df and $p < .0005$. Analysis of variance for *prebattle 12-24* produced an F statistic of 11.319 with 8 df and $p < .0005$, while Pearson’s chi-square statistic was 119.751 with 16 df and $p < .0005$. Analysis of variance for *prebattle 24-36* produced an F statistic of 5.496 with 7 df and $p < .0005$, while Pearson’s chi-square statistic was 63.814 with 14 df and $p < .0005$. Analysis of variance for *prebattle 36-48* produced an F statistic of 9.698 with 7 df and $p < .0005$, while Pearson’s chi-square statistic was 82.428 with 14 df and $p < .0005$.

combat results per prebattle activity suggests that when the Federals participated in two battles within forty-eight hours, the Union men were likely to lose the second engagement. Similarly, if the Federals engaged in more than two battles within forty-eight hours, they were likely to lose each of the subsequent engagements following their first engagement. Inversely, light duty most often preceded Federal victory. When northern regiments spent the forty-eight hours prior to battle either in camp, on picket duty, on fatigue duty, or performing any combination of these three activities, they significantly increased their chances of winning the approaching contest.¹⁸ Simply stated, Federal regiments were twice as likely to be victorious if they had not fought for at least forty-eight hours prior to entering battle. If the units engaged in combat anytime during the two days prior to battle, their chances for victory were halved.¹⁹

The relationship between experience and outcome is clarified slightly by the preceding examination of prebattle activities and battlefield results. The data clearly indicate that when the Federals engaged in multiple battles within a forty-eight hour period, they frequently lost those engagements that followed their first engagement. Therefore, previous scholarly estimates stating that Civil War combat effectiveness began to decrease after twenty-five days of continuous fighting may be too high. The data collected for this study indicate that continuous fighting over a period of time as small as

¹⁸ Those activities most frequently associated with Federal defeat during each of the twelve-hour segments of time were: *prebattle 0-12* = “combat” (led to defeat 88 percent of the time), *prebattle 12-24* = “combat” (led to defeat 89 percent of the time), *prebattle 24-36* = “combat” (led to defeat 100 percent of the time), *prebattle 36-48* = “picket” (led to defeat 100 percent of the time). Those activities most frequently associated with Federal victory during each of the twelve-hour segments of time were: *prebattle 0-12* = “camp” (led to victory 51 percent of the time), *prebattle 12-24* = “camp” (led to victory 48 percent of the time), *prebattle 24-36* = “picket” or “fatigue” (each led to victory 50 percent of the time), *prebattle 36-48* = “fatigue” (led to victory 41 percent of the time).

two days may have significantly eroded the fighting effectiveness of the Federal regiments.

Another method used to understand the relationship between experience and performance is to track the cumulative number of battles in which a regiment fought. Two scholars have suggested that after soldiers participated in their third or fourth battle, their willingness to engage the enemy vigorously had diminished to such an extent that they hampered the overall effectiveness of their regiment. Instead of pressing their attacks, the veteran soldiers would advance a short distance, lay down, open fire, and try to avoid injury. The soldiers in the Second Corps recognized this old-soldier tactic and described it as “sitting down and making coffee.” Such ineffective veterans were no longer assets to their units; they were liabilities.²⁰

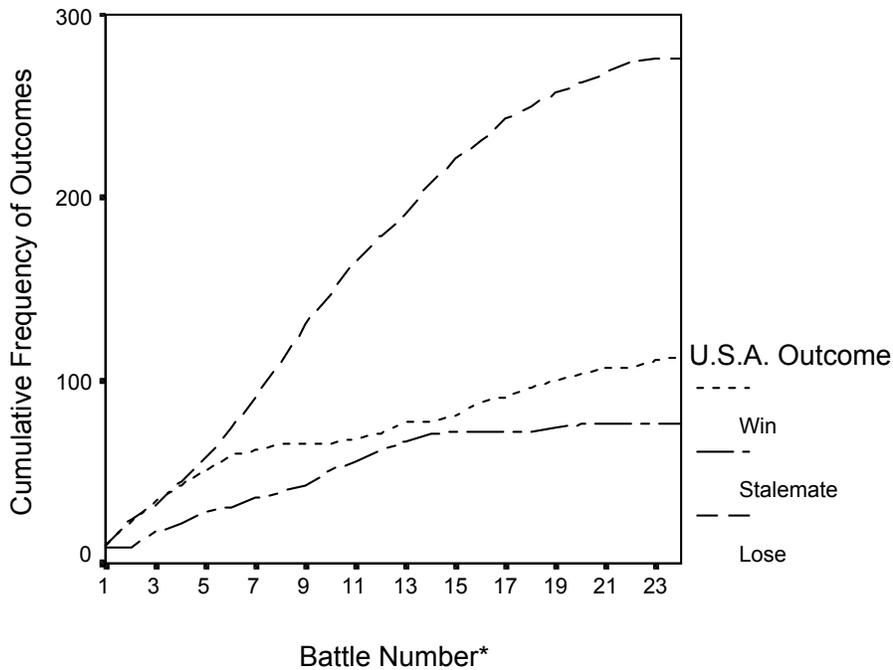
Analysis of combat outcome relative to battle number suggests that the two variables shared a statistically significant relationship.²¹ That relationship is best described in Graph 2. Throughout their first four battles, the Federals won and lost at nearly equal rates. They won forty-three engagements and lost forty-five. After their fourth battle, however, the northern units began to lose over three times as many battles as they won. They lost 231 battles and won only seventy. These trends appear to support the hypothesis that Civil War soldiers’ combat effectiveness declined after they endured the strain of battle more than four times.

¹⁹ When Federal regiments entered combat without having participated in battle for at least two days, they won 28 percent of the time. However, when they entered combat within two days of their previous battle, the Federal won only 14 percent of the time.

²⁰ See McPherson, *For Cause and Comrades*, 44-45; Griffith, *Battle Tactics of the Civil War*, 50; and Gibbon, *Personal Recollections of the Civil War*, 229.

²¹ Analysis of variance produced an *F* statistic of 3.016 with 23 df and $p < .0005$. Pearson’s chi-square statistic was 103.288 with 46 df and $p < .0005$.

Graph 2
Federal Combat Results by Battle Number



* Median Date for Battle No. 4 = July 2, 1863

Before concluding that the Federals' fourth battle served as the pinnacle of their combat effectiveness, two weaknesses in the data should be noted. First, the median date for battle number four was July 2, 1863. Approximately half of the Federal regiments fought their fourth battle before July 2 and half fought their fourth battle after July 2. Interestingly, the median date for battle number five was May 5, 1864. Considering the difference in campaign strategies and intensities between 1862-63 and 1864-65, it would be dubious to conclude that battle number alone accounted for the rapid increase in Federal losses after battle number four. Though the obvious decline in the Federals' combat effectiveness after their fourth engagement was likely the result of accumulated battle stress, other aspects of combat probably contributed to their increasingly poor

performance under fire.²² The second weakness in the data is the fact that the *battle number* variable applies only to the Federal regiments. The number of engagements in which each Confederate unit participated has not been included in this study.²³ Therefore, it is not possible to compare the fighting performances of both sides relative to their respective battle numbers. Despite its weaknesses, however, the *battle number* variable appears to provide the most compelling explanation of the relationship between combat experience and combat performance.

Based on the preceding analyses, it appears that the mental strain of battle did have an increasingly significant, negative influence on the northern soldiers' ability to fight effectively. Whether their will to engage the enemy aggressively was eroded slowly through a long series of separate engagements, or whether their spirit was dampened by recent clashes, the Federals absorbed the impact of those engagements and carried the experiences with them into their next deadly struggle.

²² The notion that Civil War combat increased in intensity during the last year of the war is not new. The change in the nature of the fighting between 1861-63 and 1864-65 has been recognized by both soldiers and scholars. See Long, ed., *Personal Memoirs of U. S. Grant*, 364, 409, 419; William Swinton, *Campaigns of the Army of the Potomac* (New York, Charles Scribner's Sons, 1882), 489-96; John C. Ropes, "Grant's Campaign in Virginia in 1864," and Thomas L. Livermore, "Grant's Campaign Against Lee," in Military Historical Society of Massachusetts, comp. *Papers of the Military Historical Society of Massachusetts*, 6 vols. (Boston: Military Historical Society of Massachusetts, 1895-1907), 4:363-405, 407-59; J. G. Randall and David Donald, *The Civil War and Reconstruction*, 2nd ed. (Lexington, MA: D. C. Heath and Company, 1969), 417-21; Allan Nevins, *The War for the Union: The Organized War to Victory, 1864-1865*, 4 vols. (New York: Charles Scribner's Sons, 1971), 4: 9, 264-65; Russell F. Weigley, *The American Way of War: A History of United States Military Strategy and Policy* (New York: Macmillan Publishing Company, 1973), 128-52; John J. Hennessy, "I Dread the Spring: The Army of the Potomac Prepares for the Overland Campaign," in Gary W. Gallagher, ed., *The Wilderness Campaign* (Chapel Hill: University of North Carolina Press, 1997), 66-105; and Weigley, *A Great Civil War*, 324-38.

²³ The gap in the Confederate data is because of the vast amount of time required to collect detailed combat histories for each southern regiment against which any one of the twenty-seven Federal regiments fought. For example, after the twenty-seven Federal units fought their first Confederate opponent, the northerners had 438 more battles to fight. If only one-fourth of the Federal regiments fought unfamiliar Confederate opponents during the remaining 438 engagements, the total number of unique southern units faced by the Federals would be approximately ninety. In other words, before a thorough

In addition to analyzing the direct relationship between combat experience and combat performance, some historians have taken a more circuitous behavioral approach to the question. Rather than measure the impact that exposure to combat may have had on a regimental effectiveness, these scholars address the impact that personnel changes may have had on a unit's battlefield performance. Though this approach does not directly address the relationship between combat experience and combat performance, it touches upon it tangentially by examining the collective level of military experience within a regiment. The scholarly consensus regarding the relationship between personnel changes and combat effectiveness holds that changes in personnel often reduced the fighting potential of a combat unit. Within this consensus, two general approaches have been taken. One approach examines the impact that changes in command personnel may have had on combat effectiveness. The second approach studies the impact that changes in enlisted personnel may have had on combat effectiveness. In both cases similar conclusions are drawn: A lack of continuity among either the commanding officers or the enlisted men generally reduced the combat effectiveness of the unit.

The analytical approach regarding command continuity emphasizes the quality of leadership demonstrated by the opposing officers. Defeat, it is believed, was often the result of incompetent leadership. Though Civil War soldiers recognized the relationship between leadership and effectiveness, the analytical approach did not gain wide acceptance until the publication of Douglas Southall Freeman's study of Confederate leadership titled *Lee's Lieutenants* in the 1940s. Freeman attributed the defeat of General

analysis of both Federal and Confederate combat performances could be attempted, the collection of complete combat and personnel histories for ninety Confederate regiments would be required.

Robert E. Lee's Army of Northern Virginia to the attrition of Confederate senior officers. The dangers of battle robbed Lee of his best subordinates, forcing the general to promote inexperienced junior officers who were not yet ready for the responsibilities of senior command, and not yet trusted by the men they commanded. Though Freeman originally argued that leadership turnover at senior command levels (e.g., brigadier general or higher) led to the defeat of the Army of Northern Virginia, other scholars have expanded his hypothesis to include officer attrition at command levels as low as infantry companies. Regardless of rank, therefore, changes in command are widely believed to have reduced the combat effectiveness of Civil War units.²⁴

This study cannot corroborate the hypothesis that officer turnover diminished regimental combat effectiveness. Indeed, the data suggest that increased Federal command changes often preceded success on the battlefield. At every level of command, the mean number of command changes associated with Federal victory were at least 33 percent greater than those associated with defeat. Also, statistical analysis reveals that at

²⁴ See Douglas Southall Freeman, *Lee's Lieutenants: A Study in Command*, 3 vols. (New York: Charles Scribner's Sons, 1942-44): 1:xv-xxvii, 3:726-52. Also see Louis Grand, *The Military Handbook and Soldier's Manual of Information* (New York: Beadle and Company, 1861), 26-27; U. S. War Department, *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*, 128 vols. (Washington, D. C.: Government Printing Office, 1880-1901, ser. 1, vol. XI, pt. 1, pp. 838-42; *ibid.*, vol. XLII, pt. 1, p. 218 (hereafter referred to as *O.R.*); Thomas W. Higginson, "Thomas Wentworth Higginson Explains the Value of Trained Officers," in Commager, ed., *The Blue and the Gray*, 1:482-87; Ulysses S. Grant, "The Battle of Shiloh," in *Battles and Leaders of the Civil War*, 4 vols., ed. Clarence C. Buel and Robert U. Johnson (New York: Century Company, 1887), 1:469-75; Francis A. Walker, *History of the Second Army Corps in the Army of the Potomac* (New York: Charles Scribner's Sons, 1887), 11-13; William Child, *A History of the Fifth Regiment New Hampshire Volunteers in the American Civil War, 1861-1865* (Bristol, NH: R. W. Musgrove, 1893), 21-22; J. E. Hall, "The Transferred Officer's Story: Part I," in Joseph W. Muffly, ed., *The Story of Our Regiment: A History of the 148th Pennsylvania Volunteers* (Des Moines, IA: Kenyon Printing, 1904), 302-05; Gibbon, *Personal Recollections of the Civil War*, 227-28; Bruce Catton, "Unit Discipline and Leadership in the Civil War," *Marine Corps Gazette* 40 (January 1956): 18-25; Griffith, *Battle Tactics of the Civil War*, 90-98; McPherson, *For Cause and Comrades*, 53; and Wert, *A Brotherhood of Valor*, 196, 315.

every level of command except corps level, statistically significant positive relationships existed between combat performance and the number of command changes.²⁵

Before concluding that frequent changes in command contributed to Federal victory, an examination of the officers' time in command before entering combat is necessary. Assuming that the consensus regarding the negative influence of command change on combat performance is correct, perhaps the frequency with which commanding officers were replaced was offset by the length of time that the new officers served as commanders before their subordinate units engaged in battle. When the mean number of days between changes in command and the affected regiments' subsequent engagements was high, the Federals often won. When the mean number of days was low, they usually lost. In other words, a greater number of days in command for a new officer prior to battle may have offset the potentially negative influence that his assumption of command had on regimental combat effectiveness.²⁶

Despite the intuitive appeal of the hypothesis that the negative effect of command change was offset by the amount of time that new commanders served prior to battle,

²⁵ Both analysis of variance and Pearson's correlation suggest that Federal combat results and the number of command changes at each level of command share statistically significant relationships at all levels of command except the corps level. Analysis of variance produced the following results: the army level *F* statistic was 4.29 with 2 df and $p = .014$, the corps level *F* statistic was .353 with 2 df and $p = .703$, the division level *F* statistic was 8.988 with 2 df and $p < .0005$, the brigade level *F* statistic was 16.755 with 2 df and $p < .0005$, and the regiment level *F* statistic was 8.918 with 2 df and $p < .0005$. Pearson's correlation produced the following results: the army level $r = .092$ with $p = .047$, the corps level $r = .039$ with $p = .405$, the division level $r = .159$ with $p = .001$, the brigade level $r = .242$ with $p < .0005$, and the regiment level $r = .192$ with $p < .0005$.

²⁶ The mean number of days between Federal command changes and subsequent engagements were consistently higher when the Federals won than when they lost. At the regiment command level, the mean values were: win = 34 days, draw = 15 days, lose = 13 days. At the brigade command level, the mean values were: win = 24 days, draw = 12 days, lose = 16 days. At the division command level, the mean values were: win = 11 days, draw = 15 days, lose = 10 days. At the corps command level, the mean values were: win = 28 days, draw = 17 days, lose = 14 days. At the army command level, the mean values were: win = 22 days, draw = 13 days, lose = 12 days.

more sophisticated statistical analyses are less supportive of the notion. The data suggest that only at certain levels within the chain of command did an officer's time in command before battle appear to influence his soldiers' fighting effectiveness. Statistically significant relationships between time in command and outcome were found at the corps and regiment levels. The amount of time that these commanders spent leading their subordinates prior to battle appears to have positively affected their soldiers' performances in battle. However, no significant relationships were found at the army, division, or brigade levels. Therefore, despite the persuasiveness of the hypothesis that longer periods of time in command prior to battle positively affected combat performance, the data can neither support nor reject it.²⁷

If the data are inconclusive regarding the relationship between command continuity and combat effectiveness, perhaps a more narrow analytical approach would prove beneficial. Assuming that time in command offset the problems associated with changes in command, then those instances in which changes in command took place in the midst of battle should exhibit significant negative relationships between command

²⁷ Analysis of variance and Pearson's correlation between Federal combat outcomes and the mean number of days in command before entering battle suggest that there was little statistical significance between the two variables. Not only do both tests find statistically significant relationships at no more than three of the five command levels, but the tests corroborate each other's results at only two of the five command levels—the corps level and the regiment level. Analysis of variance produced the following results: the army level *F* statistic was 2.575 with 2 df and *p* = .077, the corps level *F* statistic was 5.467 with 2 df and *p* = .005, the division level *F* statistic was .587 with 2 df and *p* = .557, the brigade level *F* statistic was 2.44 with 2 df and *p* = .088, and the regiment level *F* statistic was 10.316 with 2 df and *p* < .0005. Pearson's correlation produced the following results: the army level *r* = .092 with *p* = .048, the corps level *r* = .146 with *p* = .002, the division level *r* = .011 with *p* = .817, the brigade level *r* = .067 with *p* = .150, and the regiment level *r* = .195 with *p* < .0005. The statistical analyses of the relationship between Federal outcome and the mean number of days in command at the army level before entering battle contradict each other. Analysis of variance did not find the relationship to be statistically significant, while Pearson's correlation indicated that the relationship was significant. Because the *p* value from the analysis of variance was clearly not significant (*p* = .077), and because the *p* value from Pearson's correlation was barely significant (*p* = .048), it would be dubious to conclude that the relationship was statistically significant.

change and combat performance. Analysis reveals that at all command levels except corps and division, personnel changes made during battle did not appear to influence the outcome of the battle significantly. At both the corps and division levels, however, statistically significant relationships were found. Ironically, the data suggest that the greater the number of leadership changes made at these command levels during battle, the greater the likelihood that the Federals would be victorious. However, the conclusion that corps and division command changes during battle somehow bolstered the Federals' combat effectiveness is dubious. It is derived from too few data. Corps level analyses were based on thirty-five engagements while division level analyses were based on only nine. Though it appears unlikely that command changes made in the heat of battle increased the martial skills of the northern troops, it appears equally unlikely that such command changes blunted the soldiers' fighting edge.²⁸

The scholarly consensus regarding command continuity and combat effectiveness is not supported by this study for two reasons. First, the data suggest that high rates of command change often preceded tactical success rather than defeat. Second, although the data indicate that time in command may have offset the alleged corrosive effect that command change had on combat effectiveness, deeper analysis suggests that changes in command made in the heat of battle did not influence its result. Though the analyses do

²⁸ Analysis of variance between Federal combat outcomes and the number of command changes at each level of command while engaged in combat produced the following results: At the army level there were not enough data to conduct the analysis, the corps level *F* statistic was 19.8 with 1 df and $p < .0005$, at the division level there was no variance in the data to analyze, the brigade level *F* statistic was 1.553 with 2 df and $p = .22$, and the regiment level *F* statistic was .666 with 2 df and $p = .518$. Pearson's correlation of the same variables produced the following results: At the army level there were not enough data to conduct the analysis, at the corps level $r = .612$ with $p < .0005$, at the division level $r = 1.0$ with $p < .0005$, at the brigade level $r = .163$ with $p = .192$, and at the regiment level $r = -.006$ with $p = .961$.

not irrefutably reject the behavioral view regarding command continuity and combat effectiveness, the findings do question its reliability.

Like the hypothesis regarding command continuity, stability among a regiment's enlisted personnel is often associated with increased combat effectiveness. Both Civil War soldiers and scholars have shared the belief that a regiment's cohesiveness and combat effectiveness were lessened through personnel changes such as deserters fleeing the unit, new recruits replacing veterans, or illness decimating the ranks. The hypothesis regarding personnel continuity and combat performance was examined much like that regarding command continuity. Both the number of men arriving or departing from a unit, as well as the mean number of days that their transfers occurred prior to the unit's next engagement, were analyzed for possible associations with the results of the subsequent engagements. The findings were like those regarding command continuity and combat effectiveness. Both increased personnel changes, as well as increased time in service prior to battle, were significantly associated with improved combat performance.²⁹

²⁹ For examples of soldiers and scholars who expressed a belief that personnel changes reduced the fighting force of Civil War units, see *O.R.*, ser. 1, vol. II, p. 407; *ibid.*, vol. V, pp. 217-20; *ibid.*, vol. XXXVI, pt. 3, p. 552; *ibid.*, vol. XLII, pt. 1, pp. 218, 897; Walker, *History of the Second Army Corps*, 315-17, 418-19; Ezra D. Simons, *A Regimental History: The One Hundred and Twenty-Fifth New York State Volunteers* (New York: E. D. Simons, 1888), 21; Frederick, *The Story of a Regiment*, 266-67; Jacob H. Cole, *Under Five Commanders, or, A Boy's Experience with the Army of the Potomac* (Paterson, NJ: News Printing Company, 1906), 39; Favill, *The Diary of a Young Officer*, 193, 196-97; Child, *A History of the Fifth Regiment New Hampshire Volunteers*, 153, 166-67, 219-20, 224; Gibbon, *Personal Recollections of the Civil War*, 259-60; Higginson, "Thomas Wentworth Higginson Explains the Value of Trained Officers," in Commager, ed., *The Blue and the Gray*, 1: 486; Wyman S. White, *The Civil War Diary of Wyman S. White, First Sergeant of Company "F" of the 2nd United States Sharpshooter Regiment (New Hampshire Men) in the Army of the Potomac, 1861-1865* (Hemet, CA: Russell C. White, 1979), 121; Patrick D. O'Flaherty, *The History of the Sixty-Ninth Regiment in the Irish Brigade: 1861-1865* (New York: n. p., 1986), 344, 352; Ella Lonn, *Desertion During the Civil War* (New York: The Century Company, 1928), 123-24; John E. Horn, *The Petersburg Campaign: June 1864 - April 1865* (Conshohocken, PA: Combined Books, 1993), 154-76; Wayne Mahood, "'Some Very Hard Stories Were Told. . . . The 126th New York Infantry at Harpers Ferry,'" *Civil War Regiments: A Journal of the*

Six of the thirteen categories used for classifying regimental personnel changes were found to have significant relationships with Federal outcome. They include discharges from the army, deaths from illness or accident, desertions, men mustering in, men mustering out, and transfers to the Veteran Reserve Corps. In each of these categories, both the number of men transferred and the mean number of days that elapsed between transfer and battle were found significantly related to combat outcome. Both variables showed positive correlations with outcome. When the number of personnel changes within a regiment was high, and when the personnel changes occurred well before battle, the regiment was more likely to win its next engagement.³⁰

American Civil War 1, no. 4 (1991): 22-23; R. L. Murray, *The Redemption of the "Harper's Ferry Cowards: The Story of the 111th and 126th New York State Volunteer Regiments at Gettysburg* (N.p., 1994), 25; Bilby, *Remember Fontenoy!*, 121; Robert K. Krick, *Conquering the Valley: Stonewall Jackson at Port Republic* (New York: William Morrow and Company, 1996), 143, 158, 171; St. Clair A. Mulholland, *The Story of the 116th Regiment, Pennsylvania Volunteers in the War of the Rebellion*, ed. Lawrence Frederick Kohl (New York: Fordham University Press, 1996), 261; Wayne Mahood, "Written in Blood": *A History of the 126th New York Infantry in the Civil War* (Hightstown, NJ: Longstreet House, 1997), 33, 213-18, 311-12, 319-20; Thomas B. Buell, *The Warrior Generals: Combat Leadership in the Civil War* (New York: Crown Publishers, 1997), 108-09; George W. Contant, "Each Bee Was A Bullet": *Corporal Thomas Geer and Color Sergeant Judson Hicks, Company A, 111th New York Infantry, at the Battles of Harpers Ferry and Gettysburg* (Dover, DE: Historic Publications, 1998), 9; James I. Robertson, Jr., ed., *The Civil War Letters of General Robert McAllister* (Baton Rouge: Louisiana State University Press, 1998), 511, 523, 526-31; and Wert, *A Brotherhood of Valor*, 118, 175, 313-14. There were instances in which Civil War soldiers expressed admiration for the fighting quality of new recruits. See *O.R.*, ser. 1, vol. XXIX, pt. 1, p. 278, 283-84; and T. W. Myton and D. W. Woodring, "The Drafted Men and Substitute's Story," in Muffly, ed., *The Story of Our Regiment*, 749.

³⁰ Analysis of variance between number discharged and subsequent outcomes produced an *F* statistic of 9.327 with 2 df and $p < .0005$. Pearson's correlation between number discharged and subsequent outcomes was $r = .164$ with $p < .0005$. The same statistical procedures were applied to the remaining five categories. The results were as follows: number died = *F* statistic of 12.277 with 2 df and $p < .0005$, $r = .218$ with $p < .0005$; number deserted = *F* statistic of 3.429 with 2 df and $p = .033$, $r = .118$ with $p = .011$; number mustered in = *F* statistic of 5.244 with 2 df and $p = .006$, $r = .126$ with $p = .006$; number mustered out = *F* statistic of 6.251 with 2 df and $p = .002$, $r = .126$ with $p = .007$; number transferred to the Veteran Reserve Corps = *F* statistic of 3.04 with 2 df and $p = .049$, $r = .109$ with $p = .019$. Analysis of variance between the mean number of days that elapsed between discharge and subsequent battle, and the results of that battle, produced an *F* statistic of 9.56 with 2 df and $p < .0005$. Pearson's correlation between the mean number of days and the subsequent outcome was $r = .193$ with $p < .0005$. The same statistical procedures were applied to the remaining five categories. The results were as follows: mean time between death and combat = *F* statistic of 8.008 with 2 df and $p < .0005$, $r = .176$ with $p < .0005$; mean time between desertion and combat = *F* statistic of 9.838 with 2 df and $p < .0005$, $r = .201$ with $p < .0005$; mean time between mustered in and combat = *F* statistic of 5.602 with 2 df and $p = .004$, r

Initial analysis of the data regarding personnel change and combat performance leads to the same conclusion as the initial analysis of the command change data: The greater the number of regimental personnel changes, and the greater the amount of time to elapse before combat, the greater the likelihood that the regiment would be victorious in its next battle. To see if time in service offset the potentially disruptive effects of personnel change, analysis was limited to those engagements in which the Federal regiments experienced personnel changes in any one of the six significant categories (discharge, death, desertion, muster in, muster out, and transfer to the Veteran Reserve Corps) within seven days of entering combat. If the consensus view is correct, regiments that experienced such personnel changes just prior to battle should perform more poorly than the units that underwent no changes. Surprisingly, only one of the six personnel categories was found to have a significant relationship with combat outcome. That variable was the number of men mustered into the regiment. Ironically, the higher the number of inexperienced troops entering a Federal regiment on the eve of battle, the greater the likelihood that the regiment would be victorious.³¹

= .154 with $p = .001$; mean time between mustered out and combat = F statistic of 6.723 with 2 df and $p = .001$, $r = .172$ with $p < .0005$; mean time between transfers to the Veteran Reserve Corps and combat = F statistic of 7.74 with 2 df and $p < .0005$, $r = .179$ with $p < .0005$.

³¹ Both analysis of variance and Pearson's correlation of those engagements in which Federal units experienced any number of men either discharged, dying, deserting, mustering in, mustering out, or transferring to the Veteran Reserve Corps, within seven days of battle failed to find statistically significant relationships between the changes in personnel and combat performance, except in the case of men mustering into the regiments. Analysis of variance between number discharged and subsequent outcomes produced an F statistic of .168 with 2 df and $p = .846$. Pearson's correlation between number discharged and subsequent outcomes was $r = -.075$ with $p = .582$. The same statistical procedures were applied to the remaining five categories. The results were as follows: number died = F statistic of .272 with 2 df and $p = .763$, $r = .025$ with $p = .868$; number deserted = F statistic of .831 with 2 df and $p = .44$, $r = .005$ with $p = .966$; number mustered in = F statistic of 38.52 with 2 df and $p < .0005$, $r = .509$ with $p < .0005$; number mustered out = F statistic of .039 with 2 df and $p = .962$, $r = -.016$ with $p = .96$; number transferred to the Veteran Reserve Corps = F statistic of .294 with 2 df and $p = .747$, $r = .061$ with $p = .733$.

These findings indicate that personnel changes did not diminish the Federals' ability to fight. In fact, the addition of inexperienced men to the ranks of a veteran regiment appear to have increased the unit's effectiveness in battle. Whether this occurred because the inexperienced soldiers fought out of ignorance of the realities of combat, or because the combination of inexperienced and experienced troops galvanized the unit, is difficult to know. The answer is probably a combination of both; inexperienced men anxious to prove themselves in battle, assisted by the dutiful service of some veteran soldiers, combined to form a surprisingly effective fighting force.

Based on the preceding behavioral analyses, two observations may be made regarding the role that experience played on the battlefield. First, combat experience appeared to influence combat performance negatively after a certain point. After Federal regiments participated in four distinct battles, their effectiveness decreased and their number of defeats rapidly increased. Similarly, when northern units engaged in multiple battles over a forty-eight-hour time span, they often lost the battles that followed their first engagement. Second, personnel changes did not appear to affect combat performance negatively. Neither instability within the chain of command nor fluctuations within the regimental roster decreased Federal combat effectiveness. Indeed, the addition of inexperienced soldiers to veteran regiments appeared to increase the units' performance in battle.

Overall, the data collected for this study fail to support many of the specialized hypotheses proffered by scholars regarding battle efficiency. The common practice of contrasting battle strengths, casualties, and outcomes when assessing combat performance appears too limited to provide an accurate view of the tactical nature of the

fighting. Similarly, the wide-spread belief that veteran officers and men were prerequisites for an effective fighting force is also challenged. The only specialized hypothesis corroborated by this study is the notion that combat units began to lose their effectiveness after participating in a certain number of engagements.

CHAPTER 5

A NEW PERSPECTIVE

Most scholars emphasize the environmental aspects of combat when discussing Civil War tactics. Some historians have broadened this approach by including combat's behavioral aspects. Nevertheless, most authors continue to maintain that Civil War combat was dominated by its physical characteristics. The mental processes associated with transforming an individual from citizen to soldier to veteran are usually subordinated to the external realities of the battlefield.

Statistical analysis of this study's data suggests that a different approach to understanding Civil War combat may be worthwhile. Specifically, a simple environmental interpretation of Civil War combat may be less dependable than traditionally believed. The data indicate that the influence on combat performance of the soldiers' attitudes, opinions, and emotions was stronger than that of their actions, positions, and formations. In other words, the behavioral aspects of battle affected fighting efficiency more than combat's environmental aspects. The twin ironies of this analysis are that some of the behavioral variables that demonstrated the greatest influence on combat performance are aspects of battle rarely considered by many scholars, and that certain physical aspects of combat frequently emphasized by many scholars appear unreliable. Overall, these findings raise questions about the dependability of the simple environmental approach to understanding Civil War combat.

By using a statistical procedure known as a “General Linear Model” (GLM), three separate models (i.e. tests) were created for predicting Federal combat results. Two of the models were based on specific subsets of data, and the third was based on both subsets combined. The first model measured the influence of the environmental characteristics of battle on Federal outcome. The second model calculated the effects of combat’s behavioral aspects. The third model measured the combined interactions of both data subsets relative to Federal combat performance.¹

Comparison of the models’ reliability measurements (the Adjusted R Squared values) indicates that when all available data were used to analyze combat performance, the conclusions drawn were at least 25 percent more reliable than those based on any single data subset. Of the two data-specific GLMs, the model comprising behavioral variables explained Federal combat performance slightly more dependably. These variables accounted for approximately 49 percent of the northerners’ wins, losses, and stalemates. The environmental model appeared somewhat less reliable. It accounted for 42 percent of the Federal results. Finally, when both the behavioral and environmental variables were combined, they reliably explained approximately 67 percent of the Federals’ battle results (see Table 4).

¹ For a discussion of the General Linear Model statistical procedure, as well as statistical presentations of the three models, see Appendix B, pp. 142-46.

Table 4
 Comparison of each GLM's Ability to Predict Federal Combat Results

General Linear Model	Adjusted R Squared	Percent of U.S.A. Outcomes Predicted
Behavioral Variables	.487	49%
Environmental Variables	.422	42%
Combined Variables	.672	67%

The behavioral model proved the most reliable data-specific approach for understanding Federal combat performance. Yet it consisted of only three basic types of information: regimental quality, battle number, and prebattle activities. The respective quality level of the opposing sides appeared to influence combat performance the most. As discussed earlier, units that demonstrated high levels of cohesion, morale, and leadership tended to win, and forces that exhibited low levels of these attributes tended to lose. For example, when the poorly-led, undisciplined, multi-national group of men that constituted the 39th New York attempted a bayonet charge against the 21st Georgia on June 8, 1862, during the Battle of Cross Keys, the Federals had no knowledge of the strong leadership and high morale of their opponent. The Georgians, who routed the 8th New York and captured that unit's regimental flag earlier in the day, patiently waited for the New York unit to advance. Once the Federals were within fifty yards of their line, the Georgians poured volleys of buck-and-ball into them.² The men of the 39th New York initially withstood the fusillade, but they soon began to waver. Some soldiers dropped to the ground and sought protection, others broke ranks and ran to the rear. Confused, frightened, and exposed, the Union men began to panic. They retreated in the direction of

their original position, whether ordered or not is unclear, and attempted to rally. For the soldiers of the 39th New York, the day's fighting was over, but several battles lay ahead for some of the men in various courts martial. Similar to the experience of the 39th New York at Cross Keys, most low-quality regiments shared their fate when confronted by high-quality opponents.³

The cumulative number of engagements fought by a regiment was the second-most influential behavioral variable. As a measure of the relationship between combat experience and combat performance, the data indicated that after a Federal unit had endured four distinct engagements, its fighting efficiency significantly decreased with each additional deadly encounter. The 57th New York, for example, was undefeated through its first four engagements. Of its subsequent ten confrontations, however, the regiment won only two and lost eight. The loss of combat effectiveness exhibited by the New Yorkers after their fourth engagement was shared by all of the Federal regiments included in this study.

² A buck-and-ball cartridge contained a solid bullet and several smaller buckshot bullets. If the principal bullet missed, perhaps the buckshot bullets would do some useful damage. This type of cartridge was intended for use in non-rifled shoulder arms.

³ U. S. War Department, *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*, 128 vols. (Washington, D. C.: Government Printing Office, 1880-1901, ser. 1, vol. XV, pp. 655, 657-58, 664, 717, 795-800 (hereafter referred to as *O.R.*); Henry Kyd Douglas, *I Rode With Stonewall: Being Chiefly the War Experiences of the Youngest Member of Jackson's Staff from the John Brown Raid to the Hanging of Mrs. Surratt* (Chapel Hill: University of North Carolina Press, 1940), 84-94; Jedediah Hotchkiss, *Make Me a Map of the Valley: The Civil War Journal of Stonewall Jackson's Topographer*, ed. Archie P. McDonald (Dallas: Southern Methodist University Press, 1973), 53-55; Robert K. Krick, *Conquering the Valley: Stonewall Jackson at Port Republic* (New York: William Morrow and Company, 1996), 19-38, 137-209; Robert G. Tanner, *Stonewall in the Valley: Thomas J. "Stonewall" Jackson's Shenandoah Valley Campaign, Spring 1862* (New York: Doubleday and Company, 1976; reprint, Mechanicsburg, PA: Stackpole Books, 1996), 385-91 (page citations are to the reprint edition); Catherine Catalfamo, "The Thorny Rose: The Americanization of an Urban Immigrant, Working Class Regiment in the Civil War: A Social History of the Garibaldi Guard: 1861-1864" (Ph.D. diss., University of Texas, 1989), 187, 202-226; and Michael Bacarella, *Lincoln's Foreign Legion: The 39th New York Infantry, The Garibaldi Guard* (Shippensburg, PA: White Mane Publishing Company, 1996), 79-84.

The third type of variable in the behavioral model described Federal prebattle activities. The Union soldiers' activities during the two-day period preceding battle had powerful consequences on their martial capabilities. These activities ranged from combat to camping and they affected each soldier's state of mind by subjecting him to fatigue, fear, and stress, as well as rest, routine, and comfort. When the Federals next stepped into battle, they carried with them the positive and negative mental forces created by their two days of prior service.

The relationships between these three types of behavioral variables and combat performance are not surprising. Both soldiers and scholars have recognized that troop quality, combat experience, and prebattle actions affected the men's performance on the battlefield. However, the magnitude of their impact on combat performance is surprising. These three behavioral aspects can account for approximately 49 percent of all Federal wins, stalemates, and losses.

The environmental components of combat accounted for nearly 42 percent of all Federal outcomes. The image of combat created by these variables closely matched that of most authors: Entrenched defenders, supported by artillery, enjoyed a tactical advantage over exposed attackers advancing in linear formation. To this consensus view, the environmental model suggested three important modifications. First, it found that the impact of rifled versus non-rifled muskets was not significant when measured in the context of the physical realities of the battlefield. Second, it indicated that the slope of the

battlefield was more important than the texture of its surface. Third, the model revealed that the weather had an important effect on combat performance.⁴

The impact of rifled versus non-rifled muskets on the results of the 465 engagements included in this study was not significant. As discussed earlier, the data suggested that a unit armed with rifled muskets had a slightly improved chance for success versus one armed with smoothbore muskets; however, the difference failed to rise to the level of statistical significance. Speculating that the strength of rifled muskets lay with their use as a defensive weapon, the data were split into two groups: those engagements in which the Federals fought offensively, and those in which they fought defensively. Analysis indicated that the infantrymen's armament had no significant effect on combat performance in either situation, though both scenarios showed a slight improvement in Federal performance when they were armed with rifled muskets. In other words, the data suggested that the impact of the rifled musket on Civil War battlefields may be overestimated.⁵

⁴ Note that the environmental model included the variables *U.S.A. Formation*, *U.S.A. Position*, and *C.S.A. Artillery*, but the model did not include the same variables for the opposing side. This is an idiosyncratic analytical result due to the nature of the data. The absence of Confederate formation and position information, as well as Federal artillery information, does not mean that these physical characteristics had no historical impact on combat performance. Their absence from the model simply means the variables did not have statistically significant associations with Federal battle results. Furthermore, the presence of the sectional counterpart to these variables indicates that they probably were important factors during battle, but the unique nature of the data masked their true significance.

⁵ Three statistical tests were used to measure the relationship between Federal weaponry and Federal outcome relative to Federal action. When the Union forces fought defensively, analysis of variance produced an *F* statistic of .697 with 2 df and $p = .501$; Pearson's correlation coefficient was $r = .057$ with $p = .575$; Pearson's chi-square statistic was 1.416 with 2 df and $p = .493$. When the Federals fought offensively, analysis of variance produced an *F* statistic of 2.441 with 2 df and $p = .089$; Pearson's correlation coefficient was $r = .022$ with $p = .702$; Pearson's chi-square statistic was 4.852 with 2 df and $p = .088$.

Anecdotal evidence offers one possible explanation for the lack of significance between rifled and non-rifled muskets: Civil War soldiers frequently did not fire their weapons at ranges greater than the effective range of smoothbore muskets. Of the 465 engagements examined in this study, the participants recorded the ranges at which they opened fire in 206 of the actions (44 percent). The mean distance from the enemy at which the soldiers began firing was approximately 152 yards. War Department tests in early 1860 demonstrated both rifled and non-rifled shoulder arms could be used effectively up to 200 yards from a target. In other words, both Federal and Confederate soldiers tended to refrain from firing until their enemy was within 200 yards, at which point both rifled and non-rifled muskets could be used effectively.⁶

Of all the physical components of battle, terrain appeared to have the greatest impact on combat performance. Fighting uphill seemed to sap both the strength and the determination of the disadvantaged force. For example, when the 2nd Delaware took part in a Federal charge across the Wheatfield at Gettysburg on July 2, 1863, the open expanse of the field was not the cause of the regiment's defeat. The unit successfully dashed across the field despite its exposure to enemy rifle and artillery fire. Upon reaching the edge of the field, however, the Federals were faced with the daunting task of

⁶ War Department tests indicated that a rifled musket firing a conoidal bullet could strike a ten-foot-by-ten-foot target at 200 yards at least 64 percent of the time, that a smoothbore musket firing a round bullet could strike the same target at the same range at least 36 percent of the time, and that a smoothbore musket firing buck-and-ball could strike the target at least 78 percent of the time. See National Archives, Records of the War Department, Office of the Chief of Ordnance, Special File, Box 26, "Records of Firings and Opinions for the Trial of Small Arms According to Special Orders No. 23, War Department, February 1, 1860," as found in Claud E. Fuller, *The Rifled Musket* (New York: Bonanza Books, 1958), 55-148. This anecdotal analysis of the ranges at which Civil War soldiers tended to use their shoulder arms corroborates a similar examination of rifled and smoothbore musket firing ranges during the Civil War. See Paddy Griffith, *Rally Once Again: Battle Tactics of the American Civil War* (Ramsbury, Marlborough, Wiltshire: Crowood Press, 1987); reprint, *Battle Tactics of the Civil War* (New Haven: Yale University Press, 1989), 73-75, 88-90, 129 (page citations are to the reprint edition).

fighting uphill. Climbing up the rocky hillside, the Union soldiers confronted the resilient men of the 59th Georgia. Over the span of sixty minutes, the two sides pushed each other up and down the slope. Finally, the Confederates mounted a rally that turned the 2nd Delaware's left flank and forced them down the hillside. Rather than attempt another assault up the slope, the northerners retreated to safety across the Wheatfield. Though numerous other factors undoubtedly affected the performance of the 2nd Delaware that day, the hill beyond the Wheatfield significantly contributed to their defeat.⁷

The last modification of the consensus view of Civil War combat offered by the environmental model was the importance of the weather. Weather mattered to the infantrymen. Constantly exposed to the elements, the men were keenly aware of the machinations of Mother Nature. For northern troops, mild temperatures and no precipitation served as the best possible atmospheric conditions in which to fight. Under temperate conditions, they won 43 percent of the time, were stalemated 12 percent, and lost 45 percent. When fighting in extreme heat, however, the Federals performed poorly. Under sweltering conditions, they won only 17 percent, were stalemated 15 percent, and lost 68 percent. According to numerous northern soldiers, campaigning in the sweltering heat of the southern sun could sap a strong man's strength and steal a weak man's life.⁸

⁷ *O.R.*, ser. 1, vol. XXVII, pt. 1, pp. 399-409; Francis A. Walker, *History of the Second Army Corps in the Army of the Potomac* (New York: Charles Scribner's Sons, 1887), 280-81; Enoch S. Moore et al., *Report to Mark the Positions Occupied by the 1st and 2nd Delaware Regiments at the Battle of Gettysburg* (Dover, DE: Delawaren Office, 1887), 3-28; Charles A. Hale, "With Colonel Cross at the Wheatfield," ed. Edward G. Longacre, *Civil War Times Illustrated* 13 (August 1974): 30-38; Robert G. Smith, *A Brief Account of the Services Rendered by the Second Regiment Delaware Volunteers in the War of the Rebellion* (Wilmington: Historical Society of Delaware, 1909), 24-25; John E. Pickett, *The Crazy Delawares: A Short History of The Second Regiment Delaware Volunteers* (Middletown, DE: J. E. Pickett, 1995), 21-30; and Harry W. Pfanz, *Gettysburg: The Second Day* (Chapel Hill: University of North Carolina Press, 1987), 284-88.

⁸ The Federals participated in 112 engagements when the weather was mild and 263 engagements when the conditions were hot. For descriptions of the negative ways in which the southern sun affected

The combined model included both the behavioral and environmental aspects of combat. It examined all eighty-five variables from each of the 465 engagements and determined that only thirteen variables were required to explain the Federals' combat performance in over 67 percent of their engagements. Of those thirteen variables, seven were behavioral and six were environmental. In terms of the overall influence exerted by each variable on combat performance, the combined model indicated that the behavioral variables weighed more heavily than the environmental variables. In other words, the model described Civil War combat as a struggle of mental tenacity and emotion, influenced by the realities of mid-nineteenth-century warfare.

The most influential aspect of battle was the quality of the opposing forces. The attitudes of the men toward their comrades and officers, as well as toward their duties and responsibilities, appeared to be the single most important determinant of tactical success and failure. Previous analyses of the combatants' respective quality levels indicated that soldier quality affected combat performance. Both sides were victorious most often when fighting with high-quality soldiers. The Confederates won 77 percent of the time when fighting with high-quality men, and the Federals won 47 percent. Likewise, both sides frequently lost when fighting with low-quality troops. The Confederates lost 66 percent

northern soldiers, see *O.R.*, ser. 1, vol. XIX, pt. 2, pp. 14-15; David Beem, "History: Company H, 14th Indiana Volunteers: War of the Rebellion, 1861-1864," and Beem to Hala (wife), August 23, 1862, David Enoch Beem Papers, 1821-1954, Indiana Historical Society Library, Indianapolis; James I. Robertson, Jr., ed., *The Civil War Letters of General Robert McAllister* (Baton Rouge: Louisiana State University Press, 1998), 450, 453, 458, 462; Arabella M. Willson, *Disaster, Struggle, Triumph: The Adventures of 1000 'Boys in Blue' from August, 1862, to June 1865* (Albany: Argus Company, 1870), 57; John Q. Imholte, *The First Volunteers: History of the First Minnesota Volunteer Regiment, 1861-1865* (Minneapolis: Ross and Haines, 1963), 103; and Griffith, *Battle Tactics of the Civil War*, 120-21. Not all Federal soldiers succumbed to the heat; some embraced it as a physical challenge. See *O.R.*, ser. 1, vol. XVI, 106.

of their engagements when fighting with low-quality soldiers, and the Federals lost 77 percent.

Though the quality of men seemed to influence tactical outcomes, it was the difference in soldier quality that often appeared decisive on the battlefield. The most frequent combination of soldiers to clash in battle pitted low-quality Federal soldiers against average-quality Confederate soldiers. This scenario occurred in 135 engagements, and the Federals won only 5 percent of the time, were stalemated 10 percent, and lost 85 percent. It was the difference in the opposing forces' quality, especially the frequent superiority of southern forces, that had profound implications on both sides' performance under fire.

When opposing forces of equal quality clashed, however, the results were less predictable. The Federals performed best when two opposing low-quality units clashed. The Union men won 67 percent, were stalemated 10 percent, and lost 23 percent. They were less effective when soldiers of either average or high quality fought. When average soldiers engaged one another, the Federals won only 7 percent, were stalemated 48 percent, and lost 45 percent. When high-quality regiments clashed, the Federals won 25 percent, were stalemated 19 percent, and lost 56 percent. While low-quality northern troops appeared more effective than southern soldiers of equal quality, Federal forces of average or high quality usually performed poorly against similar opponents.

The Federals' inconsistent combat performance when confronted by soldiers of equal quality suggests that quality alone did not prove decisive in every engagement. Some other aspect, or aspects, of battle influenced combat performance. The combined model indicated that the cumulative number of engagements fought by Federal regiments

was the second most-influential aspect of battle. Increased exposure to intense enemy fire appeared to reduce a soldier's ability to fight at some point. The emotional baggage accumulated by a soldier as he passed through multiple engagements eventually weighted him down to the point of reducing his effectiveness under fire.

The data suggest that after their fourth engagement, Federal troops generally experienced a significant decrease in their combat effectiveness. Through their first four engagements, the Federals won 39 percent of the time, were stalemated 20 percent, and lost 41 percent. In subsequent engagements, however, their performance decreased. The northerners won only 20 percent of the time, were stalemated 15 percent, and lost 65 percent. After their fourth engagement, the Federal rate of success was nearly halved, and their rate of failure increased approximately 33 percent. Because each Federal regiment participated in at least six engagements, none were immune to the debilitating influence of prolonged combat exposure.

Of near equal influence on Federal combat performance were the prebattle activities of the northern soldiers during the thirty-six hours that preceded battle. The data indicate that the worst possible prebattle activity in which northern soldiers could have participated prior to entering combat was another engagement. When Federal troops participated in one or more engagements within thirty-six hours of battle, they lost the impending actions approximately 90 percent of the time. The data also indicate that the Federals enjoyed their highest rate of success after periods of preparation and rest. When northern units spent at least twelve of the thirty-six hours prior to battle either encamped or bivouacked, they won almost half of their subsequent engagements. The stress, fatigue, and chaos associated with combat appeared to dull the soldiers' martial edge, and

the relative comfort, preparation, and order associated with camp life seemed to sharpen it.

The scenarios of either fighting or camping prior to battle serve as the opposite ends of the spectrum regarding Federal prebattle activities. The most common actions taken by northern soldiers thirty-six hours prior to battle saw them either entrenching or marching to new positions. The former occurred before 70 percent of the Federals' engagements; the latter preceded more than half. When entrenched prior to battle, Union forces won 16 percent of the time, were stalemated 17 percent, and lost 67 percent. When marching prior to battle, they won 21 percent, were stalemated 15 percent, and lost 64 percent. In both cases, the Federals lost nearly four engagements for each that they won. Their poor combat record is testimony to the significance of proper battle preparation. The Federals could not fight, march, entrench, and then fight again, and maintain meaningful levels of combat effectiveness.

Terrain also appeared as an influential aspect of Civil War combat. As previous analyses suggested, the slope of the battlefield appeared to influence combat performance more than the texture of its surface. Both sides enjoyed their highest rate of success when fighting downhill and suffered their highest rate of defeat when fighting uphill. These data suggest that the side that held the high ground usually won.⁹

⁹ The successful defense of Marye's Heights by Lieutenant General James Longstreet's First Corps against assaults by both Major General Edwin V. Sumner's Right Grand Division and Major General Joseph Hooker's Center Grand Division during the Battle of Fredericksburg (December 13, 1862) illustrates the tactical advantage enjoyed by the force that held the high ground. However, simply maintaining a position of higher elevation did not guarantee success. General Braxton Bragg's Army of Tennessee was defeated during the Battle of Chattanooga (November 25, 1863) when its line along the crest of Missionary Ridge was broken by the frontal assault of Major General George Thomas' Army of the Cumberland.

Though the slope of the battlefield may have made certain small-unit actions lopsided affairs, tilted battlefields were not the typical terrain type upon which engagements occurred. The most common type of battlefield terrain was a level field with a slightly uneven surface. There were two important implications to fighting across such a broken field of battle. First, throughout the engagement various groups of soldiers were unable either to see the enemy or be seen by the enemy. This occasionally encouraged some cautious individuals to drop from the ranks and seek cover. Second, the uneven surface served to disrupt tactical formations, making command and control difficult and creating more opportunities for the timid to fall out of formation. Consequently, some soldiers found themselves in isolated pockets of protection where they could neither see nor hear their officers. Instead of pressing their actions, these soldiers occasionally sought cover. The resulting loss of momentum encouraged both sides to settle into positions near one another and exchanged fire, thus rendering such engagements tactical stalemates.

A comparison of both Federal and Confederate results illustrates the relationship between broken terrain and tactical stalemate. Of the 114 engagements that occurred on a broken field, the Federals won 19 percent of the time, were stalemated 35 percent, and lost 46 percent. Similarly, the Confederates won 46 percent of the time, were stalemated 25 percent, and lost 29 percent. When they fought on all other terrain types, however, both sides' percentage of stalemates decreased significantly. The Federals won 26 percent of the time, were stalemated only 10 percent, and lost 64 percent. The Confederates won 66 percent of the time, were stalemated only 10 percent, and lost 24 percent. The higher rates of stalemates and lower rates of victories and defeats can be

partially attributed to the terrain. When fighting on broken ground, many Federal and Confederate soldiers failed to press their actions until either victory or defeat was realized. Instead, they fought more cautiously and were stalemated more often.

Tactical positions appeared as the next most influential component of battle. The combatants' tactical positions affected their performance in two important ways. First, a defensive force located behind strong fortifications enjoyed a significant advantage over an exposed attacking force. Second, an offensive force suffered a psychological blow when ordered to abandon its protective works and advance against the enemy. The combined effect of defensive fieldworks, therefore, was the weakening of offensive tactics and the bolstering of defensive actions.

The data clearly indicate that fighting defensively from an entrenched position led to victory more often than defeat. Comparison of the southerners' combat record when maintaining an entrenched position, versus a position of lesser protective value (i.e., wooden fence, tree line, open field, etc.), illustrates the value of strong fortifications during combat. Of the 129 engagements in which Confederate soldiers fought defensively from positions with complete cover, they won 88 percent of the time, were stalemated 5 percent, and lost 7 percent. However, of the 109 engagements in which Southern soldiers fought defensively from positions of limited or no cover, they won only 44 percent of the time, were stalemated 25 percent, and lost 31 percent. In other words, the Confederates doubled their chances of success, and reduced their chances of defeat fourfold, by fighting defensively from an entrenched position versus fighting from any position of lesser strength.

The Federals also enjoyed noticeable success when fighting defensively from an entrenched position. Comparison of the Federals' combat record when fighting from entrenched positions versus non-entrenched positions reveals a trend similar to that found in the Confederate data. Northern soldiers won two-thirds of the time, and lost one-third of the time, when holding entrenched positions against Confederate assaults. Their defensive effectiveness decreased, however, when fighting from weaker positions. Under these circumstances, the northern regiments won only 40 percent of the time, were stalemated 8 percent, and lost 52 percent. Like their Confederate counterparts, Federal troops experienced greater success when fighting defensively from entrenched positions versus non-entrenched positions.¹⁰

Strong tactical positions also appeared to have a negative psychological effect on the men ordered to abandon such works and attack those of their opponent. When entrenched Federal soldiers were ordered to attack entrenched Confederate troops, the Federals performed miserably. Of the seventy-four engagements in which the northern men advanced from trenches and attacked enemy trenches, they won only 4 percent of the time, were stalemated 1 percent, and lost 95 percent. Ironically, when northern soldiers initiated assaults on southern trenches from non-entrenched tactical positions, the Union men experienced a significant increase in victories. Of the sixty-seven engagements in which Federal soldiers advanced from non-entrenched positions and assaulted Confederate trenches, the Federals won 25 percent, were stalemated 9 percent,

¹⁰ Note that Federal troops fought defensively from entrenched positions in only six engagements. Such a small sample cannot be considered reliable, but the trend within those six engagements is clear. The Federals tended to win when fighting defensively from strong fortifications, just as the Confederates did. The Union soldiers fought defensively from non-entrenched positions in ninety-four engagements.

and lost 66 percent. In other words, they experienced a sixfold increase in their chances of success.

Though it is nearly impossible to separate the physical dominance that strong field fortifications gave defenders from the mental intimidation that they inflicted on attackers, the data suggest that the combination of influences made such works important components of Civil War combat. Physically, an entrenched defensive force could load its weapons, aim, fire, and reload with minimal exposure to enemy fire. Mentally, an offensive force experienced anxiety and trepidation when ordered to leave its protective works and assault those of its enemy. This unique combination of environmental and behavioral influences may partially explain why defensive tactical positions were such influential aspects of battle.¹¹

The next three influential variables in the combined model were the weather during battle, and Federal and Confederate tactical actions. Each of these variables has been discussed previously and will only be summarized here. Analysis revealed that hot, humid weather appeared to give the southerners an edge in battle, and mild, temperate weather seemed to give the northerners their best chance of success. Analysis also showed that both Federal and Confederate infantrymen experienced greater combat success when fighting defensively versus offensively. The data leave little doubt regarding the nature of the relationship between these variables and Federal outcome.

The combined model also indicated that artillery played an important role in combat. That role was defined primarily by the tactical actions of each side. Because the

¹¹ For an analysis of the psychological effects of field fortifications, see Griffith, *Battle Tactics of the Civil War*, 123-35.

Confederates fought defensively in a majority of their engagements, they increased their chances of winning by using numerous cannon during battle. The defensive strength of artillery guns allowed them to repel Federal assaults and emerge victorious. The Federals, on the other hand, increased their chances of winning by fighting when artillery use was limited. Because the Federals fought offensively in a majority of their engagements, they significantly improved their chances of success when assaulting a Confederate infantry force with limited artillery support.¹²

The Confederate defense of Marye's Heights during the Battle of Fredericksburg (December 13, 1862) provides a vivid example of the defensive firepower of artillery during the Civil War. Days before battle, Lieutenant General James Longstreet ordered the Washington Artillery battalion to the crest of Marye's Heights in support of his infantry. The battalion unlimbered eleven guns, moved them into position, zeroed their aim on several key features of the field before them, and prepared their limbers for action. On the day of battle, Brigadier General Thomas Meagher, commander of the Second "Irish" Brigade, deployed his five regiments in line of battle, consciously placing the 28th Massachusetts in the center of his line because it was the only unit that carried the green colors of the Irish Brigade. (The other regimental flags were in New York City being replaced.) When the Second Brigade emerged from the south edge of town, the Confederate gunners quickly went to work.

The 800-yard advance of the Second Brigade toward Marye's Heights gave the southern artillerymen an ideal target, and within that target they aimed at the conspicuous

¹² The mean number of Federal versus Confederate artillery guns per Federal outcome were: Federal victory = 6 guns v. 9 guns; Federal stalemate = 14 guns v. 16 guns; Federal defeat = 11 guns v. 13

green flag carried by the 28th Massachusetts. The cannon blasts tore gaps through the Massachusetts line. The men leaned into the fire as if leaning into a strong wind and trudged toward the heights. Eventually, the 28th Massachusetts reached the enemy picket line and drove them back to the sunken road at the base of the hill. Once the pickets were out of the southern infantrymen's field of fire, however, the Confederate soldiers added sheets of rifle fire to the leaden hail belching from the guns of the Washington Artillery. Under the combined strain of the unrelenting artillery barrage and infantry musket fire, the Massachusetts men broke ranks and sought protection along a rail fence in front of them. All order was lost as the men simply tried to survive. Approximately one hour after initiating their attack, the 28th Massachusetts retreated pell-mell back toward town.

The 28th Massachusetts was nearly shattered. It lost 158 of 416 men (38 percent) in less than one hour of combat. The commanding officer, Colonel Richard Byrnes, spent the winter trying to rebuild his regiment. Despite his efforts, the survivors were demoralized, too demoralized even to celebrate Christmas in the usually gregarious fashion for which the Irish Brigade had become known. That holiday season, the men could do little more than lament the loss of their comrades and write bitterly of their futile assault at Fredericksburg.¹³

guns.

¹³ The description of the 28th Massachusetts at Fredericksburg was synthesized from the following: *O.R.*, ser. 1, vol. XXI, pp. 129, 226-32, 240-52, 563-77, 1126-29, ; Walker, *History of the Second Army Corps*, 162-75, 192, 196; Patrick D. O'Flaherty, *The History of the Sixty-Ninth Regiment in the Irish Brigade: 1861-1865* (New York: n. p., 1986), 184-97, 208, 327; Joseph G. Bilby, *Remember Fontenoy! The 69th New York and the Irish Brigade in the Civil War* (Hightstown, NJ: Longstreet House, 1995), 65-71; Lawrence F. Kohl and Margaret C. Richard, ed., *Irish Green and Union Blue: The Civil War Letters of Peter Welsh, Color Sergeant, 28th Regiment Massachusetts Volunteers* (New York: Fordham University Press, 1986), 40, 42-47; Kevin E. O'Brien, ed., *My Life in the Irish Brigade: The Civil War Memoirs of Private William McCarter, 116th Pennsylvania Infantry* (Campbell, CA: Savas Publishing Company, 1996), 57, 139-201; Napier Bartlett, ed., *Military Record of Louisiana, Including Biographical and Historical Papers Relating to the Military Organizations of the State* (Baton Rouge: Louisiana State

Finally, the model showed that the number of days between engagements affected Federal combat performance significantly. The data suggest that the greater the number of days to elapse between battles, the greater the Federals' chances for success in their next engagement. When northern regiments were allowed to rest and recuperate for at least 100 days between engagements, they won 46 percent of the time, were stalemated 13 percent, and lost 41 percent. However, the Federals enjoyed this advantage in only 20 percent of their engagements. Eighty percent of the time, northern soldiers faced enemy fire less than 100 days after their previous engagement. When they did, the Union forces won only 18 percent, were stalemated 17 percent, and lost 65 percent. In other words, when the Federals had at least 100 days of relative inactivity between engagements, they more than doubled their odds of winning their next fight.¹⁴

Beyond the implications of the previous analyses of the combined model's behavioral and environmental variables, the model is also noteworthy for the variables that it excluded. Every variable collected for this study was combined and measured for influence on Federal combat performance. Any variable not included in the model was removed because it failed to demonstrate a significant relationship with Federal outcome

University Press, 1964), 161, 164-66; James Lorenzo Bowen, *Massachusetts in the War, 1861-1865* (Springfield, MA: Clark W. Bryan, 1889), 424-25; William Miller Owen, "A Hot Day on Marye's Heights," found in Clarence C. Buel and Robert U. Johnson, eds., *Battles and Leaders of the Civil War*, 4 vols. (New York: Century Company, 1887), 3:96-99 (hereafter referred to as *B&L*); LaFayette McLaws, "The Confederate Left at Fredericksburg," *B&L*, 3, 86-94; Kevin E. O'Brien, ed., "'The Breath of Hell's Door': Private William McCarter and the Irish Brigade at Fredericksburg" *Civil War Regiments: A Journal of the American Civil War* 4, no. 4 (1995): 47-69; David Power Conyngham, *The Irish Brigade and Its Campaigns: With Some Account of the Corcoran Legion, and Sketches of the Principal Officers* (New York: William McSorley and Company, 1867), 337-65; James Dinkins, "Griffith-Barksdale-Humphrey Mississippi Brigade And Its Campaigns," in Southern Historical Society, comp., *Southern Historical Society Papers*, 52 vols. (Richmond: Virginia Historical Society, 1876-1959), 32:250-74 (hereafter referred to as *SHSP*); and James Dinkins, "Barksdale's Mississippi Brigade At Fredericksburg," *SHSP*, 36, 17-25.

¹⁴ Because the Federals' mean number of days between battles prior to victories was 103, the threshold of 100 days was used to compare the distributions of Federal battle results.

when measured in conjunction with the other variables in the model. Admittedly, statistical significance does not always equal real-world significance. However, it is a scientific measurement of effect that is widely accepted. Therefore, those aspects of Civil War combat not included in the combined model may be considered, at best, noticeably less influential than those variables included.

Two environmental variables used by many scholars when discussing Civil War combat failed to appear in the combined model. Neither *weaponry* nor *strength* proved statistically significant when placed in the model. The data indicated that there was little improvement in combat performance when Federal regiments used rifled muskets versus smoothbore muskets. The data also indicated that regimental combat strengths did not significantly influence the results of small-unit actions, despite Confederate regiments averaging thirty fewer men per engagement than Federal regiments. In other words, two environmental aspects of Civil War combat frequently used by scholars to understand the war's tactical nature may be less instructive than commonly thought.

Finally, two miscellaneous aspects of Civil War combat were also noticeably absent from the combined model. Data describing changes in commanding officers, from army commanders to regimental commanders, failed to demonstrate significant associations with Federal combat results. Similarly, data regarding changes in regimental personnel, ranging from recruitment through discharge, proved insignificant when tested for impact on Federal combat performance. Fluctuations in both the tenure of the officers and the consistency of the men did not noticeably affect the Federals' ability to fight.

Using the interpretation of Civil War combat suggested by the combined model, a test of the hypothesis of southern martial superiority is possible. The model identified

seven variables that exerted important influence on both sides' ability to perform effectively under fire—soldier quality, battlefield terrain, tactical actions, defensive positions, and weather. When these seven variables remained constant, Federal and Confederate combat results should have been distributed equally among victories, stalemates, and defeats. If the combatants' outcomes were not distributed equally, then the side with the better record probably fought more efficiently.¹⁵

The first comparison involved those engagements in which two low-quality forces fought. These contests most frequently occurred on level, broken ground. Of these engagements, two possible scenarios were compared. The first involved Confederates attacking in hot weather (atmospheric conditions favorable to them) and Federals defending from positions that offered limited protection. This combination of circumstances led to Federal victory and Confederate defeat 100 percent of the time. The second scenario involved Federal forces attacking in hot weather (atmospheric conditions again favoring the southerners) and Confederate forces defending from positions with complete protection. These circumstances led to Federal and Confederate stalemates 100 percent of the time. In other words, when low-quality troops fought under conditions that were either equal, or to the advantage of the Confederates, Federal forces were either victorious or stalemated, and Confederate units were either stalemated or defeated. These

¹⁵ There are two weaknesses associated with comparing Federal and Confederate combat effectiveness. First, the comparisons do not include artillery strength information. These data were omitted because it was not possible to obtain constant values while maintaining consistency among the other seven variables. However, when the other seven variables remained constant, the artillery strength of the defending force appeared as neither overwhelming nor feeble. Second, the comparisons omit several influential variables included in the combined model, specifically prebattle activities, battle number, and time between battles. These variables could not be used because they applied only to the Federal forces; no similar data were collected regarding the Confederate forces.

data suggest that low-quality Federal troops fought more effectively than low-quality Confederate soldiers.¹⁶

The second comparison involved those engagements in which two average-quality units clashed. Most of these engagements also occurred on level, broken ground. When southern soldiers attacked in hot weather and Federal troops defended from positions that offered limited protection, the Federals lost 25 percent of the time and were stalemated 75 percent. The Confederates, on the other hand, won 25 percent of the time and were stalemated 75 percent. When the Federals attacked in mild weather and the Confederates defended from positions of limited protection, the Federals and Confederates were stalemated 100 percent of the time. In other words, when average-quality soldiers clashed under equal conditions, the Confederates were occasionally victorious, frequently stalemated, and occasionally defeated. The Federals, however, were never victorious, frequently stalemated, and occasionally defeated. These data indicate that average-quality Confederates fought more effectively than average-quality Federals.

The third comparison involved those engagements in which two high-quality forces fought. The majority of these engagements occurred on level, open ground. When southern soldiers attacked in hot weather and Federal troops defended from positions with limited protection, the Federals lost every time, and the Confederates won. When the Federals attacked in mild weather and the Confederates defended from positions of

¹⁶ Based on the available data, it was not possible to make equal comparisons of the combatants' low-quality soldiers. The best comparison possible required conceding two tactical advantages to the Confederates when they fought defensively—weather and position. Ironically, the Confederates underperformed despite having these advantages.

limited protection, the Federals won half and lost half, and the Confederates won 100 percent of the time.¹⁷ In other words, when high-quality forces fought under equal conditions, the Confederates won every engagement. The Federals, however, occasionally won and frequently lost. These data suggest that high-quality Confederate troops fought more effectively than high-quality Federal soldiers.

Though the overall differences in combat performance were not glaring, southern soldiers appeared to fight with greater efficacy than northern soldiers. The three preceding comparisons suggest that when the seven most-influential shared variables remained constant, southern troops enjoyed more success than their opponents. The only exception was when low-quality soldiers clashed. In these situations, Federal regiments tended to out-fight Confederate units. To understand the Confederates' superior performance in most engagements, as well as the Federals' advantage when low-quality soldiers clashed, further analysis is required.

The combat performance of both Federals and Confederates appeared to be influenced by geography. The side that fought against an invading opponent generally performed better on the battlefield. When Confederate General Robert E. Lee led the Army of Northern Virginia into Maryland in 1862 and Pennsylvania in 1863, his men suffered numerous tactical defeats. The southerners won only 35 percent of the time, were stalemated 7 percent, and lost 58 percent. The Federals' results were the opposite; they won 58 percent of the time, were stalemated 7 percent, and lost 35 percent.

¹⁷ Note that a regiment's tactical success or failure was determined by its ability to achieve all, some, or none of its tactical objectives. Therefore, it was possible for both the Federals and the Confederates to claim victory in the same engagement. From each side's perspective, they both successfully achieved their tactical objectives.

Likewise, when northern forces advanced into southern states, the Federals were often defeated. Federal forces won only 21 percent of the time, were stalemated 17 percent, and lost 62 percent; Confederate forces won 63 percent of the time, were stalemated 15 percent, and lost 22 percent. In other words, northerners often won when fighting in the North, and southerners frequently won when fighting in the South.¹⁸

This discrepancy in performance may be attributed to the psychological impact of fighting on home soil in defense of one's capital. When the strategic situation required that one army protect both its land and its seat of government from an invading force, the side fighting to maintain the integrity of its region frequently proved more effective on the battlefield. This added behavioral aspect of Civil War combat may help explain why southern soldiers tended to perform better under fire than northern soldiers. Frequently, the Confederates were fighting to remove the Federals from the southern soil surrounding Richmond, and when not actively campaigning to force the Federals off their lands, the Confederates often served as a barrier to further northern incursions. In either case, southern soldiers could easily interpret their actions as those designed to defend home and hearth.¹⁹

¹⁸ The relationship between geographic location and combat performance proved statistically significant for both Federal and Confederate soldiers. To study the implications of geography and outcome, those engagements that occurred in northern states were coded as "1 = North," and those that occurred in southern states were coded as "2 = South." When analyzing the relationship between Confederate outcome and geographic location, Pearson's correlation coefficient was $r = .221$ with $p < .0005$. Analysis of variance produced an F statistic of 14.927 with 2 df and $p < .0005$. Finally, Pearson's chi-square statistic was 28.225 with 2 df and $p < .0005$. When analyzing the relationship between Federal outcome and geographic location, Pearson's correlation coefficient was $r = -.222$ with $p < .0005$. Analysis of variance produced an F statistic of 16.264 with 2 df and $p < .0005$. Finally, Pearson's chi-square statistic was 30.585 with 2 df and $p < .0005$.

¹⁹ Several historians have recognized the interdependence of southern nationalism, morale, and combat effectiveness. See John Leekley, ed., *Bruce Catton: Reflections on the Civil War* (New York: Doubleday Publishing, 1981), 70-71; Richard E. Beringer, Herman Hattaway, Archer Jones, and William N. Still, *Why the South Lost the Civil War* (Athens: University of Georgia Press, 1986), 66, 77; Kenneth M.

If the emotive force of fighting to defend the territorial and political integrity of the South helps to explain why Confederate soldiers tended to defeat Federal soldiers under equal conditions, the question regarding the superior effectiveness of low-quality Federal soldiers remains unanswered. The data suggest that low-quality Confederate units may have under-performed in combat because they began to doubt their chances of winning the war. Over 96 percent of the engagements involving two low-quality opponents occurred in late 1864 and early 1865. By this point in the war, some southern soldiers may have felt that their efforts were in vain. Perhaps they recognized that their attempt at independence would not survive another campaign season. Perhaps their willingness to sacrifice themselves for their country waned as their country's future became increasingly bleak. Perhaps their poor performance was a combination of both views. Regardless, without a combative spirit, sparked by the belief in one's purpose and maintained by the hope in ultimate success, the low-quality southern men were no match for their opponents.²⁰

Despite the complexities of Civil War combat, the combined model offers a plausible analysis of the fighting. The model indicated that several behavioral aspects of combat significantly influenced Federal fighting effectiveness. The quality of the

Stamp, *The Imperiled Union: Essays on the Background of the Civil War* (New York: Oxford University Press, 1980), 246-69; James M. McPherson, *Drawn with the Sword: Reflections on the American Civil War* (New York: Oxford University Press, 1996), 113-36; Reid Mitchell, "The Perseverance of the Soldiers"; in Gabor S. Boritt, ed., *Why the Confederacy Lost* (New York: Oxford University Press, 1992), 109-32; and Wiley, *The Life of Johnny Reb*, 123-50. For an introduction to Confederate nationalism, see Drew Gilpin Faust, *The Creation of Confederate Nationalism: Ideology and Identity in the Civil War South* (Baton Rouge: Louisiana State University Press, 1988); Eric H. Walther, *The Fire-Eaters* (Baton Rouge: Louisiana State University Press, 1992); and Don E. Fehrenbacher, *Constitutions and Constitutionalism in the Slaveholding South* (Athens: University of Georgia Press, 1989).

²⁰ For an analysis of morale in the Army of Northern Virginia that corroborates this study's data regarding the decline of Confederate morale by late 1864 and early 1865, see J. Tracy Power, *Lee's*

soldiers, their prebattle activities, their cumulative levels of combat experience, and the amount of time that they spent between engagements, combined sometimes to sharpen, oftentimes to dull, the cutting edge of the Union soldiers. The model also indicated that various environmental aspects affected northern combat performance in meaningful ways. The battlefield terrain, the combatants' tactical actions, the weather, and to a lesser degree, the tactical position and artillery strength maintained by the defensive force, combined to give Federal soldiers an occasional advantage, though frequently the Union men were handicapped by the difficulties associated with offensive tactics. However, certain physical aspects appear less important than previously thought. Weaponry, regimental strength, and personnel changes all failed to exert meaningful influence on regimental combat performance. Finally, application of the model to address the question regarding martial superiority suggests that Confederate soldiers often fought with greater effectiveness than their northern counterparts.

In addition to detailing those aspects of combat that most influenced performance, the combined model also suggests that a simple environmental interpretation of Civil War combat may be less reliable than previous thought. Analysis indicated that the behavioral aspects of battle exerted a somewhat greater influence on outcome. Though the physical characteristics of the fighting were important, they were often overshadowed by the mental condition of the men. When studied in combination, however, the behavioral and environmental factors identified in the model provided a dependable methodology for understanding Civil War combat.

Miserables: Life in the Army of Northern Virginia from the Wilderness to Appomattox (Chapel Hill: University of North Carolina Press, 1998).

EPILOGUE

This study is a limited statistical analysis of Civil War combat. It is based on the personnel records of twenty-seven Federal infantry and heavy artillery regiments and on the combat histories of their 465 engagements in the eastern theater of operations from 1861 to 1865. It also includes Confederate regimental combat information for each of these engagements. Because of the large number of Confederate regiments that participated in the 465 engagements, it was not possible to include their complete rosters and battle histories in the database. Nevertheless, the data collected for this study are unusually rich, and they provide a unique perspective on the nature of Civil War combat.

Analysis of the data indicates the need to reconsider the consensus view of Civil War combat. Traditional emphasis on combat's physical features appears less reliable than generally thought. Though the environmental aspects of combat were influential, the behavioral aspects had a somewhat greater impact on small-unit actions. The attitudes, opinions, and experiences of the men facing each other in battle were more likely to shape the results of combat than their weapons, positions, and actions.

The three variables with the greatest influence on combat performance were all measurements of the combatants' mental state at the time of battle. The quality of the soldiers' morale and cohesiveness and their trust in the abilities of their commanding officers appeared critical in determining who emerged from the fray unbowed and who emerged bludgeoned. The soldiers' cumulative level of combat experience also affected their determination to fight. Finally, the prebattle activities of the men demonstrated both

positive and negative effects on their ability to perform under enemy fire. In combination, these three variables reliably explained Federal combat performance in almost half the engagements examined in this study.

Certain physical characteristics of Civil War battlefields also affected combat performance, though to a lesser degree than the aforementioned behavioral variables. Most of the environmental factors commonly emphasized by both soldiers and scholars appeared important in separating victor from vanquished. Terrain emerged as the most influential physical characteristic in combat, especially the slope of the battlefield. The combatants' actions, positions, and artillery strengths also affected their fighting efficiency in meaningful ways. Finally, the impact of the weather on combat performance appeared greater than perhaps traditionally thought. Together, these environmental variables adequately explained Federal combat performance approximately 40 percent of the time.

Because the data indicate that combat performance during the Civil War was influenced more by the men doing the fighting than by the mechanisms with which they fought, it may be appropriate to reconsider the relationship of Civil War combat to other wars. Most scholars agree that the American Civil War marked a transitional period in the military history of the western world; it bridged the gap between the Napoleonic warfare of the early nineteenth century and the modern warfare of the early twentieth century. As a midpoint between these two European conflicts, the Civil War shared numerous characteristics with both epochs. Aspects of the American conflict, ranging from mobilization to industrialization, have been analyzed for similarities and differences with both the Napoleonic Wars and World War I. Though the majority of these analyses

are beyond the scope of this project, it is in the area of small-unit actions that this study may offer a fresh perspective.

If the Civil War marked a transitional period in military history, then it raises numerous historical questions by virtue of its unique chronological circumstances. Foremost among these questions has been: Was Civil War combat more like that of the Napoleonic Wars or the First World War? In addressing this question, scholars have examined various tactical aspects of battle. Comparisons of combat variables such as action, position, formation, weaponry, morale, cohesion, leadership, etc., have produced a multitude of valuable studies regarding the three wars. Yet these studies have failed to agree on the proper place of Civil War combat in military history. This lack of consensus is due in part to the numerous variables being considered. For example, offensive actions may have yielded successful results for Napoleon's soldiers, but they frequently brought stalemate or defeat to the soldiers of the Civil War and World War I. Similarly, the soldiers' construction and use of defensive field fortifications may not have occurred with regularity during the Napoleonic Wars, but the men frequently depended on such defensive works by the end of the Civil War and throughout most of World War I.

Though such a wide range of potential combat analyses has led to numerous insightful studies regarding various aspects of nineteenth- and twentieth-century warfare, the plenitude of topics has served to diffuse and fragment the scholarship. Therefore, it may be more useful to modify the analytical approach used to understand the Civil War's place in military history. Instead of comparing the overall combat experiences of the different historical periods, it may be more beneficial to examine only those aspects of battle that most influenced combat performance. In other words, the question to be

answered is this: Were the most influential aspects of Civil War combat more like those of the Napoleonic Wars or those of the First World War? In this way, the dialogue will be limited only to those battle variables that held the greatest sway over tactical combat performance.

The data in this study showed that the behavioral aspects of battle influenced martial performance more than the environmental aspects usually emphasized in combat histories of the Civil War. The spirit and emotions of the men often determined the outcome of small-unit actions. In this regard, Civil War combat was much like that of the Napoleonic Wars. The results of small-unit actions were often the product of one force disrupting and destroying another force's cohesiveness and will to fight. Through the combined use of infantry and cavalry, Napoleon's troops often gained tactical superiority over their opponents by surprising them and allowing the ensuing panic to undermine the enemy's ability to fight. Though the mechanical ways in which tactical success was achieved may have differed between the Napoleonic Wars and the American Civil War, the understanding that small-unit actions turned on the mental strengths of the men fighting remained constant.

Although the behavioral aspects of combat were important for both French and Federal soldiers, the mental status of the men failed to influence significantly the outcome of most engagements during World War I. By 1914 the soldiers' ability to influence the results of combat had yielded to the overwhelming lethality of modern battlefields. Machine guns, breech-loading artillery, high explosives, barbed wire, and complex trench systems had transformed the tactical nature of combat from a battlefield in which the soldiers significantly influenced the outcome, to a battlefield in which the

weapons and fortifications most influenced the outcome. On this new battlefield, highly-motivated men, making gallant assaults, would rarely threaten the enemy position. The waves of soldiers simply rolled toward the enemy's guns and routinely broke short of his position.

The transformation of combat tactics from the Napoleonic Wars through World War I may be described as a classic struggle between man and machine. In the early nineteenth century, the human component of battle proved more powerful than combat's physical aspects. By the mid-nineteenth century, the attitudes and sentiments of the soldiers engaged in small-unit actions still overshadowed the environmental components of the battlefield, though the difference appeared less pronounced than fifty years earlier. By the early twentieth century, however, the soldiers' will to fight made little difference when caught in the sights of an enemy machine gun or under the weight of an enemy artillery barrage. The technology of warfare had overcome the soldiers' ability to influence the results of battle.

APPENDICES

APPENDIX A: STATISTICAL PROCEDURES

Throughout Chapter 3, three statistical procedures were used to identify and describe the relationships between combat performance and the environmental and behavioral variables included in most analyses of Civil War combat. The three tests are Pearson's correlation coefficient, analysis of variance, and Pearson's chi-square. The following is a description of these statistical procedures, coupled with their application in examining the relationship between tactical actions and combat results.

Pearson's correlation coefficient (r) was used to measure the extent to which changes in one variable may have affected changes in another variable. The value of " r " varies from -1 to +1; its absolute value reveals the strength of the relationship, with higher absolute values indicating stronger relationships. The sign of " r " denotes the direction of the relationship. A positive " r " value indicates that as one of the variables increases in value, so too does the value of the other variable; a negative " r " value indicates that as one variable increases, the other decreases.

The p value associated with Pearson's correlation coefficient, as well as with most statistical procedures, asserts whether the two variables are significantly associated. The general rule for interpreting the value of p is: If p is less than or equal to .05, then the relationship between the variables is statistically significant. A p value less than or equal to .05, indicates that there is only a 5 percent chance (or less, depending on the exact value of p) that the relationship between the two variables is the result of coincidence. A p value of .05 is widely accepted as the threshold for statistical significance.

Pearson's correlation procedure compared the numerical values of both the Federals' and Confederates' *action-outcome* groupings in each of the 465 engagements included in this study. Pearson's coefficient for the Federals was $r = .096$ with $p = .038$. Pearson's correlation coefficient for the Confederates was $r = .176$ with $p < .0005$. These results indicate the existence of a statistically significant, positive relationship between *action* and *outcome*. High *action* values correlated with high *outcome* values. Note that the highest *action* value is "3 = Defense," and that the highest *outcome* value is "3 = Win." In other words, Pearson's correlation procedure indicates that defensive tactics proved more successful than offensive tactics, and that both the success of defensive tactics and the defeat of offensive tactics probably cannot be explained through coincidence.

Like Pearson's correlation procedure, analysis of variance was used to measure the relationship between the *outcome* and *action* variables. In this test, however, *outcome* was treated as a continuous variable and *action* was treated as a categorical variable. The test compared the variation in *outcome* numerical values ("1 = Lose," "2 = Stalemate," or "3 = Win") relative to the possible categories of the *action* variable ("Offense," "Mixed," or "Defense"). A test that produced an F statistic markedly greater than 1.0 indicated that a significant association existed between *outcome* and *action*. The number of "degrees of freedom" (df) associated with the F statistic was used to determine the p value of the test. The p value indicated whether the relationship between the two variables was statistically significant.

When testing *outcome* and *action*, the resulting Federal F statistic was 8.786 with 2 df and $p < .0005$. The Confederate F statistic was 9.565 with 2 df and $p < .0005$. Note

that in most instances throughout this study when analysis of variance is applied, one of the assumptions of the test is often violated. The validity of the test is dependent upon equal variances in the distribution of the continuous variable (*outcome*) among the groups created by the categorical variable (*action*). In most instances, the data used in this study violated the assumption of equal variances. Though the inequality of variances lessened the reliability of the test, the large sample size (465 engagements) served to offset the potential inaccuracies caused by the inequality of variances. Therefore, analysis of variance was used throughout this study despite its limitations. When possible, additional statistical tests were included in an effort to corroborate the conclusions suggested by analysis of variance.

Finally, Pearson's chi-square test was used to measure the relationship between the categorical nature of the two variables (*action* = "Offense," "Mixed," or "Defense"; *outcome* = "Win," "Stalemate," or "Lose"). This test compared the "observed" distribution of outcome-action pairings with the "expected" distribution. If the difference between the observed and expected distributions was great, the test generally produced a high chi-square value, indicating that the variables may be associated. However, the value of chi-square has no absolute meaning. Therefore, similar to analysis of variance, the number of degrees of freedom was used to calculate a *p* value for the test. If *p* was less than or equal to .05, then the relationship between the two variables was considered significant. Pearson's chi-square statistic for the Federals' outcome-action pairings was 33.112 with 4 df and $p < .0005$. Pearson's chi-square statistic for the Confederates' outcome-action pairings was 38.892 with 4 df and $p < .0005$.

All three statistical procedures indicated that a relationship between tactical actions and combat outcomes existed, and that the relationship was probably not the result of coincidence. Additionally, Pearson's correlation procedure showed that the relationship between the two variables was positive, indicating that defensive tactics tended to succeed and offensive tactics tended to fail. Based on the results of these statistical procedures, it appears that the tactical actions taken by two opposing forces directly influenced their respective battlefield results. Furthermore, when either side fought defensively, they significantly increased their chances for success.

APPENDIX B: GENERAL LINEAR MODELS

The General Linear Model (GLM) procedure is an advanced statistical test often used by applied and social scientists when attempting to interpret vast amounts of complex data. Although a deep understanding of the GLM requires advanced statistical training, the procedure simply defines the pattern that best fits the general relationships that exist within the data. Once this pattern is defined, the GLM can identify those variables that most closely mirror it. Of course the model does not represent every possible variable in the data set nor every variable that could have been measured. In fact, the model probably does not resemble any single variable. Rather, it represents a summary of the data by showing the general pattern contained within it. Therefore, conclusions drawn from a GLM must be recognized as probable scenarios and not absolute truths.

Several factors make a general linear model the logical procedure for analyzing and predicting Federal battle results. First, for a large sample the test can allow for departures from normality within the data. Given the nature of combat, few variables included in this study exhibit the characteristics of a normal distribution. Second, the procedure is designed to compare and contrast the effects of both categorical and continuous predictor variables on a single dependent variable. In other words, it can mix categorical variables (e.g., *terrain*, *position*, etc.) with continuous variables (e.g., *strength*, *casualties*, etc.) to see what the combined effect of these variables may have been on combat performance. Finally, the GLM can measure the individual influence that

each variable had on combat outcome and produce a ranking of these variables from most influential to least influential.

Each GLM was designed using Federal *outcome* as the dependent variable and all remaining variables as independent variables. The independent variables were further divided into either categorical or continuous variables. Once the data were separated, the procedure automatically divided the data into groups based on the categorical variables and compared the intra-group effects of the continuous variables on the intra-group means of the dependent variable. In other words, the test divided all the data into groups defined by the categorical variables and then compared the influence that the various intra-group continuous variables had on the mean values of Federal *outcome*. Through these intra-group and between-group comparisons of mean values, the procedure was able to measure the variation in Federal outcome caused by a specific variable while controlling for the effects of the other variables.

All of the GLMs presented the same statistical information. The column labeled “Variables” listed those variables that, when examined in combination, demonstrated statistically significant relationships with Federal *outcome*. The column designated “*F* statistic” presented the *F* statistic for each variable relative to Federal *outcome*. The column titled “*p* value” described the statistical strength of the relationship between each variable and Federal *outcome*.¹ The column marked “Partial Eta Squared” described the ratio of the variation of Federal *outcome* accounted for by an individual variable to the sum of the variation accounted for by the variable and the variation unaccounted for by the model as a whole. The higher a variable’s Partial Eta Squared value, the greater the

amount of influence it exerted on Federal *outcome*. In other words, the Partial Eta Squared values describe the relative magnitude of each variable's impact on Federal *outcome*.

Finally the Adjusted R Squared statistic appears at the bottom of each GLM. It is a goodness-of-fit measurement used in linear models containing several independent variables. Simply stated, the Adjusted R Squared value may be interpreted as the proportion of variation in Federal combat outcomes accurately predicted by the variables in the model. It is based on the R Squared statistic, which describes the proportion of variation in the dependent variable (Federal *outcome*) explained by the model's independent variables (e.g., *terrain*, *strength*, etc.), and is adjusted for the number of independent variables and the sample size. The R Squared statistic ranges in value from 0 to 1; the Adjusted R Squared statistic may be less than 0 for poorly fitted models. Small values indicate that the model does not fit the data well, and large values indicate that the model accurately describes most of the data.

The GLMs discussed in Chapter 5 are presented below. Table 5 describes the impact of combat's environmental characteristics on battle performance. Table 6 presents the influence of the behavioral aspects of battle on combat effectiveness. Finally, Table 7 depicts the combined effects of both combat's environmental and behavioral variables on battle performance.

¹ For a discussion of *F* statistics and *p* values, see Appendix A, pp. 138-41.

Table 5

GLM of All Significant Environmental Variables Relative to Federal Outcome

Environmental Variables	<i>F</i> statistic	<i>p</i> value	Partial Eta Squared
Terrain	9.666	< .0005	.166
Weather	19.468	< .0005	.151
U.S.A. Formation	26.803	< .0005	.109
U.S.A. Action	21.987	< .0005	.091
C.S.A. Artillery	33.185	< .0005	.070
U.S.A. Position	5.234	< .0005	.067
C.S.A. Action	7.811	< .0005	.034
Corrected Model ^a	14.036	< .0005	.455

^a The model's R Squared = .455 (Adjusted R Squared = .422)

Table 6

GLM of All Significant Behavioral Variables Relative to Federal Outcome

Behavioral Variables	<i>F</i> statistic	<i>p</i> value	Partial Eta Squared
C.S.A. Quality	66.371	< .0005	.245
Battle Number	2.303	.001	.115
U.S.A. Prebattle 12-24 hrs	4.738	< .0005	.085
U.S.A. Prebattle 36-48 hrs	4.283	< .0005	.068
U.S.A. Prebattle 24-36 hrs	3.224	.002	.052
U.S.A. Quality	6.866	.001	.032
U.S.A. Prebattle 0-12 hrs	2.148	.047	.031
Corrected Model ^a	9.008	< .0005	.548

^a The model's R Squared = .548 (Adjusted R Squared = .487)

Table 7
GLM of All Significant Variables Combined Relative to Federal Outcome

Behavioral Variables	<i>F</i> statistic	<i>p</i> value	Partial Eta Squared
C.S.A. Quality	44.085	< .0005	.184
Battle Number	3.323	< .0005	.163
U.S.A. Prebattle 12-24 hrs	9.335	< .0005	.160
Terrain	6.889	< .0005	.137
U.S.A. Position	9.813	< .0005	.131
Weather	13.526	< .0005	.122
U.S.A. Prebattle 0-12 hrs	8.120	< .0005	.111
U.S.A. Prebattle 24-36 hrs	6.230	< .0005	.100
U.S.A. Action	10.553	< .0005	.051
C.S.A. Artillery	16.248	< .0005	.040
C.S.A. Action	6.671	.001	.033
U.S.A. Quality	4.589	.011	.023
Days Between Battles	5.620	.018	.014
Corrected Model ^a	9.008	< .0005	.548

^a The model's R Squared = .723 (Adjusted R Squared = .672)

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