

Mapping rebellion: Networks of civilian and state violence during civil conflicts

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Researchers have increasingly analyzed rebel strategies, or when, where, and how such groups target civilians or the state with violence. Existing studies emphasize rebel objectives, relative power, and the number of co-belligerents fighting the state to explain whether rebels carry out violence throughout the state or within confined areas. Although this area of research is of great interest, a review of the literature exposes two shortcomings. First, research on rebel strategies remains fragmented, with scholars analyzing the actions of a subset of groups but drawing broad inferences on rebel strategies. Second, the scholarship is hindered by methodological issues, particularly in the measurement of rebel movements. We address these issues by examining rebel strategies across all conflicts using a novel spatiotemporal network measure. This allows us to test established theories and explore variations in the effect of strength and the number of co-belligerents on the movements of revolutionary and secessionist groups.

Subnational violence | Civilian victimization | Rebel goals | Network interactions | Spatial networks

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We are grateful to XXXXX XXXXXX, XXXXXX, XXXXX XXXXXX, XXXXX XXXXXX, XXXXX XXXXXX, XXXXX XXXXXX, XXXXX XXXXXX, XXXXX XXXXXX, XXXXX XXXXXX, XXXXX XXXXXX, and XXXXX XXXXXX, as well as the attendees at the XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX panel for their comments and suggestions.

Introduction

The period after the Cold War saw a surge in subnational violence, sparking expansive literature on rebel group behavior, including scholarship on where rebels attack (Bagozzi et al., 2017; Metternich et al., 2017; Sarbahi, 2021), how they coordinate (Asal and Rethemeyer, 2008; Balcells et al., 2022; Dorff et al., 2020; Gade et al., 2019; Steinwand and Metternich, 2022), and when they target civilian populations (Dorff et al., 2023; Levy, 2022; Minhas and Radford, 2017; Stanton, 2015), among other areas of study (Beardsley, 2011; Dorff et al., 2021; Metternich et al., 2013; Osorio, 2015; Sarbahi, 2021). Despite the breadth of scholarship, research on *rebel group strategy*, or when, where, and how rebel groups carry out attacks against the state and civilian populations, remains fragmented. This gap is notable, given that a thorough understanding of how rebel groups select their targets and carry out attacks could help protect civilian populations.

Variations in rebel strategies can be found across conflicts, with groups using differing levels of violence against incumbent regimes and civilians to consolidate power or spread death and destruction throughout states (Buhaug and Gates, 2002; Malthaner, 2015; Ottmann, 2017; Wood, 2014). Indeed, we can even observe wide variation in rebel group strategies among groups engaging in violence within the same state and time. Consider the post-2000 civil wars in the Central African Republic (CAR). In 2002, the Convention of Patriots for Justice and Peace (CPJP) rebelled against the CAR government. The civil war between the CPJP and CAR lasted nearly a decade, resulting in numerous casualties and civilian deaths. The conflict finally ended after both sides agreed to a ceasefire under the condition that the state would grant amnesty to some rebel group members (Agence France Presse, 2011). Yet, less than a year later, a faction of the CPJP joined the Séléka, a new rebel group, to fight against the state. The war between Séléka and the CAR regime ended when CAR President Bozizé fled the country and the Séléka rebel leader, Michel Djotodia, assumed the presidency.

Notably, the CPJP and Séléka used different strategies against the state (Themnér and Wallenstein, 2013). While the CPJP fought the CAR government primarily in the north, Séléka fought the incumbent regime across the country. Likewise, the groups pursued different coercive strategies, with Séléka killing nearly seven times as many civilians as CPJP over the course of their respective military campaigns (Hegre et al., 2020). The variation in how CPJP and Séléka carried out violence is further complicated by their shared characteristics across multiple dimensions. In addition to fighting in the same state during a similar period of time, both rebel groups had similar goals (Braithwaite and Cunningham, 2020), material capabilities (Cunningham et al., 2013), and were fighting in multiparty civil conflicts (Hegre et al., 2020). What, then, accounts for the disparity in rebel group strategy in these conflicts and others?

Scholars have attributed variability in rebel strategies to (a) rebel group goals, (b) rebel group relative strength, and (c) the broader military environment. The first group of researchers analyzed how rebel goals—in particular, whether the rebel group is revolutionary or secessionist—affect their strategy. Broadly, these scholars argue that because revolutionary groups seek to oust the incumbent regime, they move toward the capital and spread violence throughout the state. In contrast, because secessionist groups want to establish territorial control, these groups may be content to oust government forces from disputed territories (Buhaug and Gates, 2002; Fearon, 2004; Kibris, 2021; Uzonyi and Reeder, 2023). Similarly, researchers have found that revolutionary and secessionist groups use different coercive strategies against civilians. Secessionist groups generally use less violence against civilians in the regions for which they seek autonomy, while revolutionary groups more readily use violence against civilians (Kalyvas, 2006).

A second group of researchers underscored the effect of a rebel group’s material capabilities for on determining their strategy. These scholars argue that the ability of a rebel group to successfully extract concessions or topple a state affects its targets and sequence of attacks. With some exceptions (Carter et al., 2022), this literature argues that stronger rebel groups spread their violence

throughout the state, while weaker rebel groups fight within confined geographic regions (De la Calle, 2017; Holtermann, 2016).

The last group of scholars attributed the variability of rebel group strategies to the broader military context. These researchers argue that rebel groups engaged in multiparty civil wars have an incentive to spread out their violence and targets of attacks due to information problems. Specifically, when multiple actors are fighting the state, each rebel group has an incentive to demonstrate its strength and resolve to extract more favorable concessions from the state. This leads rebel groups to wage a broader geographic military campaign against the state as the number of co-belligerents increases (Butcher, 2015; Cunningham et al., 2012).

Although these explanations for when, where, and how rebel groups choose their targets and sequence of attacks have been widely studied and analyzed, the literature faces two critical issues. First, the aforementioned mechanisms have rarely been jointly considered. Instead, scholars tend to theorize and analyze revolutionary and secessionist groups independently. This has led to burgeoning scholarship on each type of civil war, wherein scholars develop similar theories, offer contradictory claims, or outright ignore each other. Given the fragmentation of the literature, it is hard to discern a comprehensive understanding of rebel strategy.

Second, extant research on rebel group strategy also faces several methodological challenges. Foremost among them are issues related to case selection, or lack thereof, and the measurement of the spread of violence. First, previous scholarship on rebel strategy primarily aggregates rebel strategy to the conflict-state level or studies variations in rebel behavior within a single state. While both approaches produce valuable insights, they both have shortcomings. Indeed, large- N analyses may miss the subnational dynamics that drive political violence, while within-state analyses may not be generalizable. Second, previous scholarship has measured the geographic scope of civil war by analyzing (a) whether groups move forward, backward, or side-to-side, (b) whether a group primarily fights the state in rural versus urban areas, and (c) temporal dependencies in rebel actions, such

as how rebel groups’ strategies from last month affect their subsequent actions. Although these approaches have clarified researchers’ understanding of subnational violence, some limitations exist. In particular, these approaches fail to account for the interconnectedness of rebel groups’ spatial movements.

In this project, we endeavor to address both of these issues. To do so, we draw out the underlying connective theory between these bodies of literature that have grown apart and offer a unified understanding of why some rebel groups fight geographically clustered while others attack broadly. Next, we develop a novel spatiotemporal network analytic approach to analyze dependencies between violent events and rebel movements in a spatial plane. Specifically, we examine a group’s violence as a spatial network in which each attack is connected to determine patterns in its clustering—that is, its transitivity or the number of closed triangles within the spatial network at the subgraph level. This approach diverges from previous network analyses of civil conflict that analyze civil wars as a network of actors (Balcells et al., 2022; Beardsley, 2022; Dorff et al., 2022; Gade et al., 2019; Haim et al., 2021; Menninga, 2019; Parkinson, 2013; Sarbahi, 2014, 2021; Wang and Edgerton, 2022).

By bringing together these branches in the literature and developing a new measure, we are able to test extant theories on rebel strategy, operationalized as their networked movement over a spatial grid. In so doing, we offer clarity on how rebel goals, strength, and the broader military environment cause variability in rebel group movements. In addition to unifying the extant theories of rebel strategy, we also test for heterogeneous effects in rebel strategy by target types—namely, whether rebel groups use different coercive strategies when fighting against the state versus civilian populations. This approach is aligned with previous scholarly approaches that have largely analyzed the tactics of secessionist and revolutionary groups as distinct and separate processes.

Overall, our article offers three contributions to research on rebel strategy, intrastate political violence, and quantitative conflict processes. First, we find strong support for the primary claim of these studies—rebel goals, strength, and the broader military environment influence the geographic

spread of civil war. Specifically, groups that are revolutionary, stronger, and fighting at the same time as more co-belligerents tend to spread out their violence across the state, whereas groups that are secessionist, weaker, and participating with fewer, or no other, co-belligerents tend to fight in geographically clustered regions.

Second, we find variability in rebel strategy by goal and target type. In particular, there is wide variation in how revolutionary and secessionist groups carry out violence when attacking the state versus civilian populations. Stronger revolutionary groups are more likely to advance the frontlines and spread out their violence against civilians and the state. In contrast, stronger secessionist groups spread out their violence against state forces, while the effect of relative strength on the spread of civilian violence is indeterminate. Moreover, revolutionary and secessionist rebel groups use different strategies in multiparty civil conflicts. Revolutionary groups in multiparty civil wars spread out their violence against the state but do not carry out wider violence against civilian populations. In contrast, in multiparty civil wars, secessionist groups carry out more geographically concentrated violence against civilians, but spread out fighting against state forces. This analysis provides a deeper and broader understanding of rebel group strategy.

Third, this article demonstrates the utility of the proposed spatiotemporal network measure. In addition to shedding light on rebel group strategy, this measurement approach can be widely applied in studies of political violence, conflict processes, and political science research. Indeed, the spatiotemporal network analytic strategy used in this paper can be adapted to better understand various conflict outcomes, including patterns in state repression, protest movements, and aerial bombarding decisions, among other acts of dynamic political violence. Thus, this approach provides a new measurement and framework for understanding how space, networks, and time affect a host of political outcomes.

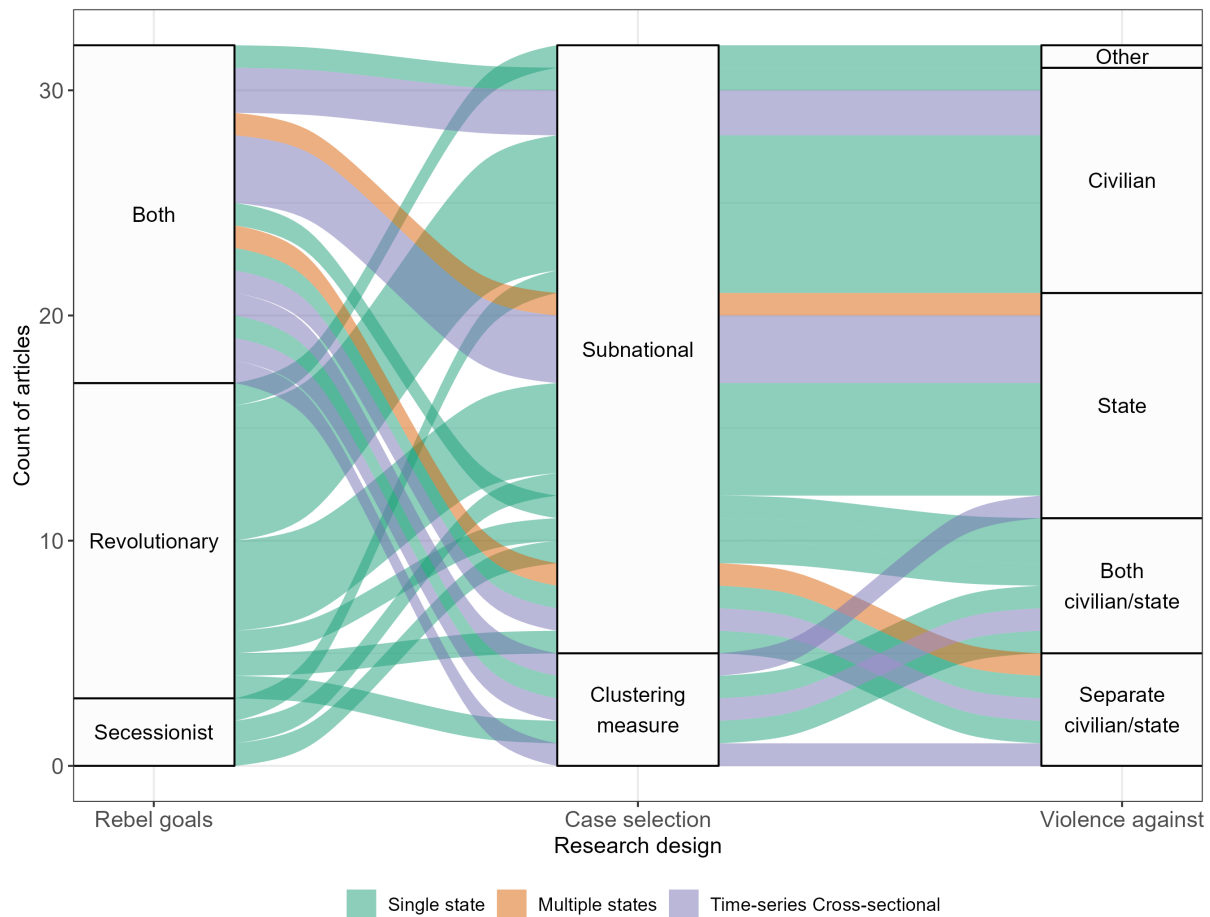


Figure 1: Extant research on rebel strategy, 2011 to 2021, from the *American Journal of Political Science*, *American Political Science Review*, *Journal of Politics*, *International Organizations*, *Journal of Conflict Resolution*, *International Studies Quarterly*, and *Journal of Peace Research*.

Theoretical foundation and argument

Figure 1 illustrates the fragmentation of existing scholarship on rebel strategy by group, unit of analysis, targets, and research methods.¹ First, despite several studies examining differences between revolutionary and secessionist groups, researchers primarily analyze rebel strategy by subsetting groups by goal (column one), with over 50% of studies on rebel strategy analyzing only secessionist or revolutionary groups. Second, although there is literature on the spatial clustering of violence, scholars rarely test the strategic behaviors of rebel groups using clustering measures, with fewer than 20% of studies accounting for the interconnectedness of violent events (second column). Third,

¹See Appendix for articles included in these data.

while there is vast literature on when rebels target civilians rather than the state, extant scholarship generally treats violence against these actors as interchangeable, with only 15% of studies examining the differences in rebel violence against civilians versus the state (column three). Finally, the majority of studies on rebel strategy use a single case to test their theories, with approximately 66% of studies conducting their analysis on a single country.

Here, we further discuss the extant scholarship on rebel strategy outlined above. In so doing, we derive three hypotheses on rebel strategy related to group goals, strength, and the broader military environment that bring together various elements of the existing literature to speak directly to one another. Furthermore, we outline additional analyses of the heterogeneous effects of strength and the broader military environment by group goals when rebels engage in violence against civilians rather than the state. However, we note here in advance that we do not draw specific testable hypotheses on the interactive effects between the main variables of interest, because the literature's fractured nature does not provide a clear expectation to test for these combinations. Instead, we use this initial empirical probe as a way to provide clarity across the various approaches thus far taken. As the present study leverages a novel network measure of violence, we pay special attention to previous research that highlights the utility of network analysis for understanding rebel behaviors (Beardsley, 2022; Dorff et al., 2020; Vega-Oliveros and Koren, 2023; Gade et al., 2019; Haim et al., 2021; Minhas and Radford, 2017; Ravanilla et al., 2022; Sarbahi, 2014).

Rebel goals

Scholars frequently assume that rebel goals help explain why some civil wars expand to engulf a country while others cluster geographically, with scholars primarily examining the differences between revolutionary and secessionist groups. Revolutionary rebels are groups whose primary aim is to oust the incumbent regime and take control of the entire country (see Fearon, 2004), while secessionist groups seek to establish independence from the incumbent regime.

To examine why revolutionary groups spread violence throughout states, scholars have used two mechanisms: (a) capital-ward pushing and (b) violent coalition building. First, the capital-ward pushing mechanism examines why revolutionary groups advance toward the capital of states. Because revolutionary groups seek to oust the incumbent regime, they must fight the state in the capital. However, since rebel groups tend to form in the periphery of the country (Fearon and Laitin, 2003; Larson and Lewis, 2018; Nedal et al., 2020), making this center-ward push often requires revolutionary groups to engage the government across the country at key junctures as they advance toward the capital (e.g., Hammond, 2018; Pettersson et al., 2021). In addition to these dynamics, revolutionary groups may spread violence throughout the state because of military setbacks. Indeed, if the initial advances of revolutionary groups are rebuffed by the state, rebels must detour and find new avenues to advance toward the capital. This causes them to expand their area of operation as they probe alternative routes toward the center (Uclés, 1996).

Second, the violent coalition-building mechanism examines how the messaging of revolutionary groups affects the spread of violence. Specifically, since revolutionary rebels promise regime change, they must craft a message that broadly resonates in a given society—for example, re-establishing a social order that allows greater social mobility (Houle, 2019). In turn, the messaging of revolutionary groups may give rise to coordinated pockets of anti-regime resistance across the country in an effort to destabilize the incumbent regime. Over time, the coalition of anti-regime parties can lead to the spread of war from the front of the initial theatre throughout the state (see also Weyland, 2009; Joshi and Mason, 2008).

In contrast to revolutionary groups, secessionist rebels are groups that aim to gain territorial and political independence from an incumbent regime. Secessionist groups often set the scope of the demand on a historical understanding of their ethnic group’s right to a territorial homeland that is geographically defined (Buhaug and Gates, 2002). To achieve victory, secessionist groups use violence against government agents to drive the state from the defined territory. Notably, because

of the limited aims of secessionist groups, these groups have little incentive to expand the scope of their military campaign throughout the state (e.g., Zhukov, 2012).

Together, the extant research on how revolutionary versus secessionist goals affect the geographic spread of violence leads to our first hypothesis:

Hypothesis 1: *Ceteris paribus*, revolutionary rebel groups will spread their violence more widely within the states they are fighting compared to secessionist groups.

Rebel strength

Other scholarship has examined how relative strength affects rebel strategies and the spread of violence. Broadly, these scholars argue that group goals are endogenous to an organization's attributes. Under this framework, rebel groups set their goals based on their material capabilities. For example, if a group is capable of capturing the whole of the country, it will seek to oust the incumbent regime, while weaker groups will seek to establish territorial control over peripheral regions. Thus, groups with greater relative strength become revolutionary groups, while groups with weaker relative strength become secessionist groups (Buhaug, 2006).

Within rebel strategy literature, competing views on rebel goals versus relative strength are often sidestepped in favor of investigating key features of the group or conflict in either revolutionary or secessionist conflicts. Strength has received significant attention in the study of revolutionary war. For example, scholars have used relative strength to explore the capital-ward pushing mechanism, with researchers arguing that for a rebel group to emerge in the periphery and successfully fight its way to the capital city, it must possess significant arms and fighters (Holtermann, 2016). In contrast, weaker revolutionary groups are likely to either be defeated further away from the capital or accept a deal from the government to surrender their arms.

In contrast to research on relative strength among revolutionary groups, there is a dearth of research on how group strength affects the actions of secessionist groups. This gap may be due to

fuzzy border claims of relative strength and group goals. Indeed, under the relative strength theoretical framework, secessionist rebels may be considered definitionally weak by virtue of their limited claims against the state (Carter et al., 2022). Nonetheless, some studies of civil war demonstrate the importance of rebel strength without differentiating between revolutionary and secessionist groups (e.g., Cunningham et al., 2009; Balcells and Kalyvas, 2014). Furthermore, scholars have noted that secessionist groups are unlikely to initiate conflict unless they have the strength to push beyond their immediate surroundings (Lacina, 2014, 2015).

Despite the fragmentation of the literature on rebel strength by goal, the limited existing research suggests that even if goals are not wholly endogenous to a group’s strength, stronger secessionists are more likely to expand the scope the theatre of their war. This leads to our second hypothesis.

Hypothesis 2: *Ceteris paribus*, stronger rebel groups will spread their violence more widely within the states they are fighting than weaker groups.

Multiparty conflicts

The last group of scholars examined how rebel strategy is affected by the broader military environment. Specifically, civil wars are frequently multiparty in nature, with more than one rebel group simultaneously challenging the government. While there is debate as to whether conflict is contagious between groups (see Forsberg, 2013), scholars studying both revolutionary and secessionist groups generally agree that multiparty wars increase the scope of fighting.

Scholars have offered three explanations for why rebel groups spread out their violence as the number of co-belligerents increases: (a) competition for resources, (b) limitations on the bargaining power of the state, and (c) division of government resources. First, researchers argue that as the number of rebel groups engaged in a conflict against the state increases, so does the probability that the rebels will be able to overrun the government in key locations and achieve victory (Akcinaroglu, 2012). As such, rebel groups engaged in multiparty conflicts are in competition with the others for

resources and followers. To demonstrate their relevance, rebels in multiparty conflicts have an incentive to push out to capture territory (Cunningham et al., 2012). Second, as the number of groups expands, the incumbent government may struggle to bargain effectively with each group. This creates information problems for the regime, faced with determining which rebels are the greater threat and what consequences will result from appeasing some but not others. This information problem creates paralysis within the government and time for the war to expand (Butcher, 2015). Third, governments engaged in multiparty conflicts must divide their forces to confront separate groups. This division of resources emboldens rebels to attack new locations throughout the states (Uzonyi and Reeder, 2023).

Previous research on multiparty conflict and rebel strategies leads to our third hypothesis:

Hypothesis 3: *Ceteris paribus*, as the number of rebel groups engaged in a conflict increases, they will spread their violence more widely within the states they are fighting.

Examining heterogeneous effects

In addition to the main analyses, we examined whether rebel group strength and the broader military environment have differential effects on the strategies of revolutionary versus secessionist groups. Although revolutionary and secessionist rebel groups have been widely studied, there is a relative lack of consistency in arguments related to how rebel strength and the broader military environment may differentially affect the strategic behaviors of revolutionary versus secessionist groups. This research gap is especially pronounced in scholarship related to civilian versus state targeting.

Indeed, research on civilian victimization has highlighted how rebel goals affect civilian victimization; yet, the extant literature on rebel strategy and the geographic spread of violence has generally treated civilian and state targeting interchangeably. The lack of scholarship in this area raises the question: *Does rebel group strategy differ between these revolutionary and secessionist*

groups when they are targeting civilians versus fighting against the state? Due to the lack of research in this area, we examined how rebel strength and the number of co-belligerents engaged in a conflict affect the strategic behaviors of these groups but do not advance a hypothesis.

Data and measurement

We used four sources of data to create the dependent and independent variables: (a) the Global Events Data (Hegre et al., 2020), (b) PRIO-GRID data (Tollefsen et al., 2012), (c) rebel group goals (Braithwaite and Cunningham, 2020), and (d) rebel strength (Cunningham et al., 2013). Data sources a—b were used to create the dependent variable, while all data sources were used to create independent variables of interest.

Measuring the spread of violence

All event data were turned into networked interactions measured as successive conflict events carried out within 50×50 -kilometer regions over the course of each rebel group’s military campaigns. Figure 2 provides examples of how the network measure was derived using the secessionist Abkhaz fighters and revolutionary rebel group al-Shabaab. The first row depicts heat maps of political violence carried out by the rebel groups during their respective wars in Georgia and Somalia. The plots are shaded by the amount of violence carried out in a geospatial region, with darker areas indicating more violent events within a region.

The second row depicts the geospatial event data as network interactions. Rectangles on these graphs correspond to 50×50 -kilometer subnational regions (Tollefsen et al., 2012). In the analysis, we treated the 50 by 50 subnational regions as spatial nodes.² The network is directed and shaded by the sequence of attacks, with the directed edge denoting the sender and receiver nodes, and the edges shaded from the least to most recent attacks. If two attacks were carried out by the same

²In the appendix, we rerun the analyses changing the subnational unit size for each node to 100×100 -kilometers.

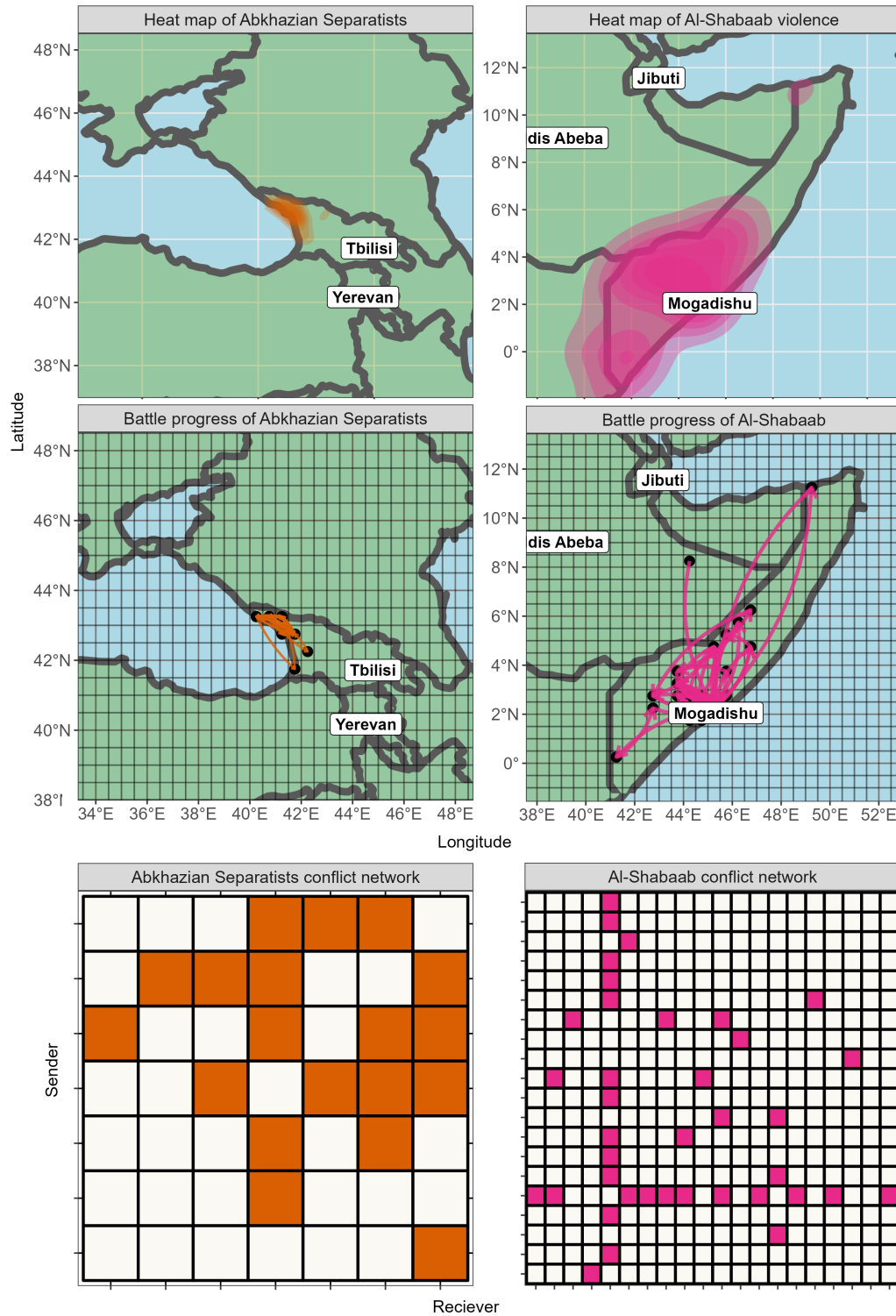


Figure 2: The first row displays heat maps of politically violent events carried out by the secessionist Abkhazian fighters and the revolutionary rebel group al-Shabaab. The second row displays the violence carried out by rebels as a spatiotemporal network. Each node is a 50×50 subnational geographic unit, with edges between regions denoting successive attacks carried out by the group. The last row shows the spatiotemporal network as adjacency matrices.

rebel groups at the same time, we created a directed tie from the sender node to the closest area of the rebel group’s previous attack until all attacks had a unique sender and receiver edge.³

In the third row, the spatiotemporal network is shown as adjacency matrices with the isolates removed. The rectangles are shaded if a rebel group carried out successive attacks from the sender to the receiver subnational unit. In the analysis, all spatial 50×50 -kilometer regions of a state were included as a node if a rebel group carried out 5% or more of its attacks in that state.⁴ For example, al-Qaeda launched attacks in 11 states during the time series. However, we restricted al-Qaeda’s networked movements to only states where they primarily carried out attacks—thus Afghanistan, Pakistan, Saudi Arabia, and Somalia were included in their network because more than 5% of al-Qaeda’s attacks were carried out in those states. In contrast, subnational units in France, Syria, Tunisia, Turkey, the United Kingdom, the United States, and Yemen were excluded from al-Qaeda’s rebel movement network because less than 5% of their attacks were carried out in those states.⁵ To operationalize the spread of violence, we measured the transitivity of rebel movements using the spatiotemporal networks of rebel violence for each group.

Transitivity is the measure of closed triangles in a network. Higher rates of closed triangles within a network correspond to greater transitivity or clustering. Figure 3 displays examples of rebel movements that have low and high transitivity. In cell (a), the rebel group shows low transitivity in its network of violence. Specifically, none of the subgraphs in this example have triadic closure of ties—for example, node A shares a tie with node B, node B shares a tie with node D, but node A does not share a tie with node D. In this example, the rebel group starts at node F and spreads violence across the spatial grid. In contrast, cell (b) displays an example of rebel movements with high transitivity in its network of violence. In this example, the rebel group carries out violence in clustered areas, with several examples of perfectly connected subgraphs of nodes—for example,

³In the appendix, we rerun the analyses but randomize the order of successive networked movements of attacks carried out by the same group and time.

⁴In the appendix, we rerun the analyses changing the cutoff point for a state to be included in the analysis.

⁵In the appendix, we list all rebel groups in the data and what states they are coded as fighting.

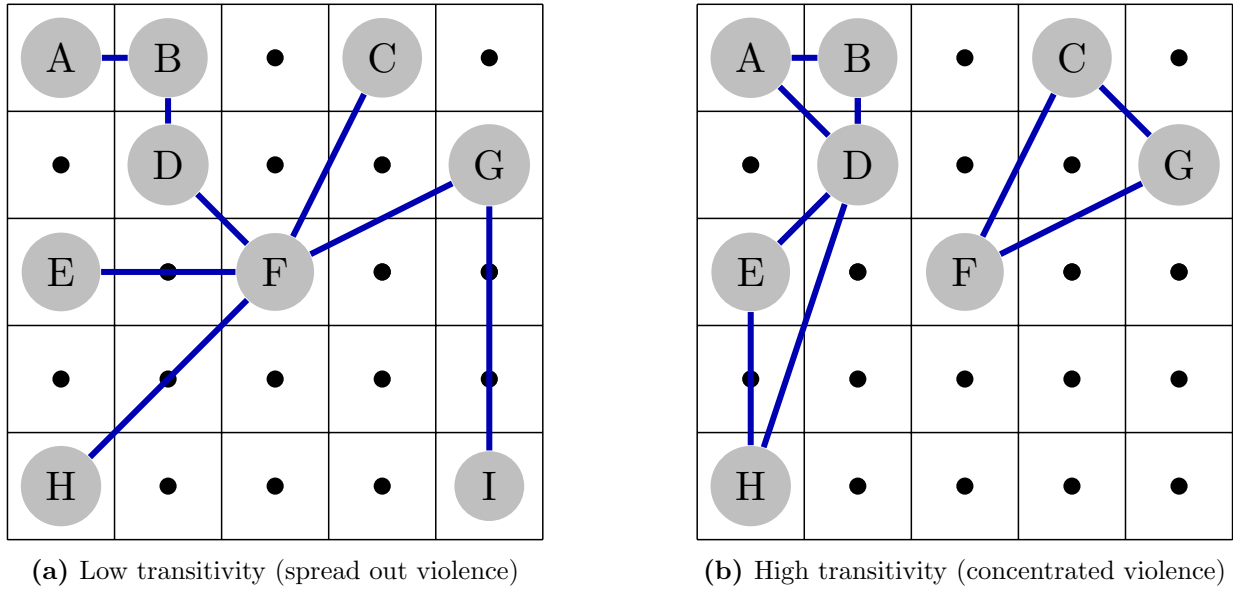


Figure 3: The networks above illustrate low and high transitivity networks over a spatial grid. Cell (a) provides an example of a network with low transitivity, with none of the subgroups having closed triadic ties. Cell (b) displays an example of a network with high transitivity and densely connected subgraphs of nodes.

nodes A, B, and D have triadic closure because they all share ties.

Dependent variable

For the analysis, we calculated the transitivity for each rebel group as the aggregate monthly spatiotemporal networks, using rebel group violence against (a) all actors, (b) civilians, and (c) the state for two reasons. First, it allows us to test whether revolutionary groups, stronger groups, or groups engaging in conflicts with a greater number of co-belligerents spread out their violence—namely, did the rebel movements of these groups have lower transitivity. Second, by breaking down rebel movements against civilians versus the state, we could test for heterogeneous strategic behavior of revolutionary and secessionist groups. Specifically, do stronger revolutionary (secessionist) groups or revolutionary (secessionist) groups fighting in conflicts with more co-belligerents adopt different coercive strategies against civilians versus the state.⁶

Figure 4 provides a descriptive plot of the transitivity in rebel movements by target of attack,

⁶See the appendix for alternate dependent variable model specifications.

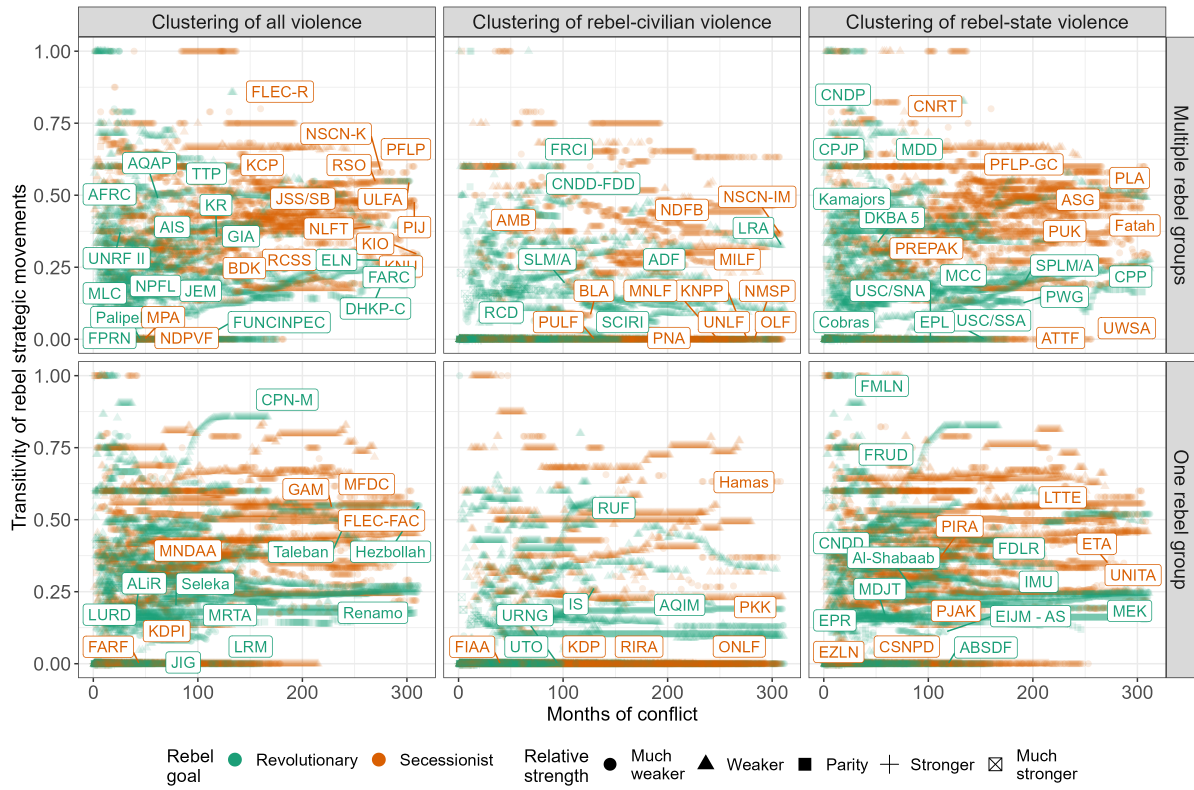


Figure 4: Transitivity of rebel strategic movements over time for all violence, violence against civilians, and violence against the state.

group goal, group strength, and the broader military environment over time. In total, there were 221 unique rebel groups carrying out violence in 67 states. Because the experimental units are the aggregate monthly movements of rebel groups, there were 23,946 unique observations in the data. Table 1 provides further descriptive information on the dependent variables. The transitivity of networked violence is right-skewed, with more rebel groups carrying less clustered violence.

Independent variables

We analyzed three independent variables of interest: (a) rebel group goals (Braithwaite and Cunningham, 2020), (b) rebel group strength (Cunningham et al., 2013), and (c) the number of co-belligerents also fighting the state (Hegre et al., 2020). Table 1 displays the summary statistics of the independent variables of interest.

Table 1: Descriptive statistics of the dependent, independent and control variables.

Variable	Obs.	Min.	First quartile	Median	Mean	Third quartile	Max
Dependent variable							
Transitivity for all violence	23 946	0.00	0.10	0.29	0.29	0.45	1.00
Transitivity for civilian violence	23 946	0.00	0.00	0.27	0.28	0.45	1.00
Transitivity for state violence	23 946	0.00	0.00	0.00	0.11	0.16	1.00
Independent variables							
Revolutionary group	23 946	0.00	0.00	0.00	0.44	1.00	1.00
Rebel strength	23 946	-2.00	-2.00	-2.00	-1.43	-1.00	2.00
Log count of rebel groups	23 946	0.00	0.69	0.69	0.92	1.39	2.89
Control variables							
Log count of military personnel	23 232	0.00	4.16	5.03	5.01	6.01	8.13
Log of state area in km	23 946	7.53	12.37	13.43	13.13	14.07	16.92
No battles	23 946	0.00	0.00	0.00	0.24	0.00	1.00

Rebel group goals

To assess whether rebel group goals affect their strategic movements, we created an indicator variable to identify whether a rebel group’s goals are revolutionary. Rebel groups pursuing regime change or democratization were coded as revolutionary groups, while those seeking to establish autonomous control of a region or independence from the state were coded as secessionist (Braithwaite and Cunningham, 2020). In total, 44% of the observations in our data were revolutionary rebel groups.

Rebel group strength

To assess whether stronger rebel groups spread out violence across the state, we used an ordered categorical variable that measured a rebel group’s relative strength against the state with which it was fighting. Rebel groups were coded as being (a) much weaker, (b) weaker, (c) equal to, (d) stronger, and (e) much stronger than the state they were fighting (Cunningham et al., 2013). In the analysis, we treated the ordered outcome as a numeric variable and centered it at zero, with a mean value of -1.43 for rebel strength, indicating that a majority of rebel groups were weaker or much weaker than the state they were fighting.

Multiparty conflicts

To assess whether the number of co-belligerents affects the likelihood that a rebel group spreads its violence, we used the event data to measure how many unique rebel groups carried out an attack in the same state in a given month (Hegre et al., 2020). Because the count of rebel groups was overdispersed, we log count of rebel groups in the analysis. In total, 46% of the rebel groups were fighting in multiparty civil conflicts.

Control variables

We used the following control variables in our analysis: (a) count of military personnel of the incumbent regime (Singer et al., 1972), (b) square kilometers of the state (World Bank, 2023), and (c) whether the rebel group carried out new attacks during a given period (Hegre et al., 2020). These variables were included to close backdoor effects. Specifically, the count of military personnel, the area of the state, and whether a rebel group carried out an attack within a given month may have an association with both the independent and dependent variables. Thus, controlling for these variables may provide a cleaner estimate of the independent variables of interest. Table 1 displays the summary statistics for the control variables.

Analytic strategy

We used mixed effect regressions for the analysis. The regressions include all relevant predictors and random effects for the rebel group, state, year, and month of the conflict, as well as an offset parameter for the cumulative number of violent events and lagged dependent variables. Furthermore, we allowed for the year and month of the conflict to have random slopes across each state and included a second-order polynomial for year and month of the conflict in all regressions. This approach accounts for within-unit homogeneity and temporal dependencies by rebel groups, states,

years, and months of the conflict and include invariant rebel group and state independent variables.⁷

We ran two sets of regressions. First, we analyzed the full data to test extant theories on how goals, strength, and the number of co-belligerents affect rebel strategic movements. Second, we conducted additional within-group analyses of revolutionary and secessionist groups for their strategic movements against civilians versus the state. This allowed us to measure heterogeneous treatment effects for rebel strength and the number of co-belligerents.

Results

This section reports the results for both sets of mixed effect regressions: (a) analysis of how rebel group goals, strength, and the broader military affect the geographic spread of violence and (b) analysis of variations in how revolutionary and secessionist groups carry out violence against civilians versus the state.

Variations across groups

Table 2 reports the full regression results. Consistent with the extant literature, we found that rebel groups with revolutionary goals, greater relative strength, and those engaging in conflicts with more co-belligerents had a lower clustering of violence within the states they were fighting. Specifically, we observed that (a) relative to secessionist groups, revolutionary groups had less transitive strategic movements; (b) a one-unit increase in relative strength decreased the transitivity of rebel groups' strategic movements; and (c) as the number of co-belligerents increased, the transitivity of rebel movements decreases.⁸ Put another way, rebel groups that are revolutionary, stronger, and fighting in multiparty civil wars are more likely to spread their violence throughout the state, while secessionist, weaker, and groups fighting in a two-party conflict tend to fight in more clustered movements.

⁷See the appendix for alternative model specifications.

⁸The reported effects are from Model 5

Table 2: The effect of rebel goals, strength, and multiparty civil wars on the spread of violence.

	Transitivity of networked violence (spatial clustering)				
	Bivariate (1)	Bivariate (2)	Bivariate (3)	Reduced (4)	Full (5)
<u>Mechanisms</u>					
Revolutionary	−0.60* (0.14)	—	—	−0.47* (0.14)	−0.46* (0.15)
Rebel strength	—	−0.55* (0.09)	—	−0.49* (0.09)	−0.53* (0.10)
Count of rebel groups ¹	—	—	−0.10* (0.01)	−0.10* (0.01)	−0.06* (0.01)
<u>Control variables</u>					
Military personnel ¹	—	—	—	—	−0.07* (0.01)
Square kilometers ²	—	—	—	—	−0.06 (0.07)
No battles	—	—	—	—	0.06* (0.02)
Constant	−4.23 (4.00)	−4.95 (4.55)	−3.74* (0.19)	−4.52 (4.68)	−3.80 (4.70)
Deviance	37691	37730	37190	37591	36189
Observations	23725	23725	23725	23725	23020
Log likelihood	−18845	−18865	−18595	−18796	−18095

* $p < 0.05$. Models 1-5 include group, year, state, month of the conflict random effects. Models 1-5 allow for year and month of the conflict to have random slopes by state. Models 1-5 include second-order polynomials for year and month of the conflict. ¹ independent variable is log plus one. ² independent variable is logged. Models 1-5 include a lagged dependent variable and an offset parameter for cumulative number of battles.

Heterogeneous effects

Table 3 reports the within-group regressions for revolutionary and secessionist groups carrying out violence against civilian populations versus the state. Notably, there are variations in when, where, and how violence is carried out by these groups.

Figure 5 helps visualize the heterogeneous treatment effects of strength and multiparty civil conflict by rebel group goals. Stronger revolutionary groups carry out less clustered violence against both civilians and state forces, with a one-unit increase in rebel strength corresponding to a decrease

Table 3: Rebel strategy by group and target type. We see heterogeneous effects for rebel strength and multiparty conflicts on the networked movements of revolutionary and secessionist groups.

Transitivity of networked violence for:	Revolutionary groups		Secessionist groups	
	Civilian violence (1)	State violence (2)	Civilian violence (3)	State violence (4)
<u>Mechanisms</u>				
Rebel strength	−0.30* (0.09)	−0.27* (0.10)	−0.15 (0.13)	−0.91* (0.19)
Count of rebel groups ¹	−0.03 (0.01)	−0.08* (0.02)	0.03* (0.01)	−0.02 (0.02)
<u>Control variables</u>				
Military personnel ¹	−0.02 (0.01)	−0.13* (0.02)	−0.04* (0.01)	−0.05 (0.03)
Square kilometers ²	−0.13 (0.08)	0.02 (0.07)	0.05 (0.07)	0.08 (0.11)
No battles	0.10* (0.02)	0.11* (0.03)	0.05* (0.01)	0.09* (0.02)
Constant	−0.75 (1.19)	−4.80 (2.63)	−3.30* (1.19)	−6.17 (4.02)
Deviance	9184	15734	4199	18278
Observations	9827	9827	13193	13193
Log likelihood	−4592	−7867	−2100	−9139

* $p < 0.05$. Models 1-4 include group, year, state, month of the conflict random effects. Models 1-4 allow for year and month of the conflict to have random slopes by state. Models 1-4 include second-order polynomials for year and month of the conflict. ¹ independent variable is log plus one. ² independent variable is logged. Models 1-4 include a lagged dependent variable and are offset by the cumulative number of battles.

in the clustering of violence against civilians and against the state. Namely, stronger revolutionary groups spread their violence against both civilian and state targets throughout the state.

In contrast, we see inconsistent results for the effect of strength on the networked movements of secessionist rebel groups. Specifically, stronger secessionist groups carry out less clustered violence against the state, while the effect of rebel group strength on networked attacks against civilian populations is negative but null. Thus, a one-unit increase in rebel strength corresponds to a decrease in the transitivity of violence against the state but an indeterminate effect on the clustering of violence against civilians. Put another way, stronger secessionist groups spread out their violence against the state, while the effect of strength on civilian victimization is unclear.

We can also observe variations in rebel group movements between revolutionary and secessionist groups fighting in conflicts with more co-belligerents. As the number of co-belligerents increases, revolutionary groups see a decrease in the transitivity of violence against state forces, while the effect is negative but null on violence carried out against civilians. In other words, in multiparty civil wars, revolutionary groups spread out their violence against the state, but may not spread out their violence against civilians.

Similarly, we found inconsistent effects for secessionist rebel group strategies against civilians and state forces in multiparty civil wars. Secessionist rebel groups engaging in multiparty civil wars carry out a higher rate of clustered violence against civilian populations but a lower rate of clustered violence against the state, with an increase in the transitivity of networked movements against civilians but a decrease in the transitivity of rebel movements against the state. Thus, secessionist groups fighting in multiparty civil wars concentrated their violence within geographic regions against civilians, but spread their violence out against the state.

Discussion

This article offers three key findings on rebel groups. First, it substantiates and expands upon previous research on rebel goals and strategies. Second, it provides a within-group analysis of secessionist versus revolutionary group strategic behavior. Third, it provides novel insights into the coercive strategic behaviors used by revolutionary and secessionist groups against civilian populations versus the state.

The first finding substantiates an oft posited but rarely tested, assumption throughout the civil war literature that the violence of revolutionary rebels is more likely to engulf a country than that of secessionists due to their differing goals (Kibris, 2021). Importantly, our analysis provides generalized and thorough evidence of the association between rebel group goals and strategy. First, whereas previous research has focused on rebel groups within single states to assess their claims

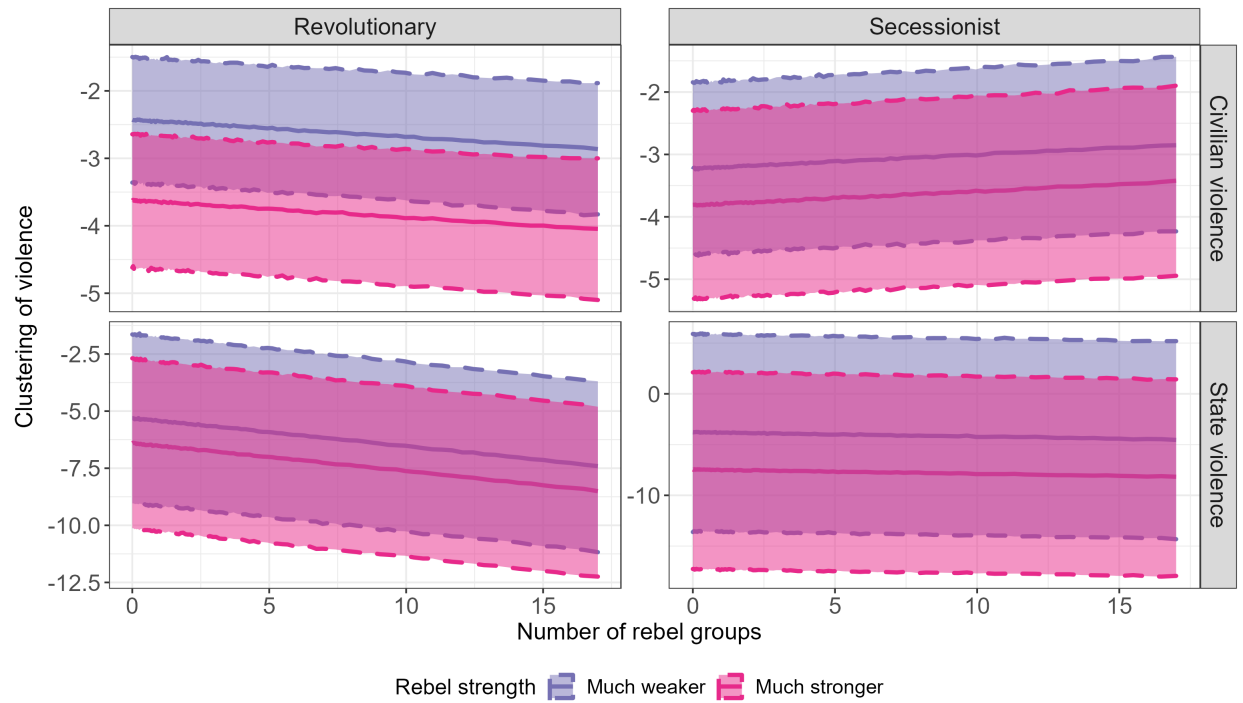


Figure 5: Predicted clustering of violence against civilians for revolutionary and secessionist rebel groups, varying rebel group strength, and the number of other groups engaged in the conflict. There are heterogeneous effects of strength and the number of rebel groups on the clustering of violence for revolutionary versus secessionist rebel groups.

(Holtermann, 2016; Raleigh and De Bruijne, 2017), we have demonstrated an association between rebel goals and strategic movements across 221 rebel groups in 67 states. Second, our novel analytic approach shows that the association between rebel group goals and strategies holds when measuring conflict as an interconnected spatiotemporal measure. This means that while revolutionaries may move forward and backward during a war, they tend to remain focused on expanding the theater of fighting as they increase pain upon the regime (e.g. Hultman, 2009; Slantchev, 2003). Third, we have shown that the effect of rebel goals on their strategy holds when controlling for a rebel group’s strength and the number of other active non-state groups. These patterns indicate that rebel groups’ goals exogenously influence their wartime strategies (Buhaug, 2006), suggesting that these stated preferences are more than “cheap talk.”

The second finding goes deeper to probe what explains the variability in the geographic expansion of violence between groups with similar goals. In particular, we examined how relative strength and

the broader military environment affect the strategic behaviors of revolutionary versus secessionist groups. With respect to relative strength, we found much more similarity between revolutionary and secessionist rebels than previous research has suggested. Regardless of type, stronger groups are more likely to expand geographically against the state. While this finding aligns with the literature on revolutionary (Holtermann, 2016) and secessionist groups (Lacina, 2014, 2015), it hints at a unified logic of rebellion. Put simply, groups capable of carrying out greater levels of violence produce more of it (Fearon and Laitin, 2003). To that end, the finding that stronger secessionists also expand their wars geographically against the state suggests that there is a more strategic answer to the puzzle of why secessionists attack beyond their homelands.⁹ In turn, further research on secessionist groups' incentives for attacking outside their native territories may be a fruitful area of future research.

In a similar vein, we found that multiparty conflicts push both revolutionary and secessionist groups to expand the geographic footprint of their fighting against the state. Thus, once more, we find that revolutionary and secessionist groups are more similar than previous research has suggested. This finding fits with extant scholarship on revolutionary groups, with research finding that multiparty civil wars incentivize revolutionary groups to rush into new territory (see Uzonyi and Reeder, 2023) and reduce the likelihood of a bargain to limit the spread of violence (Butcher, 2015). Although this finding aligns with research on revolutionary groups, it raises some questions in relation to separatist literature.

Research on secessionist groups in multiparty conflicts has found an association between the number of rebel groups and violence between rebel groups (Cunningham et al., 2012). However, because all these parties are fighting over the same contested homelands, it is unclear whether the violence should spiral outward. Our findings suggest that secessionist groups participating in multiparty civil wars spread out their violence against the state rather than becoming clustered

⁹See Carter et al. (2022) for issues surrounding the fuzziness of administrative boundaries and civil conflict.

in space. This may be because groups are forced to seek additional resources, populations, or allies outside the initially claimed area. Alternatively, this could be caused by secessionist groups' attempts to divert government attention (Holtermann, 2019). Although our analysis cannot identify the precise mechanism to explain why secessionist groups engaged in multiparty conflicts spread out their violence against the state, the association suggests a fruitful area for future research.

The third finding contributes to the literature by bringing scholarship on state-based violence together with that on civilian victimization, which is not commonly done in the study of civil war expansion. While each of these diverging branches is venerable and large, scholars studying the geographic scope of civil war have tended to focus on one type of violence or the other. This is particularly true of scholars focused on either revolutionary or secessionist groups. While the former body of findings suggests that these two types of groups display many similar characteristics in their war-fighting strategies, this is not the case when it comes to their decision to target civilians. Indeed, neither of our two variables of interest behaves consistently between groups.

First, consider group strength. We found that stronger revolutionary groups expand the geographic scope of violence against civilians. This finding fits with the literature on revolutionary groups, which finds that when stronger revolutionaries push into new territory, they victimize civilians to establish order (Oswald et al., 2020). However, group strength has a null effect on whether secessionists expand violence against civilians. We offer three potential explanations for the null effect of the strength of secessionist groups and civilian victimization. Specifically, the effect of relative strength on the clustering of violence of secessionist groups may be null due to (a) limited geographical goals of secessionist groups, (b) ethnic homogeneity of contested regions, or (c) strategic interactions between the secessionist group and the incumbent government in contested regions (Wood, 2010). Whatever the reason, we believe this highlights that the debate on whether civilian victimization is a weapon of the weak (Fortna, 2015; Polo and González, 2020) is far from over and much more complex than strength alone. As highlighted by our novel analytical approach, it is

clear that for scholars to fully understand when strength influences civilian atrocities, they must account for the interconnectedness of violent events and geographic proximity.

Second, consider multiparty conflicts. In contrast to previous research (Cunningham et al., 2012; Fjelde and Nilsson, 2012), we found that secessionist groups engaged in multiparty conflicts reveal more geographic clustering of violence against civilians but less against the state. Thus, in this context, secessionists appear to treat civilians and agents of the state as substitutes for one another. This tradeoff is one that scholars have yet to recognize and thus provides ample room for theoretical development. Notably, the effect of more co-belligerents on the geographic spread of violence against civilians has a null effect for revolutionary groups. This is surprising, given that scholars expect revolutionary groups engaged in multiparty wars to spread into new fronts (Butcher, 2015), resulting in renewed civilian victimization (Raleigh and De Bruijne, 2017; Oswald et al., 2020). We believe this finding highlights the need for further theory building, as multiparty competition may lead some groups to bargain with civilians (Rueda, 2017) or constrain groups to their ideological commitments (Stanton, 2015).

Conclusion

Why do some rebel groups fight geographically clustered wars while others fight broadly? Our research provides strong evidence that a group's goals, strength, and the broader military context shape its strategic behavior vis-à-vis when, where, and how it carries out violence. In addition to this finding, we demonstrated that revolutionary and secessionist groups adopt similar coercive strategies regarding state-based violence but diverging coercive strategies against civilians. Thus, the present research findings suggest that the geographic spread of violence against the state is dependent in part on the goals, strength, broader military environment, and the target of attack. In turn, policymakers can use the present findings to identify vulnerable civilian populations more accurately and allocate resources against rebel groups.

In addition to our substantive contributions, we demonstrated the utility of the proposed spatiotemporal network measure of rebel violence. While the present study used this measure to explain rebel group strategic movements, future scholarship can use this process to understand the interconnected nature of other political phenomena, including patterns in state repression (Sudduth and Gallop, 2023), aerial bombing campaigns (Johnston and Sarbahi, 2016), and variations in terrorist targets (Desmarais and Cranmer, 2013), among other issues (Cranmer et al., 2017; Cranmer and Desmarais, 2017; Dorff et al., 2023; Ward et al., 2013).¹⁰

Although this article makes several notable substantive and methodological contributions to the extant research on rebel behaviors and political violence, we wish to note a potential limitation posed by this study. In particular, we identify variations in revolutionary and secessionist strategic behaviors with regard to their strength, the broader military environment, and their targets of attack. In highlighting these patterns, we posited several potential mechanisms to more fully unpack the logic of rebel strategy and the geographic scope of civil war. Notably, we are unable to provide precise evidence for our suggested mechanisms due to a lack of data. Although this is a limitation, we believe that we have provided a framework for future research, data collection efforts, and statistical model development.

This limitation notwithstanding, this article offers a groundbreaking contribution to the existing research on conflict. In particular, we unified the existing scholarship on rebel strategy by providing the first large- N analysis of rebel strategic behavior across groups and states at the subnational level. In addition, we offered the first analysis of the differing coercive strategies employed by revolutionary and secessionist groups against civilian populations versus the state. These findings underscore the utility of the proposed spatiotemporal network measure for understanding dynamic conflict processes. As a whole, our research holds important implications, as preventing and redressing civilian harm during conflicts is not only a policy priority for practitioners, but it is also of paramount

¹⁰In the appendix, we demonstrate the potential utility of this measurement approach for forecasting.

humanitarian significance.

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