Allegiance, Ability, and Achievement in the American Civil War: Commander Traits and Battlefield Military Effectiveness*

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Abstract

How do the characteristics of military leaders relate to battlefield outcomes? To answer this question, we employ original battle-level data and biographical information on hundreds of commanders in more than 250 battles in the American Civil War. We examine the relationship between two common measures of battlefield success (victory and casualties) and two latent features of commanders—competence and loyalty—that have long been seen as important in the broader study of executive appointments. We find that competent commanders are associated with more successful battlefield outcomes, as are more loyal Confederate commanders. More broadly, our analysis suggests that focusing on the relationship between military appointments and battlefield outcomes—with the latter's relatively clear definition of "success"—allows for direct examination of the relationship between appointee traits and organizational performance. As such, our results have implications for the study of conflict as well as bureaucratic politics.

*Authors listed in alphabetical order, though this is observationally equivalent to the results of our most recent foot race. All contributed equally to the paper. Thanks to Alexander Acs, Alexander Bolton, Gregory Brill, Benjamin Fordham, Hein Goemans, Richard Jordan, Kerim Can Kavaklı, Lael Keiser, Dave Lewis, Michael McKoy, Chad Nelson, Paul Poast, Melinda Ritchie, Theodore Samuelson, Kathryn Spond, and Alan White for their comments, as well as attendees at the American Civil War and International Relations Workshop at the 2015 Annual Meeting of the Peace Science Society and those at the 2016 and 2017 Annual Meetings of the Southern and Midwest Political Science Associations. All remaining errors are our own.

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Historians and military strategists have long recognized the critical role of leadership in determining battlefield outcomes. Gen. A. A. Vandegrift asserted that “positions are seldom lost because they have been destroyed, but almost invariably because the leader has decided in his own mind that the position cannot be held” (United States Marine Corps, 1997, p. 1). Plutarch (1992) claimed Quintus Fabius Maximus was the only man capable of stopping Hannibal’s invasion of Italy. Liddell Hart (1996) traced the importance of six great commanders in the second millennium. And Taaffe (2011) highlighted U.S. Army Chief of Staff George C. Marshall’s World War II selection of officers who could defeat the Axis powers. However, relatively little systematic, quantitative work exists within political science on the sources and effects of military leadership. In this research note, we fill this lacuna by analyzing a conflict for which the importance of military leadership is well known: the American Civil War (hereafter, “the Civil War”).

The Civil War makes an excellent case for an initial analysis of the role of command, as early Confederate victories have long been attributed to superior leadership (e.g., Alexander, 2007, McPherson, 1988). As the war progressed, the leadership gap narrowed, and Lincoln moved from appointing “political generals,” meant to appease particular constituencies (see Goss, 2003, Patterson, 2014), to generals that had demonstrated battlefield competence. This allowed the Union to exploit advantages in population and resources (Bond, 1998), achieving victory in the end.

In using the Civil War to examine the relationship between commander traits and battlefield success, we provide several contributions. First, we employ large-scale data on the attributes of battlefield commanders in the Civil War to compute measures of generals’ competence. This is, to our knowledge, the first systematic investigation into the characteristics defining a quality commander, and provides researchers with a way to use military competence as an explanatory variable in future work. In comparing political commanders to those appointed for skill, we also illustrate the utility of using the military to study bureaucratic dynamics. Finally, we assess the roles that individual atributes play in determining battlefield outcomes, directly testing the widely-accepted idea that leadership matters in military engagements. Though our results challenge the generalizability of extant theories of bureaucratic appointments, especially with respect to the loyalty-competence tradeoff, they are also broadly supportive of the traditional international relations hypotheses: leadership is strongly related to success (though how loyalty matters is contextualized by other factors), and while the Confederacy began the war with a competence advantage among its commanders, the gap narrowed considerably as the war progressed.[1]

Military Leadership and Battlefield Outcomes

The international relations literature explaining the outcomes of military conflict has generally focused on the overall dispute, with less attention devoted to the outcome of battles within those those conflicts (Gartner, 1998, Reiter, 2009). Though exceptions exist (e.g., Biddle and Long, 2004, Grauer and Horowitz, 2012, Reiter and Stam, 1998), few studies explain *battle-level* effectiveness. Yet, understanding combat within war is essential to understanding war more generally, since a complete and coherent theory of war must explain how fighting can resolve the bargaining failure that caused war in the first place (Leventoğlu and Slantchev, 2007).

One plausible determinant of battlefield success, military leadership, has been particularly neglected. When considering leaders, scholars primarily focus on *political* figures (e.g., Bueno De Mesquita and Siverson, 1995, Chiozza and Goemans, 2011), rather than military leadership. Two important exceptions are noteworthy. First, the coup-proofing literature focuses on the tradeoff that coup-vulnerable political leaders face when choosing between personally-loyal officers and militarily-competent commanders who can defeat domestic and foreign enemies, but may also pose a threat to the regime (Gaub, 2013, Pilster and Böhmelt, 2011). Second, Reiter and Wagstaff (2017) analyze how battlefield success in World War II affected decisions to promote or remove commanders. However, whereas their analysis primarily focuses on the effects of battle outcomes on military leadership decisions, we examine the inverse: the effect of military leadership on

[1]Additional results (see Appendix) also suggest that more loyal commanders are more likely to be viewed as "political" generals in the modern era.

battle outcomes.[2]

In the past, a lack of quality data on both battles and the commanders of those battles has limited the study of military leaders. Therefore, while we may acknowledge leadership matters, we do not know *which* attributes are important. The Civil War, however, is well documented (Weiss, 1966), allowing us to construct a dataset of all primary battles of the war, with biographical characteristics for commanders of those battles.

Although the international relations literature has mostly ignored the Civil War (exceptions include Poast 2015 and Reiter 2009), it is a conflict that generalizes easily to more recent disputes, as it shares several features with contemporary combat. First, the Civil War marks the start of the modern era of warfare, with the introduction of technologies such as the machine gun, barbed-wire, and trench warfare, making it at least as relevant as World War I. Second, the real GDP per capita of the United States at the start of the Civil War was equivalent to a middle-income income country in the present day. Finally, like the plurality of post-Cold War civil wars (Kalyvas and Balcells, 2010), the Civil War was primarily a conventional war. Thus, the Civil War has the potential to tell us much about modern warfare.

Military Appointments in the American Civil War

In most cases (brevet appointments excepted), Article II of the United State Constitution governs the appointments of the senior officers who tend to serve as battlefield commanders. Like other executive appointments, they generally require presidential nomination and Senatorial confirmation. Recent appointments research in the bureaucratic politics context has examined a tradeoff between appointees' loyalty and competence (e.g., Edwards, 2001, Hollibaugh, Horton and Lewis, 2014, Krause and O'Connell, 2016).[3] Although these works focus on appointments to executive

[2]Reiter and Wagstaff do find unit performance typically improved when poor commanders were replaced, but this is not their central focus.

[3]This tradeoff has been found in countries outside of the U.S. as well (e.g., Egorov and Sonin, 2011, Reuter and Robertson, 2012).

agencies and departments, there is reason to believe the negative relationship between loyalty and competence is applicable to military appointments as well. This is especially true of the Civil War, the background of which made loyalty particularly important. Indeed, there is evidence both Lincoln and Davis considered loyalty when deciding whom to promote, sometimes to the (potential) detriment of competence. After General Don Carlos Buell was relieved for failing to defeat Braxton Bragg's forces in Kentucky, Lincoln replaced him with Ohio-born William Rosecrans, skipping over the militarily-successful George H. Thomas, out of a reluctance to "replac[e] one Southern-born commander for another" (Broadwater, 2009, p. 87). When Secretary Stanton expressed little confidence in Rosecrans, urging Lincoln to replace him with Thomas, Lincoln referenced Thomas's origin, saying "Let the Virginian wait" (Piatt and Van Boynton, 1893, p. 327), illustrating his willingness to trade competence for loyalty. Thomas was given command of the Army of the Cumberland at the end of 1863, but only after he prevented Rosecrans' defeat at Chickamauga from turning into a disaster.

While loyalty also played an important role in the selection of Confederate commanders, Davis arguably placed a premium on *personal* loyalty, rather than birthplace. The most senior officer in the Confederate military was not Robert E. Lee, but New York native Samuel Cooper, who was appointed adjutant general of the Confederate Army, responsible only to President Davis himself. Cooper was awarded this lofty rank because of his friendship with the president, and his willingness to do Davis' bidding, allowing the latter to "solidify [his] control over his armies. Davis could act through Cooper, and the rank insulated Cooper from question" (Davis, 1996, p. 360).

While these anecdotes suggest perceptions of loyalty influenced both sides' decision making during the war, loyalty was likely not the key criterion. Indeed, relative to bureaucratic appointments, the importance of battlefield competence and the existential threat posed to the Confederate government likely increased the relative importance of competence. Yet, the unique context of the war may have altered the relationship between loyalty and competence for a number of reasons. Most prominently, uncertainty over punishment if it lost might have ensured the pool of potential Confederate nominees was disproportionately loyal. Cultural factors may also have played a role. While both sides were originally part of the United States, cultural differences between the two persist to this day. One of those most relevant to our analysis is honor, which has long been valorized within the American South (Nisbett and Cohen, 1996). Characterizing honor as a reputation for resolve, Dafoe and Caughey (2016) find Southern presidents have been more likely to initiate, continue, and win militarized disputes. Therefore, the commanders who most identified with the Southern cause likely also identified most closely with Southern honor, making them more likely to fight harder.[4] This could increase the likelihood of success for Southerners, as it provides them with an opportunity to snatch victory from the jaws of defeat, but it might also increase the expected number of casualties on both sides.

Finally, for Confederates with military backgrounds, traits related to competence may be associated with increased personal loyalty to Davis. Unlike Lincoln, Davis was a West Point graduate and Mexican War veteran. As such, he maintained personal connections within the officer corps, and staffed the government and military with USMA graduates. For Davis, some attributes associated with competence as an officer—such as training at West Point—might also have been related to personal loyalty.

Thus, the circumstances involved in military appointments and the characteristics of the South could result in a *positive* association between loyalty and competence for Confederate commanders. These considerations should be absent for Union commanders. In general, they neither grew up in the culture of the American South, nor served under a leader with a military background, and likely faced less potential punishment for defeat. For Union officers, the standard loyalty-competence tradeoff should apply, with loyalty having neutral—or even negative—effects on outcomes.

[4] Given Dafoe and Caughey's (2016) characterization of honor as a reputation for resolve, this would be consistent with Goemans's (2000) definition of resolve as "the total amount of resources one side is willing to expend" (p. 29).

Battle Data

To examine the effect of leadership and the relationship between loyalty and competence for Civil War commanders, we construct two original datasets on Civil War battles and biographical information for relevant commanders. For our list of battles, we rely upon the National Park Service's Civil War Sites Advisory Commission's (CWSAC) list of the more than 300 "principal battles" of the war. These are defined as battles "of special strategic, tactical, or thematic importance to local operations, campaigns, theaters, or to the war as a whole" (Staff of the Civil War Sites Advisory Commission, 1993*a*,*b*). From the CWSAC list, we include all battles between the Battle of Fort Sumter and the Battle of Appomattox Court House, exclusive. We omit from the list the following: battles fought between Union forces and Native Americans, primarily naval battles, unopposed captures, one-sided violence against civilians, and battles without a commander in our biographical dataset. This yields a final dataset of 294 battles. These observations range from battles engaging armies, such as Gettysburg, where the average number of personnel on each side is greater than 53,000 (~7% of battles), to those at the corps level (greater than 17,000, ~15%), division level (greater than 5,300, ~32%), brigade level (greater than 1,700, ~35%), and regiment level (all others, ~11%).

For each battle, the data comprise several features: its outcome, the strengths (number of personnel present or engaged) of the forces on both sides, and the casualties on both sides. CWSAC assigns a military result—"Union victory," "Confederate victory," or "Inconclusive"—for all battles in its data (Staff of the Civil War Sites Advisory Commission, 1993*a*,*b*). This classification generally follows the rule that the victorious side was the one in control of the battlefield at the conclusion of the battle (Fox, 1898, Livermore, 1900).[5] We derive each side's strengths and casualties (killed, wounded, missing, and captured) from multiple sources (Bodart, 1908, Fox, 1898, Kennedy, 1998, Livermore, 1900, National Park Service, 2012, Phisterer, 1883, U.S. Army Concepts

[5]These classifications are largely consistent with those in Bodart (1908), Fox (1898), Livermore (1900), and U.S. Army Concepts Analysis Agency (1991).

Analysis Agency, 1991). For battles where there are multiple sources of data, we use the geometric mean of the available sources. We then estimate the remaining strength and casualty data with multiple imputation (King et al., 2001).[6]

Commander Data

The commanders of each battle are those the Staff of the Civil War Sites Advisory Commission (1993*a*) lists as principal commanders. While most forces have one principal commander, some have up to four.[7] For each commander, we used several sources (Allardice, 2006, Eicher and Eicher, 2002, Historical Data Systems, 2017, Warner, 1959, 1964) to collect biographical data, including birthplace and year, length of military service, Mexican War service, military academy attendance, experience as planters (plantation owners), command experience, partisan affiliation, office-holding experience, and familial connections to notable individuals on both sides. We were not able to collect biographical information for some commanders, and we dropped battles with these leaders from the analysis.[8]

However, while we expect these variables to be associated with important latent traits (namely, loyalty and competence) that might drive battlefield results, including them in one regression model would likely result in crippling multicollinearity. Moreover, the direction of the relationship is unclear. To avoid potential problems—and to examine the separate effects of "loyalty" and "competence"—we fit a structural equation model to estimate latent dimensions of loyalty and competence.[9] This is consistent with existing work that has sought to estimate these traits from biographical characteristics (e.g., Krause and O'Connell, 2016).

[6]Our data are missing values for Union strength in 6% of battles, Union casualties in 8%, Confederate casualties in 17%, and Confederate strength in 29%. We impute the missing values as functions of battlefield site, attacking party, date the battle began, who surrendered (if anyone), battle duration, location (theater and coordinates), battle significance, commander ranks, and outcome. We use the geometric means of these imputations.

[7]Not all principal commanders were generals, since some battles were regiment-level or smaller.

[8]This results in a loss of 13.8% of battles and 33.8% of commanders (almost entirely lower-ranked).

[9]Typical factor analysis methods assume latent indicators are causally prior to observed indicators. As several indicators here are formative, factor analysis is inappropriate.

Our measure of competence is derived from several variables, categorized as either formative (causing competence) or reflective (caused by latent competence). Our formative indicators are: (1) number of years served in the military; (2) Mexican War service; (3) number of Civil War battles engaged in to that point; (4) United States Military Academy attendance; (5) other military academy attendance; (6) whether they had achieved the grade of midshipman; (7) experience as an elected official; and (8) whether the commander in question was from a Confederate state. Variables (1) through (3) capture the influence of military experience, variables (4) through (6) capture the influence of training, variable (7) accounts for management experience from other means (it takes some degree of competence to win an election or serve in office), and variable (8) accounts for residual socialization effects. Our reflective measures are: (1) the commander's (logged) cumulative win percentage in battles up to that point; (2) the (logged) cumulative casualty ratio of the commander's opponents in battles up to that point; (3) whether the individual had experience in command of a corps, army, or division; and (4) highest grade attained to that point.

Our measure of loyalty is similarly derived. Our formative indicators are: (1) whether the individual was born in a Confederate state; (2) whether the individual was born in a border state; (3) whether the individual was born abroad; (4) Lincoln's vote share in the 1860 presidential election in the individual's home state;[10] (5 and 6) the difference in the number of prominent relatives the individual had on each side—as defined by Eicher and Eicher (2002) and disaggregated by in-laws versus blood relatives—weighted by the coefficient of relationship (Wright, 1922), which is designed to capture the closeness of kinship; (7) whether the individual was a planter before the war; and (8) whether they attended the United States Military Academy. Variables (1) through (4) capture the influence of loyalty to place of birth as well as other socialization effects, variables (5) and (6) capture the influence of loyalty to family, variable (7) represents the influence of economic incentives, and variable (8) accounts for possible loyalties to Jefferson Davis, an 1828 West Point graduate (Eicher and Eicher, 2002). The reflective indicators are: (1) whether the individual joined

[10] Those born abroad were coded as zero.

the Confederate military; (2) a factor variable capturing the extent of pro-Confederate partisan loyalties;[11] (3) whether the individual had served as an elected official in a Confederate state, a Union state, or neither; and (4) whether the individual had attended the Peace Conference of 1861, in an attempt to avert the war (Chittenden, 1864). Full descriptions of all variables can be found in the appendix.

We use these indicators (measured at the commander level on the first day of each battle in which they fought) to estimate a two-factor multiple indicators and multiple causes (MIMIC) model (Jöreskog and Goldberger, 1975).[12]

To aid in interpretation, both traits are set to mean zero and variance one. We cluster by commander and weight each observation by the reciprocal of the number of times each commander appears in our sample, so that all commanders are weighted equally and no single commander is driving the results. We assume a logistic link function for dichotomous reflective indicators and an ordered logistic link function for *Top Grade Reached*.[13]

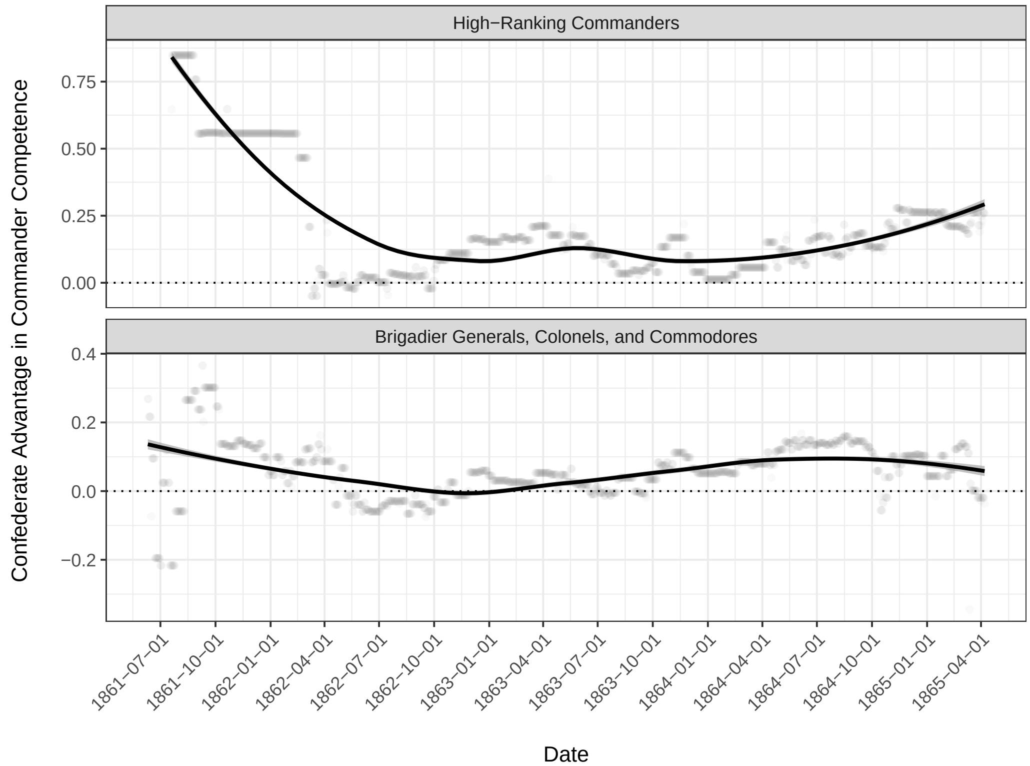
According to Table 1, the indicators described above generally load onto the loyalty and competence dimensions as expected. Almost all reflective indicators achieve significance, and all coefficients show the expected signs. Where statistically significant, all formative indicators are also signed appropriately. Overall, both sets of indicators behave as expected, with results for reflective indicators being more in line with our expectations. Additionally, all relevant goodness-of-fit measures suggest the model fits the data well.

[11] This variable was created using principal component analysis (PCA) on variables indicating whether the person was a Democrat, Whig, or Republican before the war, or had ever been a member of the Free Soil Party. Note that these are not necessarily mutually exclusive because the Free Soil indicator can be used in conjunction with any of the other partisan indicators, and various party-Free Soil combinations might illustrate different attitudes toward abolitionism and the Confederacy. We use PCA as opposed to including the variables in the MIMIC model directly because, individually, the party variables exhibit too little variation and their inclusion results in problems with convergence and model fit. Preprocessing by fitting a PCA and recovering the first factor alleviates this problem and preserves the essential underlying variance.

[12] That variables are measured on the first day of battle is important, as two reflective indicators of competence—cumulative win percentage and opponent's cumulative casualty ratio—are measured until (but not including) the first day of battle. This ensures that when we use these in our later analyses to predict casualties, we are not simply regressing y on y. See also Footnote 22.

[13] See appendix for more information about the model's assumptions.

Figure 1: Confederate Advantage in Competence Over Time



Conventional wisdom holds that the Confederacy possessed superior leadership early in the war (Alexander, 2007). As time progressed, the Union reduced the leadership gap, exploiting its own advantage in resources and manpower (Bond, 1998, p. 5). Our estimates speak to this understanding. Figure 1 plots the competence of the active commanders, those who fought in at least one battle and omitting those who left the military or died, over the course of the war.[14] The top panel presents estimates for two-star officers or higher (who could command divisions), while the bottom presents the same for lower-ranked other commanders, who were pressed into command without the requisite grade. In general, these results are consistent with the common narrative of the war: the Confederacy began with an advantage, which dwindled to one-third of its

[14]The line is the LOESS curve through the point estimates. The y-axis indicates the difference in terms of standard deviations.

Table 1: A MIMIC Model of Loyalty and Competence

	Confederate Competence	Loyalty
Formative Indicators		
Southern	−0.054	0.427***
	(0.083)	(0.103)
United States Military Academy	0.055†	0.073*
	(0.030)	(0.032)
Military Service	0.357**	
	(0.043)	
Battle Experience	0.612**	
	(0.034)	
Passed Midshipman	0.007	
	(0.014)	
Other Military Academy	−0.010	
	(0.019)	
Mexican War Experience	0.053*	
	(0.022)	
Prewar Elected Official	0.088**	
	(0.023)	
Border State		0.117
		(0.072)
Foreign		−0.058
		(0.073)
Confederate Bias in Weighted Coefficient of Relationship (Blood Relatives)		0.096*
		(0.046)
Confederate Bias in Weighted Coefficient of Relationship (In-Laws)		0.190**
		(0.044)
Planter		0.129†
		(0.071)
Home-State Lincoln Vote		−0.328**
		(0.106)
Reflective Indicators		
Log Cumulative Win Percentage	0.572**	
	(0.042)	
Log Cumulative Opponent Casualty Percentage	0.347**	
	(0.062)	
Command Experience	0.788**	
	(0.038)	
Top Grade Reached	0.699**	
	(0.054)	
Confederate Commander		0.914**
		(0.033)
Confederate Partisan Bias		0.867**
		(0.058)
Confederate Office-holding Bias		0.859**
		(0.069)
Peace Conference Attendance		−0.202
		(0.177)
Average Variance Explained (AVE)	0.647	0.704
Squared Inter-trait Correlation	0.006	
Comparative Fit Index	0.961	
Tucker-Lewis Index	0.952	
Weighted Root Mean Square Residual	0.858	
Root Mean Square Error of Approximation	0.017	
Number of Commanders	260	
Number of Observations	721	

Note: Bootstrapped standard errors clustered on commanders in parentheses. Two-tailed tests: $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.1$.

initial value by war's end. Intriguingly, the Confederate States possessed a much smaller advantage among lower-ranked commanders, which fluctuated over the course of the war.

That our competence measure comports well with established theories of Civil War leadership is encouraging. A check of the face validity of our loyalty measure appears in the appendix.[15]

Latent Traits and Battlefield Outcomes

Before moving to more sophisticated regression models, we look at the correlations between our estimated traits. We estimate two models: our "dynamic" model includes correlations between loyalty and competence for all active officers for each day of the war, and our "initial" model only includes correlations between loyalty and competence, where each officer's contribution is his level of loyalty and competence at the time of attaining the grade in question.[16] We do this because the "dynamic" model—as well as Figure 1—uses indicators of aggregate levels of loyalty and competence over time, and does not necessarily stem from considerations at the time of appointment, since it could reflect learning over the course of the war. Thus, the "initial" model is a better measure of the relationships between indicators *at the time* commanders were appointed.

The results in Figure 2 suggest the presence of the loyalty-competence tradeoff is conditional on side.[17] For the Union, the results are consistent with historical accounts of the sustained use of "political generals" (Work, 2012), especially for higher-ranking commanders. If the determinants of Union appointments were partially political in nature, where some generals were selected for politics and others for military expertise, then the observed distribution of commander traits

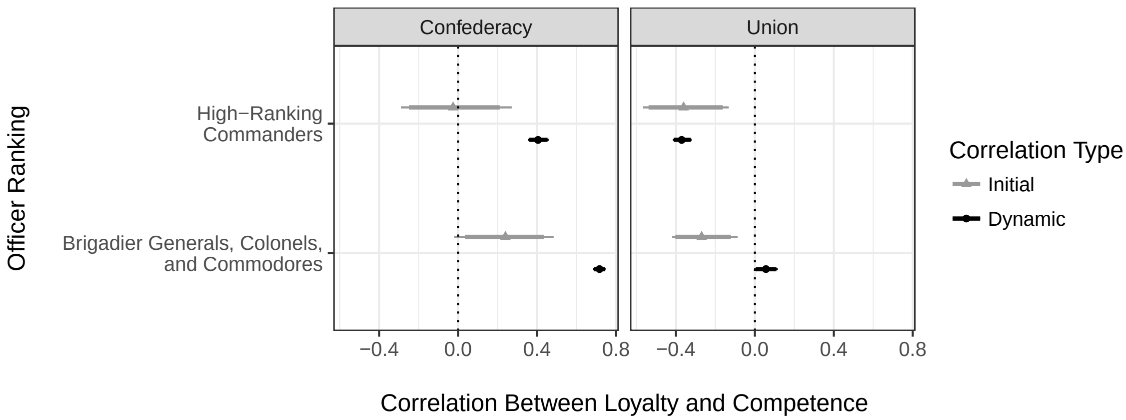
[15]Before proceeding, we should note that, given the directions of the loadings, the estimated factor for "loyalty" is better described as *Confederate Loyalty*. Therefore, we separately re-normalize the estimated positions on this factor for Confederate and Union commanders, multiply these normalized factors by -1 for all Union commanders, and re-normalize *post hoc* the resulting estimates to ensure the new factor has mean zero and variance one. This renormalized measure will be used in all later analyses.

[16]Each commander appears up to twice in our "initial" version—once for the "Higher-Ranking Commanders" set, and once for the "Lower-Ranking Commanders" set.

[17]Spearman's ρ is presented with 90% (thick line) and 95% (thin line) confidence intervals. "Dynamic" observations are at the day level.

should be similar to those predicted by extant theories of the appointments process, with a negative relationship between loyalty and competence.

Figure 2: Correlations Between Latent Traits



For the Confederacy, the results are somewhat different. Indeed, in stark contrast to the negative correlation among Union commanders, the correlation between loyalty and competence for the Confederacy's commanders is positive and significant at the 95% level in our "dynamic" version, and is significant at the 90% level for lower-ranking commanders. While the effect for Confederate officers is contrary to existing theories of executive appointments, it is consistent with the ideas explored above, including Southern honor and personal loyalty to Davis.

However, these results do not directly reflect performance on the battlefield. Thus, we examine the relationship between traits and battlefield outcomes with a series of regressions. Battlefield success can be measured using either categorical indicators of "victory" (Grauer and Horowitz, 2012, Reiter and Stam, 1998), or relative casualties between sides (Biddle, 2006, Biddle and Long, 2004). There are advantages and drawbacks to both. Inflicting greater casualties does not directly equate to military success, but it is easier to measure. Classifying the results of battles as victories and defeats incorporates more information about the context of the battle, but requires more subjective decisions. In our analyses we use both victory and casualties as measures of battlefield success, though the two measures are associated in the case of our sample.[18]

We first examine *Battlefield Outcome*. This is an ordinal variable, for which *Confederate Victory* < *Inconclusive* < *Union Victory*. For models with *Battlefield Outcomes* as the response, we estimate an ordered logistic regression model. Our key independent variables are the latent traits extracted above. However, our unit of analysis is the battle, and in any given battle, either side can have multiple commanders.[19] Thus, for commander-level latent traits, we use the battle-level means for the Confederate and Union commanders as covariates, which are denoted *Confederate Competence*, *Union Competence*, *Confederate Loyalty*, and *Union Loyalty*.[20]

In order to capture the effects of military strength, we include the strengths of each combatant (in thousands), denoted as *Confederate Strength* and *Union Strength*. We control for location, which affects both knowledge of terrain and willingness to fight. The variable *Confederate Battle* is a binary variable equaling one if the battle took place in a Confederate state. We interact it with our *Loyalty* variables, as Southern honor may matter more when defending one's home. Finally, the variable *Union Attacker*, is an indicator variable for whether the Union was the attacking side.

Our results are presented in Table 2. As expected, higher levels of competence among Confederate [Union] generals are associated with higher probabilities of stalemates or Confederate [Union] victories. Additionally, greater Confederate [Union] strength is associated with higher probabilities of Confederate [Union] victories (or stalemates). These dynamics are illustrated in Figure 3, which shows the expected relationship between competence and outcomes—more competent commanders are associated with greater probabilities of victory for their respective sides. In this figure, we examine how the probabilities of each outcome change as we move commander traits from

[18]An ordered logit regression of *Battlefield Outcome* on the logged loss-exchange ratio predicts 67% of battle outcomes in-sample. The loss-exchange ratio is the ratio of casualty ratios on each side: $\frac{casualties_{CSA}}{strength_{CSA}} \Big/ \frac{casualties_{USA}}{strength_{USA}}$. We add one to each term to prevent divide by zero errors. While the loss-exchange ratio is not the exact measure of casualties we use in later analyses, it is clear casualties and battle outcomes are correlated.

[19]The maximum in our data is four.

[20]Robustness checks included in the appendix suggest we obtain similar results to those presented here when using the maxima and minima of the relevant commander-level traits, when running separate models on subsets of the data according to whether combined forces were above or below the mean, and when accounting for the mean level of loyalty for "crossover" commanders.

Table 2: Latent Traits and Battle Outcomes

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Confederate Commander Competence	-0.385^{**}	-0.352^{*}	-0.352^{*}	-0.344^{*}	-0.368^{**}	-0.179
	(0.132)	(0.139)	(0.139)	(0.140)	(0.142)	(0.203)
Union Commander Competence	0.628^{**}	0.574^{*}	0.605^{**}	0.602^{**}	0.641^{**}	0.342
	(0.210)	(0.230)	(0.232)	(0.232)	(0.234)	(0.286)
Confederate Commander Loyalty	-0.105	-0.101	-0.098	-0.045	-0.032	0.104
	(0.116)	(0.117)	(0.117)	(0.246)	(0.248)	(0.273)
Union Commander Loyalty	-0.058	-0.051	-0.045	-0.205	-0.209	-0.281
	(0.112)	(0.113)	(0.113)	(0.289)	(0.290)	(0.318)
Confederate Strength		-0.043^{*}	-0.044^{*}	-0.043^{*}	-0.051^{**}	-0.057^{*}
		(0.019)	(0.019)	(0.019)	(0.020)	(0.024)
Union Strength		0.022^{*}	0.023^{*}	0.023^{*}	0.028^{*}	0.028^{*}
		(0.011)	(0.011)	(0.011)	(0.012)	(0.014)
Confederate Battle			-0.329	-0.324	-0.346	-0.118
			(0.292)	(0.294)	(0.294)	(0.341)
Confederate Commander Loyalty × Confederate Battle				-0.094	-0.104	0.021
				(0.279)	(0.281)	(0.311)
Union Commander Loyalty × Confederate Battle				0.203	0.208	0.294
				(0.315)	(0.316)	(0.350)
Union Attacker					-0.317	-0.402
					(0.252)	(0.281)
Cutpoint 1	-1.043^{**}	-1.050^{**}	-1.312^{**}	-1.309^{**}	-1.503^{**}	-1.579^{**}
	(0.147)	(0.190)	(0.303)	(0.305)	(0.343)	(0.438)
Cutpoint 2	-0.167	-0.158	-0.418	-0.412	$-0.602^{\dagger}$	-0.570
	(0.134)	(0.180)	(0.293)	(0.296)	(0.334)	(0.428)
AIC	606.613	604.887	605.604	608.868	609.277	622.299
BIC	628.715	634.356	638.756	649.388	653.480	765.959
Log Likelihood	-297.307	-294.444	-293.802	-293.434	-292.638	-272.150
Likelihood Ratio Test	12.964^{*}	18.690^{**}	19.973^{**}	20.709^{*}	22.300^{*}	63.278^{**}
Number of Observations	294	294	294	294	294	294

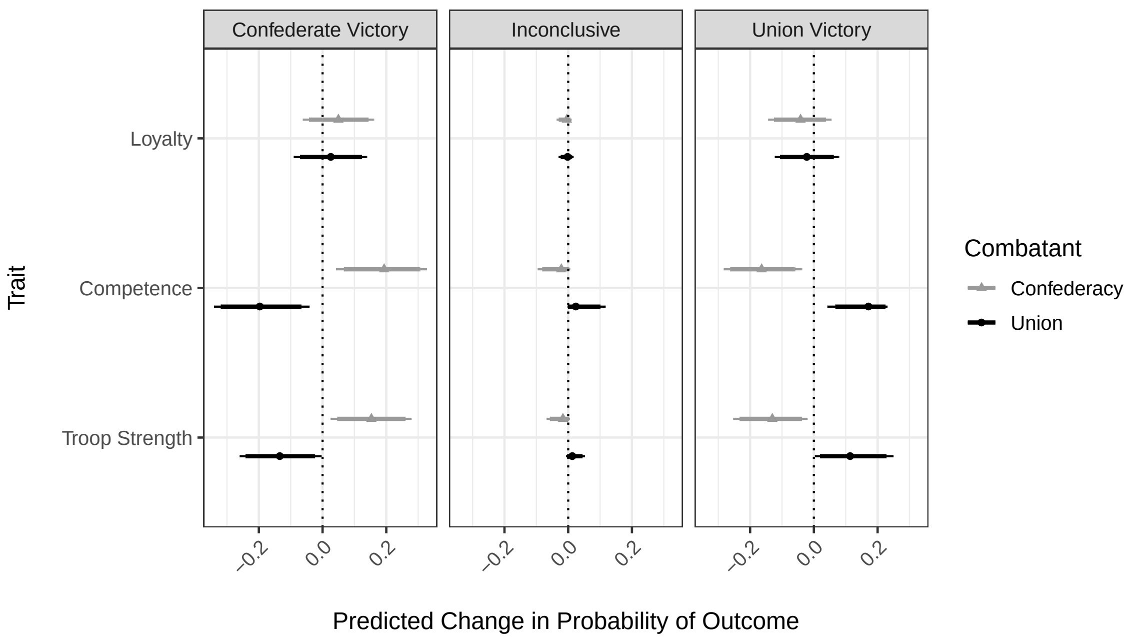
Note: Ordered logit coefficients. Observations are at the battle level. The dependent variable is an ordered factor with the levels being, in order, *Confederate Victory*, *Inconclusive*, and *Union Victory*. Negative [positive] coefficients indicate the covariate is associated with higher probabilities of Confederate [Union] victories. Model 6 includes commander-level fixed effects for those who fought in at least seven battles. Standard errors in parentheses. Two-tailed tests: $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.1$.

one standard deviation below the combatant-specific mean to one above; for purposes of comparison, we also illustrate the substantive effects for troop strength.[21] Increasing the competence of Confederate [Union] commanders from one standard deviation below the mean to one above increases the likelihood of victory by about 4–32 [7–23] percentage points, and decreases the probability of defeat by about 4–24 [7–34] percentage points. Comparing the effect of competence to troop strength demonstrates its substantive effect, as the change is only somewhat weaker than a

[21]To calculate the effects in Figure 3, we set all continuous independent variables to their mean values and allow competence, loyalty, and strength to vary. Our predictions, which include 90% (thick line) and 95% (thin line) confidence intervals, are based on the coefficient estimates in Model 2, which had the lowest BIC of those models estimated with the strength variables as covariates.

one-standard-deviation shift in troop strength: increasing the strength of the Confederate [Union] side from one-half standard deviation below the mean to one-half above—equivalent to a fivefold increase in strength, or an increase in Confederate [Union] strength from 3,102 to 17,566 [6,774 to 31,119] troops—raises the likelihood of victory by about 3–28 [0–25] percentage points, and reduces the probability of defeat by about 2–25 [0–26] percentage points.

Figure 3: Loyalty, Competence, Strength, and Battle Outcomes



Interestingly, loyalty has no effect on the probability of success in any model. This could be because loyalty does not matter when it comes to battlefield performance, or because loyalty plays a different role altogether. Instead, it might affect *how* commanders fight on the battlefield. To unpack this, we examine how loyalty and competence affect the ratio of combatants' casualties.[22] While this does not translate into victory *per se*, it is not dependent upon subjective classification.

[22]Importantly, the casualties used in Table 3 are *not* the same as those used in the estimation of the latent traits. The latent traits are estimated at the outset of each battle, while the casualties used as the dependent variable here are those obtained over the course of the battle. As such, there is no overlap, and we are not merely regressing y on a function of y. At best, the recovered latent traits can be considered to be a function of a lagged dependent variable, albeit dependent on several other covariates not included in the models in Table 3.

Furthermore, it distinguishes the magnitude of victory (Biddle and Long, 2004, p. 535). Therefore, we estimate a series of quasi-binomial regression models (with logistic link functions) with the same independent variables used in Table 2. The dependent variables in all analyses are the proportion of casualties from the Confederacy.[23]

The results presented in Table 3 are more varied than those in Table 2, but tell the same story in terms of competence, as *Confederate [Union] Competence*, where significant, is associated with decreased [increased] rates of Confederate casualties. The effect of *Loyalty* is more ambiguous: the results suggest more loyal Confederate commanders generally suffer lower rates of Confederate casualties, while loyalty has little impact for Union commanders.

That said, our model is a quasi-binomial model, and direct interpretation of the results is difficult. Therefore, we examine how the proportion of casualties from the Confederate side changes as we move commander traits from one standard deviation below the combatant-specific mean to one above. Results are presented in Figure 4, which includes 90% (thick line) and 95% (thin line) confidence intervals.[24]

Figure 4 illustrates dynamics similar to those presented in Figure 3, with more competent commanders associated with better outcomes. Generally, the effect is consistent with the results from the outcome models, though troop strength is never significant. The competence of Confederate [Union] commanders is associated with lower ratios of Confederate to Union [Union to Confederate] casualties. More specifically, a shift from one standard deviation below the mean to

[23]We use the binomial regression framework as these are count models where the maximum possible count is known, and thus the dependent variable is the proportion of the possible maximum count. This allows the estimator to make use of the variation in the maximum count, allowing for more precise estimates than standard count models while accounting for the heterogeneity in total casualties. In our case, the maximum count is the sum of the casualties on both sides, and thus our analysis can be construed as measuring the relative Confederate casualty rate. We estimate quasi-binomial models because of overdispersion. This is analogous to using a negative binomial model instead of a Poisson model when using count data where the maximum count is unknown or undefined; in practice, however, our model is simply a weighted logit where the dependent variable is the battle-level proportion of casualties from the Confederacy, with each observation weighted by the total number of casualties (both Union and Confederate). Note that we maintain the *Confederate Strength* and *Union Strength* independent variables in part because the number of possible casualties is limited by the strength brought to the battle.

[24]We use the coefficient estimates from Model 7, as it had the lowest Quasi-AIC of those estimated. As with Figure 3, we set continuous variables to their means.

Table 3: Latent Traits and Relative Confederate Casualty Rates

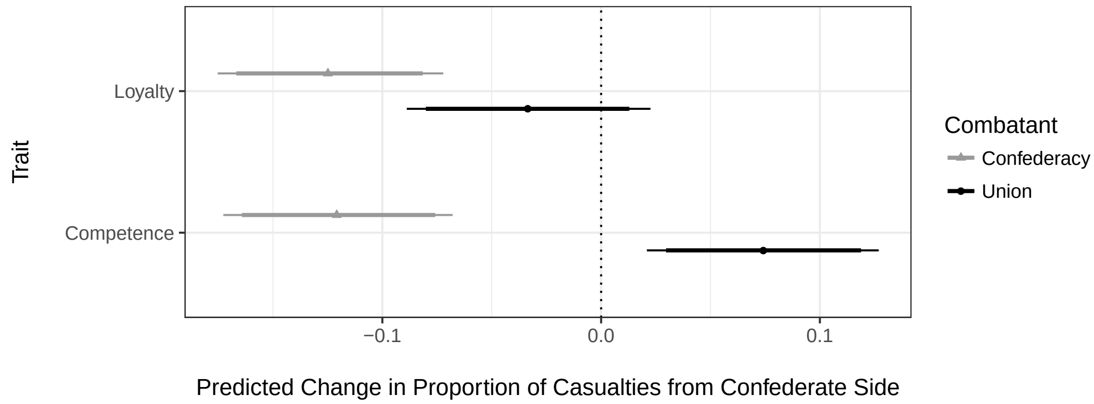
	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Confederate Commander Competence	−0.217**	−0.235**	−0.245**	−0.243**	−0.245**	−0.122
	(0.048)	(0.055)	(0.056)	(0.056)	(0.056)	(0.085)
Union Commander Competence	0.213**	0.211**	0.252**	0.247**	0.239**	0.191
	(0.078)	(0.080)	(0.084)	(0.084)	(0.085)	(0.124)
Confederate Commander Loyalty	−0.255**	−0.254**	−0.256**	0.108	0.102	0.261
	(0.053)	(0.054)	(0.054)	(0.213)	(0.213)	(0.252)
Union Commander Loyalty	−0.064	−0.053	−0.048	−0.005	−0.008	0.074
	(0.054)	(0.056)	(0.056)	(0.160)	(0.160)	(0.197)
Confederate Strength		0.001	0.001	0.000	0.002	0.009
		(0.004)	(0.004)	(0.004)	(0.004)	(0.006)
Union Strength		0.000	0.000	0.000	−0.001	−0.002
		(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Confederate Battle			−0.210	−0.107	−0.112	−0.186
			(0.129)	(0.144)	(0.144)	(0.188)
Confederate Commander Loyalty × Confederate Battle				−0.384†	−0.378†	−0.422†
				(0.217)	(0.217)	(0.248)
Union Commander Loyalty × Confederate Battle				−0.047	−0.047	0.001
				(0.171)	(0.171)	(0.222)
Union Attacker					0.072	0.073
					(0.114)	(0.122)
Constant	0.160**	0.118	0.309*	0.229	0.195	0.326
	(0.058)	(0.079)	(0.142)	(0.151)	(0.161)	(0.218)
Quasi-AIC	305.965	307.940	308.965	310.980	311.969	339.305
Wald Test	76.259**	76.296**	78.790**	81.746**	81.848**	128.819**
Number of Observations	294	294	294	294	294	294

Note: Quasi-binomial logistic coefficients. Observations are at the battle level. The dependent variable is the proportion of battle casualties from the Confederacy. Positive [negative] coefficients indicate the covariate is associated with higher [lower] ratios of Confederate casualties. Model 12 includes commander-level fixed effects for those who fought in at least seven battles. Standard errors in parentheses. Two-tailed tests: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{\dagger}p < 0.1$.

one standard deviation above the mean in the competence of Confederate [Union] commanders reduces [increases] the proportion of casualties from the Confederate side by about 4–14 [3–13] percentage points. The plot suggests the effect of loyalty is strong, but only apparent for Confederate commanders, and is associated with better outcomes for the Confederacy. These results support the mechanism of Southern honor for Confederate commanders, with Confederate soldiers fighting harder since most battles take place at home.[25] Alternatively, it may indicate greater familiarity with the terrain, as Models 10–12 suggest the loyalty effect is limited to Confederate battlefields

[25]Recall the dependent variable is effectively a proportion, so causing more Union casualties would serve to drive down the proportion of Confederate casualties.

Figure 4: Commander Traits and Predicted Effects on Confederate Versus Union Casualties



(though those models exhibit poorer fit than the more parsimonious Model 7).

Overall, these results reinforce our findings from Figure 2, Table 2, and Figure 3. Competence is associated with better outcomes, regardless of how it is measured. Loyalty is associated with lower casualty ratios for the Confederacy, and appears irrelevant to the Union, despite the presence of the loyalty-competence tradeoff implied by Figure 2. Broadly speaking, the Confederate results are consistent with theories of resolve and Southern honor discussed earlier, whereas the Union results are more consistent with traditional theories of executive appointments, which posit tradeoffs between loyalty and competence. Collectively, the results challenge the generalizability of standard theories of executive appointments. Moreover, they should motivate scholars to better conceptualize the linkages between individual characteristics and organizational performance, since, despite the presence of a tradeoff for the Union, we do not generally observe worse Union performance when loyalty is high.

Grant, Lee, and the Substantive Importance of Leadership

In this section, we provide one final demonstration of the substantive importance of our results by applying them to the cases of Generals Ulysses S. Grant and Robert E. Lee. With our model, we estimate the leadership effect of the two generals, by comparing the observed results of the battles which they commanded to the counterfactual of an "average" commanders.[26] To do this, we simulate 10,000 sets of predicted probabilities from Model 5 in Table 2 using the observed values; this gives us distributions of possible battle outcomes under Grant and Lee's leadership. We then replace their traits with those of the average commander and simulate another 10,000 sets of predicted probabilities. We plotted the distributions in Figures 5 and 6.[27]

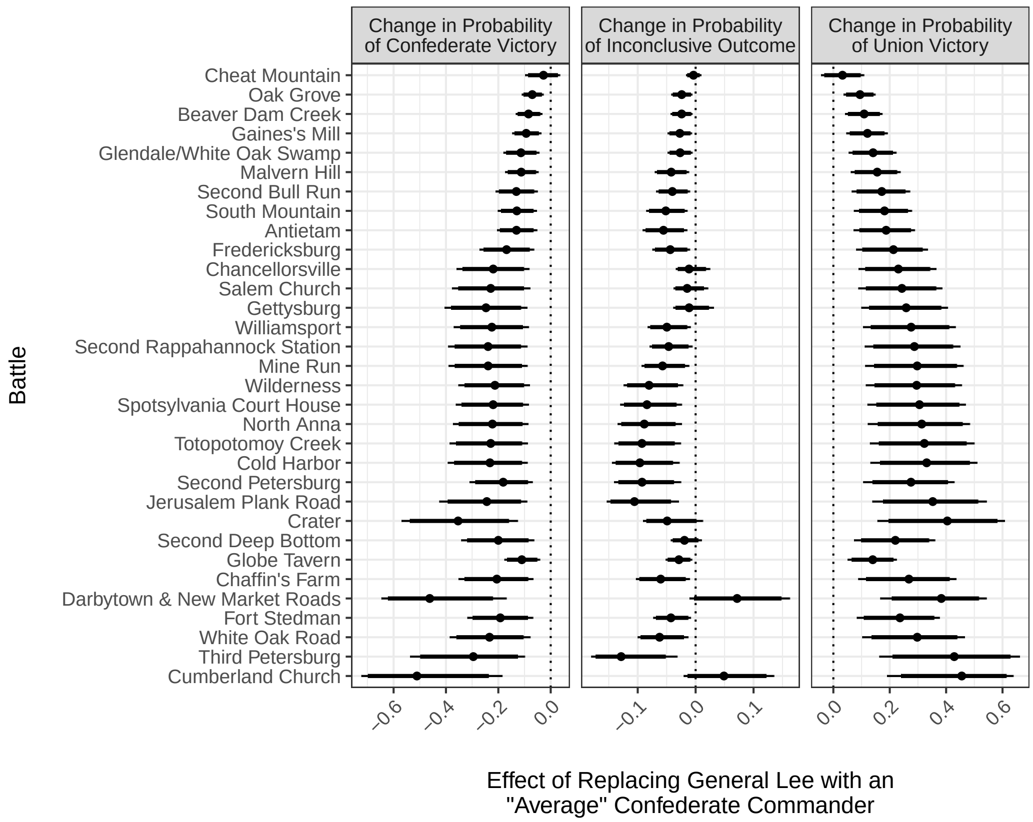


Figure 5: Outcome Probabilities Under General Lee and Average Confederate Commanders

Looking at Lee's results in Figure 5, we note that in most cases, replacing General Lee with an

[26] An average commander is defined as one with mean lifetime-level traits.

[27] For Figures 5 and 6, the estimates are the median changes in predicted probabilities for each outcome over 10,000 simulations, assuming Confederate forces commanded by General Lee or Grant were instead commanded by commanders from the same side who possessed average traits. We include 90% (thick line) and 95% (thin line) confidence intervals.

average Confederate commander would have proved disastrous for the rebel cause. In most cases, it would have resulted in a 10–40-percentage-point decrease in the probability of a Confederate victory, with commensurate increases in the probabilities of Union victories. Results for General Grant (Figure 6) illustrate similar dynamics.

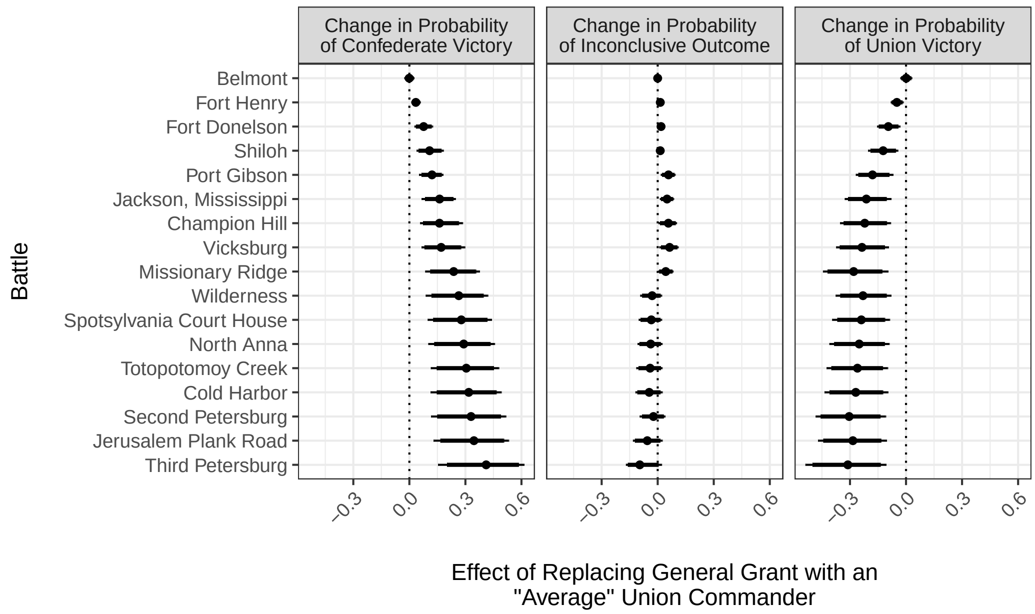
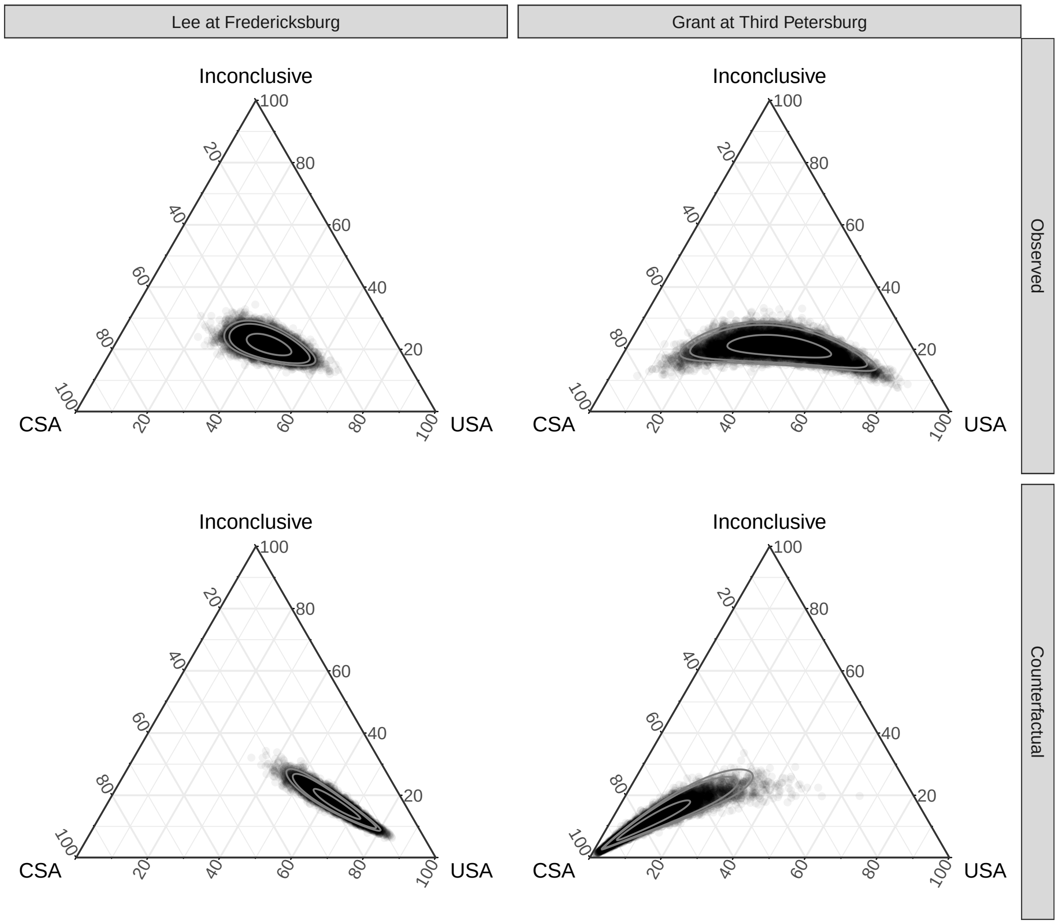


Figure 6: Outcome Probabilities Under General Grant and Average Union Commanders

We can unpack these results further by examining the results of two of the most consequential battles of the war. For Lee, we used the Confederate victory at Fredericksburg. For Grant, we used the Union victory at the Third Battle of Petersburg in 1865, which ended the Siege of Petersburg and immediately led to the capture of Richmond. Ternary plots of simulated outcomes for these battles are presented in Figure 7. Each point represents one set of predicted probabilities, and the rings represent the 50%, 90%, and 95% confidence intervals.

Figure 7 suggests that leadership was critical to Confederate and Union fortunes at Fredericksburg and the Third Battle of Petersburg, respectively. At Fredericksburg, under Lee, the predicted probability of a Confederate victory was about 35.6% (95% CI: [27.1%, 44.9%]); under an average Confederate commander, the probability of a Confederate victory would have been about seven-

Figure 7: Simulated Outcomes Under Lee, Grant, and Average Commanders



teen percentage points lower, at 18.6% (95% CI: [12.4%, 26.6%]). The results for Grant at the Third Battle of Petersburg are similar and suggest he might have helped to turn a probable Confederate victory into a likely Union triumph. Under an average Union commander, the predicted probability of a Confederate victory would have been about 79.4% (95% CI: [49.8%, 93.8%]), with only a 9.7% chance (95% CI: [2.8%, 28.4%]) of a Union victory. However, under Grant, the Confederate win probability declined to 36.1% (95% CI: [16.9%, 61.4%]), and the Union win probability increased to 42.2% (95% CI: [19.7%, 68.0%]), suggesting a more likely Union victory (and the resulting Union victory was critical to the war's outcome).

Overall, these results reinforce our previous finding on the importance of leadership, and illustrate that different leadership during critical stages of the war might have had far-reaching consequences for its ultimate outcome.

Discussion and Conclusion

While previous scholarship has examined military leadership in particular cases, it has not sought broader evidence for the claim. By obtaining commander-level data and identifying traits relevant to leadership quality, we conducted one of the first large-scale quantitative studies of commander quality in combat.[28] Our analysis suggests a number of empirically-observable factors underlying leader competence, and suggests higher-quality leaders generate substantially better outcomes on the battlefield—raising commander competence from one standard deviation below the mean to one above is roughly equivalent to fielding five times as many troops. That our results comport with findings of in-depth qualitative studies of the conflict provides face validity.

We also find a surprising relationship between loyalty and battlefield outcomes. Union loyalty is negatively associated with competence (at least for high-ranking generals), while competence and Confederate loyalty are *positively* correlated. Moreover, we find *no* relationship between Union loyalty and same-side casualty rates, and a *negative* relationship between Confederate loyalty and the same. Given the dominant paradigm, this suggests a need to refine our understanding of executive appointments. Indeed, there might exist situations where the tradeoff is turned on its head, with loyalty *positively* associated with competence. While we cannot ascertain the exact mechanism at this point, scholars of executive appointments might consider self-selection into the pool of potential nominees, large penalties for failure, and reputational effects. Further exploration would shed more light on the mechanisms driving our results, as well as the appointments process more generally.

[28]But see also Reiter and Wagstaff (2017).

Our results point to two additional paths for future work. First, the techniques we used to analyze the relationships between loyalty, competence, and victory can be applied to other situations, given data availability. It would be useful to explore other conflicts, to verify generalizability. A natural starting point might be World War II, using the data analyzed by Reiter and Wagstaff. However, our technique is equally applicable to internal conflicts. Indeed, analyses of the loyalty and competence levels of officers appointed to the upper echelons of a country's military can tell us much about the concerns of the country's leadership—whether threats are expected to be internal or external—and whether the leader is engaging in coup-proofing.

Second, we have omitted consideration of the political contexts surrounding leaders' appointments. Given the apparent breakdown of the loyalty-competence tradeoff for Confederate commanders and its irrelevance for Union commanders, it would be useful to examine which commander qualities were emphasized during the initial appointments process. This is of particular interest because, unlike other many studies of executive appointments, the pool of potential nominees to general and flag officer (GFO) status is reasonably well-defined for both sides. Moreover, such an analysis would illuminate whether our aggregate findings here about the loyalty-competence tradeoff hold for all appointments, or whether the relative emphases on each changed along with perceived chances of victory. This could allow scholars to determine the extent to which experiential learning (e.g., Krause and O'Connell, 2016) influenced the presidents' appointment decisions.

More generally, while providing additional context to the findings here, examinations of military appointments would help executive politics scholars to understand how nominee pool constraints affect the appointments process more broadly. In the present case, since our findings point to differences in the relationship between loyalty and competence for the two sides, we surmise pools of potential GFOs may have been constrained in different ways for the two combatants. Given the different roles played by generals and civilian bureaucrats, it would be interesting to determine whether appointment politics stop at the water's edge.

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Appendix A: Description of Variables in MIMIC Model (NOT FOR PRINT PUBLICATION)

Table A-1: Description of Factors Used in the MIMIC Model

Variable	Variable Name	Description
Competence		
Formative	Military Service	Number of years served in the military.
	Mexican War Experience	Served during the Mexican War.
	Battle Experience	Number of Civil War battles engaged in.
	United States Military Academy	Attended the United States Military Academy.
	Military College	Attended a military college (e.g. The Citadel, VMI, Norwich University).
	Midshipman	Achieved the grade of Midshipman.
	Prewar Elected Official	Served in elected office prior to the Civil War.
	Southern	Born in a seceding state.
Reflective	Command Experience	Served as commander of corps, army, or division
	Top Grade Reached	Highest grade attained to that point; from "None" to "General" (for the Army officers) and "Admiral" (for Naval offices).
	Log Cumulative Win Percentage	Log percentage of battles won when a principal commander.
	Log Cumulative Opponent Casualty Percentage	Log opponent casualty ratio in battles when a commanding officer.
Loyalty		
Formative	*Southern*	Born in a seceding state.
	Border State	Born in a border state (Delaware, Kentucky, Maryland, or Missouri).
	Foreign	Not born in the United States.
	Home-State Lincoln Vote	Home state's vote share for Lincoln in the 1860 presidential election [a].
	Confederate Relatives	Number of prominent Confederate blood relatives (Eicher and Eicher, 2002), weighted by their coefficient of relationship (Wright, 1922), minus the weighted number of prominent Union blood relatives.
	Confederate In-laws	*ibid*, but calculated using the number of prominent Confederate and Union in-laws (Eicher and Eicher, 2002).
	Planter	Planter/Plantation owner prior to the war.
	United States Military Academy	Attended the United States Military Academy.
Reflective	Confederate Commander	Commander in the Confederate military.
	Confederate Partisan Bias	Pro-Confederate partisan orientations [b].
	Confederate Office-holding Bias	1 (−1) if held in an elected office in a Confederate (Union) state and never in a Union (Confederate) state; 0 if never held elected office or served in both Confederate and Union states.
	Peace Conference Attendee	Attended the Peace Conference of 1861.

[a] Zero for foreign-born individuals

[b] The first principal component on variables for whether the individual was a member of the Democrats, Whig, or Republican parties before the war, or had ever been a member of the Free Soil Party. The factor is oriented so that "Republican" and "Free Soil" have negative loadings. Also see Footnote 11

Appendix B: Alternative Specifications (NOT FOR PRINT PUBLICATION)

Table B-1: Latent Traits and Battle Outcomes (Minimum Traits Used)

	Model A-1	Model A-2	Model A-3	Model A-4	Model A-5	Model A-6
Confederate Commander Competence	-0.380^{**}	-0.377^{**}	-0.377^{**}	-0.365^{**}	-0.392^{**}	-0.243
	(0.127)	(0.137)	(0.138)	(0.139)	(0.142)	(0.184)
Union Commander Competence	0.599^{**}	0.531^{*}	0.562^{*}	0.553^{*}	0.597^{**}	0.329
	(0.209)	(0.223)	(0.225)	(0.225)	(0.228)	(0.274)
Confederate Commander Loyalty	-0.106	-0.104	-0.103	-0.026	-0.010	0.109
	(0.117)	(0.118)	(0.118)	(0.241)	(0.243)	(0.272)
Union Commander Loyalty	-0.066	-0.059	-0.055	-0.208	-0.208	-0.305
	(0.112)	(0.113)	(0.113)	(0.281)	(0.282)	(0.311)
Confederate Strength		-0.046^{*}	-0.046^{*}	-0.045^{*}	-0.054^{**}	-0.057^{*}
		(0.019)	(0.019)	(0.019)	(0.020)	(0.024)
Union Strength		0.026^{*}	0.027^{*}	0.026^{*}	0.032^{**}	0.029^{*}
		(0.011)	(0.011)	(0.011)	(0.012)	(0.014)
Confederate Battle			-0.325	-0.324	-0.350	-0.115
			(0.292)	(0.296)	(0.297)	(0.343)
Confederate Commander Loyalty × Confederate Battle				-0.125	-0.139	-0.122
				(0.275)	(0.277)	(0.302)
Union Commander Loyalty × Confederate Battle				0.199	0.198	0.302
				(0.308)	(0.308)	(0.344)
Union Attacker					-0.336	-0.406
					(0.253)	(0.281)
Cutpoint 1	-1.025^{**}	-0.989^{**}	-1.249^{**}	-1.246^{**}	-1.454^{**}	-1.494^{**}
	(0.147)	(0.188)	(0.301)	(0.305)	(0.345)	(0.436)
Cutpoint 2	-0.147	-0.093	-0.350	-0.345	-0.548	-0.484
	(0.134)	(0.179)	(0.293)	(0.297)	(0.335)	(0.427)
AIC	605.734	603.262	604.007	607.181	607.402	621.572
BIC	627.836	632.730	637.159	647.701	651.605	765.231
Log Likelihood	-296.867	-293.631	-293.004	-292.591	-291.701	-271.786
Likelihood Ratio Test	13.843^{**}	20.315^{**}	21.570^{**}	22.396^{**}	24.175^{**}	64.005^{**}
Number of Observations	294	294	294	294	294	294

Note: Ordered logit coefficients presented. Observations are at the battle level. The dependent variable is an ordered factor with the levels being, in order, *Confederate Victory*, *Inconclusive*, and *Union Victory*. Negative [positive] coefficients indicate the covariate is associated with higher probabilities of Confederate [Union] victories. Standard errors in parentheses. Model A-6 includes commander-level fixed effects for those who fought in at least seven battles. Two-tailed tests: $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.1$.

Table B-2: Latent Traits and Relative Confederate Casualty Rates (Minimum Traits Used)

	Model A-7	Model A-8	Model A-9	Model A-10	Model A-11	Model A-12
Confederate Commander Competence	-0.151^{**}	-0.169^{**}	-0.178^{**}	-0.174^{**}	-0.173^{**}	-0.100
	(0.046)	(0.056)	(0.056)	(0.056)	(0.057)	(0.074)
Union Commander Competence	0.223^{**}	0.221^{**}	0.258^{**}	0.249^{**}	0.251^{**}	0.230^{*}
	(0.081)	(0.081)	(0.084)	(0.084)	(0.086)	(0.115)
Confederate Commander Loyalty	-0.283^{**}	-0.281^{**}	-0.285^{**}	0.040	0.041	0.191
	(0.055)	(0.055)	(0.055)	(0.198)	(0.198)	(0.239)
Union Commander Loyalty	-0.036	-0.028	-0.027	-0.047	-0.047	0.035
	(0.051)	(0.054)	(0.054)	(0.157)	(0.157)	(0.193)
Confederate Strength		0.001	-0.000	-0.001	-0.001	0.009
		(0.004)	(0.004)	(0.004)	(0.004)	(0.006)
Union Strength		0.001	0.001	0.001	0.001	-0.002
		(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Confederate Battle			$-0.234^{\dagger}$	-0.138	-0.137	-0.171
			(0.126)	(0.139)	(0.140)	(0.182)
Confederate Commander Loyalty × Confederate Battle				$-0.346^{\dagger}$	$-0.347^{\dagger}$	$-0.401^{\dagger}$
				(0.201)	(0.202)	(0.233)
Union Commander Loyalty × Confederate Battle				0.022	0.022	0.040
				(0.166)	(0.166)	(0.215)
Union Attacker					-0.019	0.055
					(0.114)	(0.121)
Constant	0.068	0.033	$0.244^{\dagger}$	0.171	0.180	0.292
	(0.056)	(0.080)	(0.139)	(0.147)	(0.158)	(0.212)
Quasi-AIC	306.011	307.983	309.020	311.037	312.019	339.457
Wald Test	79.852^{**}	79.544^{**}	82.971^{**}	85.868^{**}	85.606^{**}	137.530^{**}
Number of Observations	294	294	294	294	294	294

Note: Quasi-binomial logistic coefficients presented. Observations are at the battle level. The dependent variable is the proportion of battle casualties from the Confederacy. Positive [negative] coefficients indicate the covariate is associated with higher [lower] ratios of Confederate casualties. Model A-12 includes commander-level fixed effects for those who fought in at least seven battles. Standard errors in parentheses. Two-tailed tests: $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.1$.

Table B-3: Latent Traits and Battle Outcomes (Maximum Traits Used)

	Model A-13	Model A-14	Model A-15	Model A-16	Model A-17	Model A-18
Confederate Commander Competence	-0.270^{*}	$-0.223^{\dagger}$	$-0.221^{\dagger}$	$-0.216^{\dagger}$	$-0.229^{\dagger}$	-0.032
	(0.119)	(0.123)	(0.123)	(0.123)	(0.124)	(0.194)
Union Commander Competence	0.494^{**}	0.479^{*}	0.507^{*}	0.506^{*}	0.532^{*}	0.295
	(0.190)	(0.218)	(0.219)	(0.219)	(0.221)	(0.279)
Confederate Commander Loyalty	−0.075	−0.071	−0.068	−0.060	−0.052	0.106
	(0.106)	(0.107)	(0.107)	(0.244)	(0.246)	(0.268)
Union Commander Loyalty	−0.058	−0.049	−0.043	−0.210	−0.219	−0.259
	(0.109)	(0.110)	(0.110)	(0.293)	(0.294)	(0.321)
Confederate Strength		-0.043^{*}	-0.044^{*}	-0.043^{*}	-0.050^{*}	-0.057^{*}
		(0.019)	(0.019)	(0.019)	(0.020)	(0.024)
Union Strength		$0.020^{\dagger}$	$0.020^{\dagger}$	$0.020^{\dagger}$	0.025^{*}	0.028^{*}
		(0.011)	(0.011)	(0.011)	(0.012)	(0.014)
Confederate Battle			−0.325	−0.322	−0.339	−0.150
			(0.291)	(0.291)	(0.292)	(0.340)
Confederate Commander Loyalty × Confederate Battle				−0.030	−0.033	0.181
				(0.272)	(0.273)	(0.306)
Union Commander Loyalty × Confederate Battle				0.204	0.214	0.270
				(0.317)	(0.318)	(0.350)
Union Attacker					−0.267	−0.381
					(0.249)	(0.281)
Cutpoint 1	-0.993^{**}	-1.051^{**}	-1.309^{**}	-1.306^{**}	-1.467^{**}	-1.674^{**}
	(0.143)	(0.189)	(0.300)	(0.301)	(0.338)	(0.434)
Cutpoint 2	−0.126	−0.169	−0.424	−0.420	$-0.578^{\dagger}$	−0.662
	(0.130)	(0.178)	(0.291)	(0.292)	(0.328)	(0.424)
AIC	610.836	608.784	609.513	612.964	613.810	621.526
BIC	632.938	638.252	642.665	653.483	658.013	765.186
Log Likelihood	−299.418	−296.392	−295.756	−295.482	−294.905	−271.763
Likelihood Ratio Test	$8.741^{\dagger}$	14.793^{*}	16.064^{*}	$16.613^{\dagger}$	$17.767^{\dagger}$	64.051^{**}
Number of Observations	294	294	294	294	294	294

Note: Ordered logit coefficients presented. Observations are at the battle level. The dependent variable is an ordered factor with the levels being, in order, *Confederate Victory*, *Inconclusive*, and *Union Victory*. Negative [positive] coefficients indicate the covariate is associated with higher probabilities of Confederate [Union] victories. Standard errors in parentheses. Model A-18 includes commander-level fixed effects for those who fought in at least seven battles. Two-tailed tests: $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.1$.

Table B-4: Latent Traits and Relative Confederate Casualty Rates (Maximum Traits Used)

	Model A-19	Model A-20	Model A-21	Model A-22	Model A-23	Model A-24
Confederate Commander Competence	-0.210^{**}	-0.209^{**}	-0.213^{**}	-0.213^{**}	-0.218^{**}	-0.041
	(0.043)	(0.046)	(0.047)	(0.047)	(0.047)	(0.075)
Union Commander Competence	0.138^{*}	0.143^{*}	0.166^{*}	0.165^{*}	0.155^{*}	0.066
	(0.067)	(0.071)	(0.076)	(0.076)	(0.077)	(0.116)
Confederate Commander Loyalty	-0.185^{**}	-0.188^{**}	-0.189^{**}	0.144	0.128	0.287
	(0.047)	(0.048)	(0.048)	(0.224)	(0.225)	(0.254)
Union Commander Loyalty	-0.070	-0.070	-0.065	0.035	0.028	0.119
	(0.056)	(0.057)	(0.058)	(0.166)	(0.166)	(0.198)
Confederate Strength		0.001	0.001	0.001	0.004	0.010
		(0.004)	(0.004)	(0.004)	(0.005)	(0.006)
Union Strength		-0.001	-0.001	-0.001	-0.003	-0.001
		(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Confederate Battle			-0.124	-0.033	-0.043	-0.174
			(0.134)	(0.151)	(0.152)	(0.192)
Confederate Commander Loyalty × Confederate Battle				-0.346	-0.335	-0.343
				(0.228)	(0.228)	(0.252)
Union Commander Loyalty × Confederate Battle				-0.110	-0.107	-0.077
				(0.177)	(0.177)	(0.224)
Union Attacker					0.136	0.081
					(0.116)	(0.124)
Constant	0.210^{**}	0.210^{*}	0.323^{*}	0.251	0.189	0.343
	(0.059)	(0.082)	(0.147)	(0.158)	(0.167)	(0.220)
Quasi-AIC	305.704	307.672	308.669	310.672	311.676	339.156
Wald Test	57.420^{**}	57.215^{**}	57.821^{**}	60.071^{**}	61.199^{**}	120.183^{**}
Number of Observations	294	294	294	294	294	294

Note: Quasi-binomial logistic coefficients presented. Observations are at the battle level. The dependent variable is the proportion of battle casualties from the Confederacy. Positive [negative] coefficients indicate the covariate is associated with higher [lower] ratios of Confederate casualties. Model A-24 includes commander-level fixed effects for those who fought in at least seven battles. Standard errors in parentheses. Two-tailed tests: $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.1$.

Table B-5: Latent Traits and Battle Outcomes (Smaller Battles)

	Model A-25	Model A-26	Model A-27	Model A-28	Model A-29
Confederate Commander Competence	-0.533^{*}	-0.434	-0.425	-0.426	-0.423
	(0.266)	(0.274)	(0.276)	(0.280)	(0.289)
Union Commander Competence	0.553	0.241	0.297	0.374	0.372
	(0.368)	(0.400)	(0.405)	(0.413)	(0.416)
Confederate Commander Loyalty	-0.111	-0.134	-0.132	-0.169	-0.171
	(0.150)	(0.153)	(0.154)	(0.295)	(0.295)
Union Commander Loyalty	-0.074	-0.143	-0.143	-0.957^{*}	-0.960^{*}
	(0.155)	(0.163)	(0.165)	(0.457)	(0.458)
Confederate Strength		-0.269^{*}	-0.262^{*}	-0.288^{*}	-0.287^{*}
		(0.113)	(0.113)	(0.115)	(0.118)
Union Strength		$0.147^{\dagger}$	0.163^{*}	0.133	0.132
		(0.080)	(0.081)	(0.083)	(0.084)
Confederate Battle			-0.487	-0.428	-0.427
			(0.383)	(0.396)	(0.396)
Confederate Commander Loyalty × Confederate Battle				-0.117	-0.116
				(0.355)	(0.356)
Union Commander Loyalty × Confederate Battle				1.021^{*}	1.024^{*}
				(0.490)	(0.491)
Union Attacker					0.014
					(0.365)
Cutpoint 1	-0.921^{**}	-0.779	$-1.081^{\dagger}$	-1.280^{*}	$-1.272^{\dagger}$
	(0.265)	(0.539)	(0.592)	(0.616)	(0.650)
Cutpoint 2	-0.022	0.174	-0.118	-0.280	-0.272
	(0.252)	(0.536)	(0.586)	(0.606)	(0.640)
AIC	287.049	282.146	282.507	280.057	282.056
BIC	304.436	305.328	308.588	311.933	316.830
Log Likelihood	-137.524	-133.073	-132.254	-129.029	-129.028
Likelihood Ratio Test	5.471	14.374^{*}	16.012^{*}	22.462^{**}	22.464^{*}
Number of Observations	134	134	134	134	134

Note: Ordered logit coefficients presented. Observations are at the battle level. The dependent variable is an ordered factor with the levels being, in order, *Confederate Victory*, *Inconclusive*, and *Union Victory*. Negative [positive] coefficients indicate the covariate is associated with higher probabilities of Confederate [Union] victories. Battles under analysis are those where the total forces on both sides are at or below the median in our dataset. Standard errors in parentheses. Two-tailed tests: $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.1$.

Table B-6: Latent Traits and Relative Confederate Casualty Rates (Smaller Battles)

	Model A-30	Model A-31	Model A-32	Model A-33	Model A-34
Confederate Commander Competence	0.177	0.154	0.154	0.151	0.154
	(0.144)	(0.143)	(0.143)	(0.140)	(0.142)
Union Commander Competence	0.344	0.211	0.254	0.304	0.296
	(0.209)	(0.220)	(0.226)	(0.221)	(0.225)
Confederate Commander Loyalty	−0.045	−0.096	−0.102	−0.347	−0.349
	(0.095)	(0.095)	(0.096)	(0.224)	(0.224)
Union Commander Loyalty	0.059	0.028	0.041	-1.005^{**}	-1.005^{**}
	(0.086)	(0.085)	(0.086)	(0.338)	(0.339)
Confederate Strength		-0.180^{**}	-0.185^{**}	-0.188^{**}	-0.186^{**}
		(0.051)	(0.052)	(0.051)	(0.052)
Union Strength		0.003	0.005	−0.016	−0.018
		(0.042)	(0.042)	(0.042)	(0.042)
Confederate Battle			−0.227	0.105	0.102
			(0.238)	(0.263)	(0.265)
Confederate Commander Loyalty × Confederate Battle				0.274	0.275
				(0.243)	(0.244)
Union Commander Loyalty × Confederate Battle				1.140^{**}	1.140^{**}
				(0.351)	(0.352)
Union Attacker					0.042
					(0.197)
Constant	0.157	0.636^{*}	0.842^{*}	$0.637^{\dagger}$	0.614
	(0.136)	(0.300)	(0.372)	(0.379)	(0.394)
Quasi-AIC	145.333	147.668	148.662	151.051	152.012
Wald Test	11.375^{*}	23.712^{**}	24.502^{**}	36.884^{**}	36.675^{**}
Number of Observations	134	134	134	134	134

Note: Quasi-binomial logistic coefficients presented. Observations at the battle level. The dependent variable is the proportion of battle casualties from the Confederacy. Positive [negative] coefficients indicate the covariate is associated with higher [lower] ratios of Confederate casualties. Battles under analysis are those where the total forces on both sides are at or below the median in our dataset. Standard errors in parentheses. Two-tailed tests: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{\dagger}p < 0.1$.

Table B-7: Latent Traits and Battle Outcomes (Larger Battles)

	Model A-35	Model A-36	Model A-37	Model A-38	Model A-39
Confederate Commander Competence	-0.345^{*}	$-0.286^{\dagger}$	$-0.288^{\dagger}$	$-0.319^{\dagger}$	-0.336^{*}
	(0.157)	(0.163)	(0.163)	(0.165)	(0.166)
Union Commander Competence	0.630^{*}	0.650^{*}	0.648^{*}	0.697^{*}	0.801^{*}
	(0.285)	(0.313)	(0.313)	(0.317)	(0.322)
Confederate Commander Loyalty	−0.140	−0.137	−0.135	−0.421	−0.336
	(0.181)	(0.184)	(0.184)	(0.678)	(0.681)
Union Commander Loyalty	−0.030	−0.012	−0.011	0.604	0.563
	(0.169)	(0.172)	(0.172)	(0.556)	(0.572)
Confederate Strength		$-0.036^{\dagger}$	$-0.036^{\dagger}$	-0.038^{*}	-0.057^{**}
		(0.019)	(0.019)	(0.019)	(0.022)
Union Strength		0.014	0.014	0.015	0.028^{*}
		(0.012)	(0.012)	(0.012)	(0.014)
Confederate Battle			−0.114	−0.148	−0.231
			(0.483)	(0.504)	(0.511)
Confederate Commander Loyalty × Confederate Battle				0.333	0.231
				(0.701)	(0.703)
Union Commander Loyalty × Confederate Battle				−0.748	−0.692
				(0.588)	(0.602)
Union Attacker					-0.818^{*}
					(0.388)
Cutpoint 1	-1.056^{**}	-1.195^{**}	-1.290^{**}	-1.354^{**}	-1.888^{**}
	(0.202)	(0.265)	(0.485)	(0.505)	(0.575)
Cutpoint 2	−0.198	−0.316	−0.411	−0.464	$-0.977^{\dagger}$
	(0.185)	(0.249)	(0.475)	(0.496)	(0.561)
AIC	331.775	331.557	333.501	334.674	332.029
BIC	350.263	356.209	361.234	368.570	369.006
Log Likelihood	−159.887	−157.779	−157.751	−156.337	−154.014
Likelihood Ratio Test	$8.089^{\dagger}$	$12.306^{\dagger}$	$12.362^{\dagger}$	$15.189^{\dagger}$	19.835^{*}
Number of Observations	161	161	161	161	161

Note: Ordered logit coefficients presented. Observations are at the battle level. The dependent variable is an ordered factor with the levels being, in order, *Confederate Victory*, *Inconclusive*, and *Union Victory*. Negative [positive] coefficients indicate the covariate is associated with higher probabilities of Confederate [Union] victories. Battles under analysis are those where the total forces on both sides are at or above the median in our dataset. Standard errors in parentheses. Two-tailed tests: $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.1$.

Table B-8: Latent Traits and Relative Confederate Casualty Rates (Larger Battles)

	Model A-40	Model A-41	Model A-42	Model A-43	Model A-44
Confederate Commander Competence	-0.236^{**}	-0.258^{**}	-0.271^{**}	-0.269^{**}	-0.273^{**}
	(0.060)	(0.070)	(0.070)	(0.070)	(0.070)
Union Commander Competence	0.143	0.142	$0.189^{\dagger}$	0.173	0.163
	(0.101)	(0.104)	(0.108)	(0.109)	(0.110)
Confederate Commander Loyalty	-0.287^{**}	-0.284^{**}	-0.285^{**}	0.328	0.319
	(0.069)	(0.070)	(0.070)	(0.348)	(0.350)
Union Commander Loyalty	−0.107	−0.094	−0.090	0.138	0.134
	(0.072)	(0.075)	(0.075)	(0.208)	(0.209)
Confederate Strength		0.001	0.000	−0.001	0.001
		(0.005)	(0.005)	(0.005)	(0.006)
Union Strength		0.001	0.001	0.001	−0.000
		(0.003)	(0.003)	(0.003)	(0.004)
Confederate Battle			−0.253	−0.096	−0.101
			(0.166)	(0.198)	(0.199)
Confederate Commander Loyalty × Confederate Battle				$-0.631^{\dagger}$	$-0.623^{\dagger}$
				(0.351)	(0.353)
Union Commander Loyalty × Confederate Battle				−0.260	−0.259
				(0.223)	(0.224)
Union Attacker					0.079
					(0.147)
Constant	0.224^{**}	0.171	0.405^{*}	0.289	0.253
	(0.079)	(0.112)	(0.191)	(0.208)	(0.219)
Quasi-AIC	170.186	172.164	173.180	175.200	176.190
Wald Test	59.346^{**}	58.975^{**}	61.090^{**}	65.087^{**}	64.895^{**}
Number of Observations	161	161	161	161	161

Note: Quasi-binomial logistic coefficients presented. Observations at the battle level. The dependent variable is the proportion of battle casualties from the Confederacy. Positive [negative] coefficients indicate the covariate is associated with higher [lower] ratios of Confederate casualties. Battles under analysis are those where the total forces on both sides are at or above the median in our dataset. Standard errors in parentheses. Two-tailed tests: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{\dagger}p < 0.1$.

Table B-9: Latent Traits and Battle Outcomes (With "Crossover" Variables)

	Model A-45	Model A-46	Model A-47	Model A-48	Model A-49	Model A-50
Confederate Commander Competence	-0.388^{**}	-0.355^{*}	-0.355^{*}	-0.353^{*}	-0.376^{**}	-0.191
	(0.132)	(0.138)	(0.139)	(0.140)	(0.142)	(0.203)
Union Commander Competence	0.630^{**}	0.575^{*}	0.607^{**}	0.600^{**}	0.638^{**}	0.360
	(0.210)	(0.230)	(0.232)	(0.233)	(0.235)	(0.288)
Confederate Commander Loyalty	-0.154	-0.148	-0.151	-0.151	-0.141	0.092
	(0.166)	(0.167)	(0.167)	(0.347)	(0.349)	(0.468)
Union Commander Loyalty	-0.026	-0.010	-0.002	-0.106	-0.115	-0.186
	(0.121)	(0.122)	(0.122)	(0.294)	(0.296)	(0.340)
Crossover Confederate Commander Loyalty	0.110	0.108	0.121	0.354	0.352	0.131
	(0.241)	(0.243)	(0.243)	(0.535)	(0.540)	(0.708)
Crossover Union Commander Loyalty	-0.240	-0.294	-0.304	-8.410^{**}	-8.214^{**}	-9.961^{**}
	(0.312)	(0.313)	(0.314)	(0.161)	(0.161)	(0.172)
Confederate Strength		-0.045^{*}	-0.045^{*}	-0.045^{*}	-0.053^{**}	-0.058^{*}
		(0.019)	(0.019)	(0.019)	(0.020)	(0.024)
Union Strength		0.023^{*}	0.024^{*}	0.024^{*}	0.029^{*}	0.029^{*}
		(0.011)	(0.011)	(0.011)	(0.012)	(0.014)
Confederate Battle			-0.345	-0.406	-0.429	-0.150
			(0.292)	(0.340)	(0.341)	(0.429)
Confederate Commander Loyalty × Confederate Battle				-0.015	-0.021	0.038
				(0.397)	(0.398)	(0.489)
Union Commander Loyalty × Confederate Battle				0.153	0.164	0.260
				(0.325)	(0.326)	(0.384)
Crossover Confederate Commander Loyalty × Confederate Battle				-0.293	-0.294	-0.140
				(0.602)	(0.606)	(0.738)
Crossover Union Commander Loyalty × Confederate Battle				8.110^{**}	7.912^{**}	9.711^{**}
				(0.161)	(0.161)	(0.172)
Union Attacker					-0.305	-0.393
					(0.253)	(0.281)
Cutpoint 1	-1.064^{**}	-1.068^{**}	-1.346^{**}	-1.394^{**}	-1.582^{**}	-1.605^{**}
	(0.159)	(0.200)	(0.311)	(0.343)	(0.378)	(0.516)
Cutpoint 2	-0.185	-0.174	-0.448	-0.492	$-0.676^{\dagger}$	-0.592
	(0.147)	(0.190)	(0.302)	(0.334)	(0.368)	(0.507)
AIC	609.782	607.756	608.349	614.325	614.858	628.727
BIC	639.251	644.592	648.869	669.579	673.795	787.121
Log Likelihood	-296.891	-293.878	-293.175	-292.162	-291.429	-271.363
Likelihood Ratio Test	13.795^{*}	19.821^{*}	21.228^{*}	23.252^{*}	24.719^{*}	64.850^{*}
Number of Observations	294	294	294	294	294	294

Note: Ordered logit coefficients presented. Observations are at the battle level. "Crossover" variables indicate the battle-level mean competence for "crossover" commanders of the indicated side. The dependent variable is an ordered factor with the levels being, in order, *Confederate Victory*, *Inconclusive*, and *Union Victory*. Negative [positive] coefficients indicate the covariate is associated with higher probabilities of Confederate [Union] victories. Battles under analysis are those where the total forces on both sides are at or above the median in our dataset. Model A-50 includes commander-level fixed effects for those who fought in at least seven battles. Standard errors in parentheses. Two-tailed tests: $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.1$.

Table B-10: Latent Traits and Relative Confederate Casualty Rates (With "Crossover" Variables)

	Model A-51	Model A-52	Model A-53	Model A-54	Model A-55	Model A-56
Confederate Commander Competence	-0.210^{**}	-0.228^{**}	-0.238^{**}	-0.233^{**}	-0.233^{**}	-0.107
	(0.048)	(0.055)	(0.055)	(0.056)	(0.056)	(0.084)
Union Commander Competence	0.188^{*}	0.197^{*}	0.243^{**}	0.237^{**}	0.237^{**}	0.290^{*}
	(0.077)	(0.080)	(0.083)	(0.084)	(0.085)	(0.128)
Confederate Commander Loyalty	0.064	0.068	0.077	0.413	0.413	1.179^{**}
	(0.093)	(0.093)	(0.093)	(0.265)	(0.266)	(0.373)
Union Commander Loyalty	-0.015	-0.008	0.005	0.066	0.066	0.028
	(0.060)	(0.061)	(0.061)	(0.167)	(0.167)	(0.205)
Crossover Confederate Commander Loyalty	-0.485^{**}	-0.499^{**}	-0.514^{**}	$-1.334^{\dagger}$	$-1.334^{\dagger}$	-2.076^{**}
	(0.116)	(0.118)	(0.118)	(0.737)	(0.739)	(0.795)
Crossover Union Commander Loyalty	-0.125	-0.086	-0.115	0.155	0.155	0.109
	(0.116)	(0.124)	(0.124)	(1.058)	(1.060)	(1.044)
Confederate Strength		0.004	0.003	0.003	0.003	0.003
		(0.004)	(0.004)	(0.004)	(0.005)	(0.006)
Union Strength		-0.001	-0.001	-0.001	-0.001	0.002
		(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Confederate Battle			$-0.247^{\dagger}$	-0.101	-0.101	0.017
			(0.127)	(0.166)	(0.167)	(0.224)
Confederate Commander Loyalty × Confederate Battle				-0.384	-0.384	-0.721^{*}
				(0.283)	(0.283)	(0.355)
Union Commander Loyalty × Confederate Battle				-0.070	-0.070	0.166
				(0.180)	(0.180)	(0.244)
Crossover Confederate Commander Loyalty × Confederate Battle				0.875	0.876	1.302
				(0.746)	(0.748)	(0.790)
Crossover Union Commander Loyalty × Confederate Battle				-0.258	-0.258	-0.266
				(1.066)	(1.069)	(1.062)
Union Attacker					-0.001	-0.033
					(0.114)	(0.125)
Constant	0.005	-0.042	0.175	0.059	0.059	0.022
	(0.069)	(0.087)	(0.142)	(0.167)	(0.175)	(0.249)
Quasi-AIC	308.213	310.198	311.244	315.210	316.192	343.638
Wald Test	92.161^{**}	92.978^{**}	96.965^{**}	97.067^{**}	96.721^{**}	145.674^{**}
Number of Observations	294	294	294	294	294	294

Note: Quasi-binomial logistic coefficients presented. Observations at the battle level. "Crossover" variables indicate the battle-level mean competence for "crossover" commanders of the indicated side. The dependent variable is the proportion of battle casualties from the Confederacy. Positive [negative] coefficients indicate the covariate is associated with higher [lower] ratios of Confederate casualties. Battles under analysis are those where the total forces on both sides are at or above the median in our dataset. Model A-56 includes commander-level fixed effects for those who fought in at least seven battles. Standard errors in parentheses. Two-tailed tests: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{\dagger}p < 0.1$.

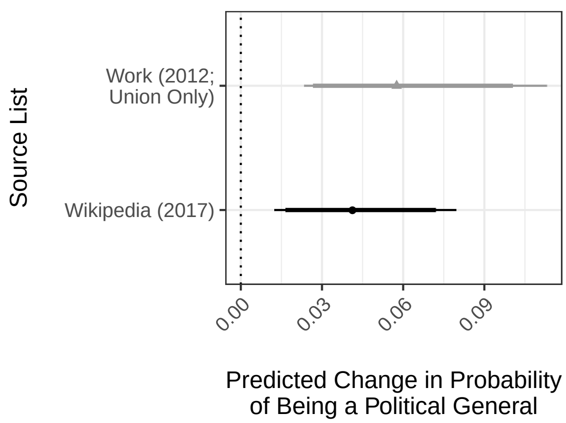
Appendix C: "Political Generals" and Our Measures (NOT FOR PRINT PUBLICATION)

In addition to our assessment of the validity of our competence measure in the main text, we examine the face validity of loyalty here. To do this, we leverage the fact that many commanders were deemed "political generals" and arguably appointed primarily for political purposes. Presumably, these commanders would have higher levels of loyalty, on average. We examine the relationship between loyalty and being a "political general" by regressing indicators of political general status on commanders' mean lifetime-level loyalty scores.[29] We use two indicators of "political general" status—whether a Union commander appeared on Work's (2012) list of Lincoln's "political generals," and whether a commander appeared on Wikipedia's list of "political generals" for the American Civil War.[30] In both logistic regression models, the coefficient for loyalty is positive and significant ($\beta_{\text{Work}} \approx 0.708$, $\widehat{\sigma}_{\text{Work}} \approx 0.201$; $\beta_{\text{Wikipedia}} \approx 0.442$, $\widehat{\sigma}_{\text{Wikipedia}} \approx 0.165$), indicating that more loyal generals are more likely to be seen as "political generals" in contemporary times, regardless of which source is used. Figure B-1 illustrates this relationship graphically, with Figure B-1(a) showing that the probability of being perceived as a "political general" increases by about two-to-twelve percentage points when shifting loyalty from one standard deviation below its mean to one above, and Figure B-1(b) showing the distributions of the two.[31] Between these results and those presented in Figure 1, the congruence between our results and the historical narrative suggests face validity, providing us with confidence that our estimated factors tap into underlying latent dimensions of loyalty and competence. These factors—or traits—in hand, we proceed to a series of empirical models.

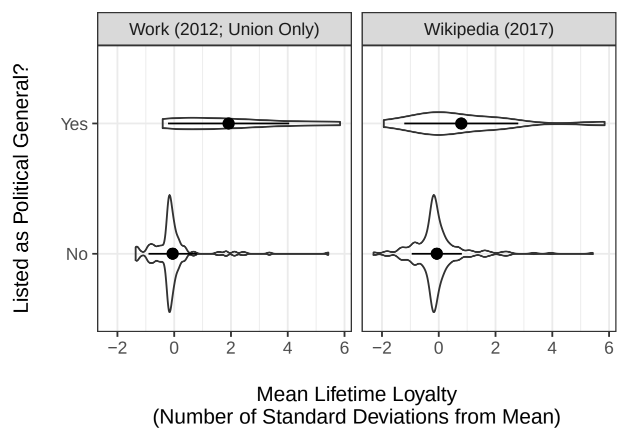
[29] An individual's "lifetime-level" score for a particular trait is defined as the mean of all estimates for a particular trait-individual combination. This lifetime-level aggregation is used here because the model in Table 1 allows for trait-level estimates to vary over time.

[30] The permanent URL for the Wikipedia page is https://en.wikipedia.org/w/index.php?title=Political_general&oldid=802825806#American_Civil_War_2.

[31] In Figure B-1(a), the thin lines represent the 95% confidence intervals, and the thick lines represent 90% intervals. In Figure B-1(b), the dark circles represent the means, and the lines represent the mean +/- one standard deviation.



(a) Effects of Loyalty



(b) Distributions of Loyalty

Figure B-1: Loyalty and "Political Generals"

Appendix D: Brief Description of the MIMIC Model (NOT FOR PRINT PUBLICATION)

In this section, we describe the general assumptions underlying the MIMIC model (Jöreskog and Goldberger, 1975). Though the description provided herein is for the case of single latent variables (largely due to simplicity), and our main analysis has two (loyalty and competence), the same underlying logic is easily applied to the case of multiple latent variables.

Within traditional confirmatory factor analysis (CFA), observed indicators are used to estimate the factor structure of underlying latent variables, with the assumption that the underlying factors are proximate causes of the observed variables. The MIMIC (Multiple Indicators Multiple Causes) generalizes this approach into a structural regression (SR) model, and allows for the factor to both cause observed indicators (the "reflective" indicators) and be caused by other observed indicators (what are deemed "formative" indicators).

Per Jöreskog and Goldberger (1975), suppose that the relationship between a set of observed reflective indicators $y_1, \ldots, y_m$ and an unobserved factor y^* can be defined as

$$\begin{aligned} y_1 &= \beta_1 y^* + u_1, \\ &\vdots \\ y_m &= \beta_m y^* + u_m, \end{aligned}$$

where u_i represents the error terms and $\beta_1, \ldots, \beta_m$ represent the factor loadings between the unobserved factor and the m reflective indicators. Further suppose that the relationship between the observed formative indicators $x_1, \ldots, x_k$ and our unobserved factor y^* can be defined as

$$y^* = \alpha_1 x_1 + \ldots + \alpha_k x_k + \epsilon,$$

where α_i represents the factor loadings between the unobserved factor and the k formative indicators, and ϵ is the error term.

As written, this model is often estimated via maximum likelihood estimation. Importantly, the model is readily extendable to the case of multiple latent factors as well as limited dependent reflective indicators y_i. However, in this case, MLE is often eschewed in favor of weighted least squares with mean and variance adjustment (WLSMV; see Muthén, 1984 and Muthén, du Toit and Spisic, 1997). This approach tends to perform better than other methods when limited dependent variables are included (Brown, 2014, DiStefano and Morgan, 2014, Li, 2016), and more readily allows for the estimation of fit statistics (e.g., CFI, TFI, RMSEA, etc.).

Appendix E: References for Appendices

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