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Leadership Decapitation: Volume and Intensity of Terrorist Attacks

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Leadership Decapitation:
Volume and Intensity of Terrorist Attacks

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Abstract

Leadership Decapitation:
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What is the effect of leadership decapitation—the targeted killing or capture of a leader—on the violence levels of terrorist groups? Strong evidence has yet to emerge, as existing literature examines its effect on group degradation, measured as the duration of group existence post-decapitation. However, this outcome variable does not allow us to fully explore the question. Rather than ending the group or not, terrorist groups may utilize higher levels of violence post-decapitation. Instead of simply being ineffective, leadership decapitation may in fact be counter-productive. Building on a principal-agent model as a theoretical lens, I explore the full effects of leadership decapitation. Without the leader's more strategic perspective and assertion of operational control, group operative's more violent preferences are often realized. Yet, without the organization and resources provided by a leader, these mechanistic groups are less efficient in their attacks post-decapitation. Consistent with this theory, examining 42,000 attacks from 133 terrorist groups over 46 years, leadership decapitation has the countervailing effect of a greater number of attacks post-decapitation, but lower levels of fatalities per attack.

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1. Introduction

Mohammed Yusuf founded the group Boko Haram in 2002. For 7 years, the militant group conducted relatively peaceful operations in the name of establishing an Islamic emirate in northwest Nigeria. Amidst police crackdowns in 2009, Yusuf was arrested and subsequently killed. Boko Haram regrouped under the leadership of Abubakar Shekau and starting in late 2010 engaged in increased levels of violence. The group has been responsible for over 1,500 attacks through 2013. They have expanded throughout Nigeria and into Chad, Niger and Cameroon. It has recently pledged allegiance to both al-Qaeda and ISIL, becoming widely known on the international stage.

Leadership decapitation, such as with Yusuf, has long been an accepted counterterrorism strategy, with a reaffirmed commitment to this tactic post-9/11 (Bush 2003). Government officials have posited that targeting and removing leaders who are essential to a terrorist group's activities, whether through arrests or killings, will likely result in organizational collapse. However, as is highlighted in the Boko Haram case, removing the leader of a terrorist group may, rather than resulting in organizational collapse, cause an expansion of violence. In this article I examine the question: What is the effect of leadership decapitation on the levels of violence among active terrorist groups? More specifically, how does decapitation affect the number and the nature of attacks?

In recent years, academics have studied the effectiveness of leadership decapitation. The central research focus has been on whether leadership decapitation leads to a decline in a terrorist group's activity, and ultimately to its collapse. Studies using duration of the group as their dependent variable have found conflicting results (Price 2012; Jordan 2009). But, this dependent variable does not allow an examination of the full effects of decapitation, as it only pertains to whether the group ended or not.

Offering the first large-N analysis of the ultimate counter-productive nature of the leadership decapitation policy, this paper provides a more rigorous study of the phenomenon. As Shapiro (2013) predicts, instead of degradation, as measured through duration, decapitation may in fact lead to higher levels of violence, measured through change in the number of attacks attributed to a group. Leaders are able to control group membership and set operational boundaries, even if preferences for violence among the leader and their operatives do not align. From and agency-theory perspective, this can be explained by the observation that terrorist leaders hold an information advantage over their agents. They better understand the strategic link between a given attack and the longer-run political outcomes. Overall, this "insight" by the leader results in behaviors that are more constrained and focused. Thus, removing a leader could actually lead to violence of a greater scope with groups being left unchecked and hence driven more by ideology and emotion than strategy.

However, offering new insight, leaders also provide stability, resource access, and organization to groups. These qualities, when provided by the leader, allow groups to operate efficiently—or rather to make the most impact per attack. Terrorist groups need media attention in order to survive (Hoffman 2006). High profile attacks on hardened targets or attacks that produce larger numbers of fatalities are thus needed to garner maximum media attention. Examining efficiency through the change in the number of fatalities per attack, leadership decapitation renders groups less efficient. When the leader is removed, while there more be more violence in regards to the number of attacks, their ability to carry out attacks which result in higher numbers of fatalities and thus impact society in a more direct way is paradoxically less. These effects are especially prevalent among larger groups, who were previously tightly controlled by the principal but now have the autonomy to pursue their wide array of interests. Consequently, the results of leadership decapitation renders not just more attacks, but offsetting effects of prevalence versus efficiency overall.

Utilizing data specifically focused on groups that are active, and thus can have an impact on counterterrorism policy, I examine the levels of violence following leadership decapitation. The analysis finds that following decapitation, the relative difference in attack frequency among groups is significantly higher than pre-decapitation. However, groups are less efficient without a central leader, as evidenced by the relative change in fatalities per attack and number of perpetrators per attack being significantly lower than pre-decapitation. Rather than leadership decapitation being ineffective, as posited in other empirical studies and constrained by time and variable definition, this study's findings indicate its effects to be countervailing.

The paper is organized as follows: First, I review previous work on leadership decapitation provide a basic platform and motivation for the research. Second, principal-agent theory and theory on types of organizations are used to explore and explain the inherent tradeoffs leaders make between organizational security and operational control.

This general theory is then use to drive more specific hypotheses that both challenge and support leadership decapitation theories. A methods section examines both the structure of the research as well as provides a discussion on the characteristics of the data, its inherent limitations, and the motivation for the choice of dependent variable (i.e., the relative frequency of attacks, rather than group duration). Finally, a discussion section focuses on why this new finding has a profound impact on the current research agenda and counterterrorism policies.

2. Existing Literature

Building on the theoretical foundation that terrorist groups rely on the charisma and organizational routine provided by their leaders in order to remain strong and effective, leadership decapitation has long been a popular counterterrorism strategy among policy makers. When leaders are removed, the organization's effectiveness and capabilities are disrupted. According to the National Security Strategy put forth by President George W Bush, removing the most highly skilled and able member of the group has negative effects, ultimately degrading the group until they cease to exist. The resulting power vacuum either render remaining members prone to infighting, or inspires fear, resulting in as others being reluctant to step into the leadership void. Furthermore, because of the clandestine nature of these groups, their processes are not often codified. Groups are highly reliant on their leader in order for the group to function. When the leader is removed, therefore, the group is thought to be highly susceptible to collapse (Bush 2003).

Accordingly, with the stakes of leadership decapitation so high, studies have been conducted to assess its effectiveness. Cronin, in qualitatively looking at how terrorist groups end, finds several cases, such as the Real Irish Republican Army and Aum Shinrikyo, in which leadership decapitation has been ostensibly successful in ending groups. However, as decapitation is not always successful in ending groups, Cronin calls for more work to be done on leadership decapitation cases in order to provide further insight (Cronin 2006). Further case studies, all using Israel and Palestine as the case study, have yielded conflicting results. Some found targeted killings of the group's leader effective in degrading groups' capabilities to carry out attacks, while others found no meaningful impact on violence in Palestine (David 2003; Hafez and Hatfield 2006; Byman 2006).

Quantitatively motivated studies also rendered inconsistent findings. Many have found groups to be relatively unaffected by decapitation, in that groups neither radicalize, disband or divide after decapitation (Langdon 2004; Mannes 2008). Without an empirical consensus on the effect of leadership decapitation, scholars have looked at key differences in group characteristics as a way to explain the varying results. These differences include whether the leader was captured or killed, the age, size and structure of the group, and the ideology of the group (Cronin 2008; Ganor 2005; Arquilla 2001; Price 2012; Jordan 2009). Others have looked at target selection post-decapitation, finding groups select more indiscriminate targets such as civilians (Abrahms & Potter 2015). Still, even with the inclusion of these variables, no clear picture exists.

Though not empirically tested, some have suggested that decapitation, rather than degrading a group, can increase members' resolve and result in calls for increased violence as retaliation (Jordan 2009). Citing "Martyrdom Effects," decapitation can further aid in recruitment efforts, as the leaders are turned into martyrs, with their image inspiring recruits to join in their honor (Byman 2006). Martyrdom Effects cannot stand on its own, however, as a predictor of increased violence or recruiting for two reasons. First, it tacitly assumes that the leader was well known and popular thereby making decapitation unwelcomed by the group. Without that status, the loss of a leader has little effect. Second, it relies on emotion as the driving force behind the terrorist group's subsequent actions (Johnston 2012). Yet, most scholars acknowledge that terrorists act out of strategic calculation—rather than pure emotions (Pape 2005; Kalyvas 2006; Abrahms 2008). Without these conditions, the impact of leadership decapitation is left with a weak theoretical base.

Jordan and Price provided the most comprehensive empirical tests to date on the effect of decapitation, examining 96 and 207 groups, respectively. Both focused on the duration of a group—or how long groups exist post-decapitation—as their dependent variable. Jordan examined the short term effects of decapitation, looking at a time horizon of duration two years after attack. Price examined the longer-term effects, with an indefinite time horizon within a 49 year period (1970-2008). Ultimately, Jordan and Price found conflicting results. In the short term, Jordan found there was little meaningful effect on duration after decapitation. Conversely, Price found that decapitation significantly increased the mortality rate of terrorist groups in the long term (Price 2012; Jordan 2009).

While these pivotal studies made significant inroads into the question of leadership decapitation effectiveness in ending groups, they only examine effectiveness in one way. The addition of relative number of attacks and fatalities adds richness to any explanation of decapitation effectiveness. Duration only explores one side of effectiveness. The change in attack levels will both allow us to capture the duration of a group, but also to examine levels of violent activity within the group. Fatalities will further examine the violence level of groups and facilitate the expansion of the general question addressed in previous work to include continued existence, effectiveness and *efficiency* of these groups pre and post-decapitation. This will allow for a fuller assessment of the impact of leadership decapitation by not only focusing on the question of: does the group merely exist or not? Rather than only looking at whether leadership decapitation leads to the demise of a group, we can test whether the inverse is true and decapitation conversely leads to higher levels of violence and lower levels of efficiency.

With such varying results and a lack of theoretical consensus, some scholars have integrated a principal-agent framework in order to generate a more robust theoretical underpinning for the effects of decapitation. With terrorist groups, an inherent dilemma exists because principals, or the leader, must balance the need for control over how violence is executed with the more violent preferences of their agents, or operatives. For example, Iran has long been a state sponsor of terrorism undertaken by Hizballah. Iran delegates to Hizballah to carry out illicit attacks in order to advance Iran's foreign policy goals. Iran is able to deny involvement and avoid political retaliation while Hizballah receives resources to help it survive (Byman & Kreps 2010). However, Hizballah is more willing to undertake mass casualties than Iran prefers (Byman 2005). Iran, in turn, tempered its support and resources until Hizballah's ideology aligned with its own and Hizballah only undertakes attacks with Iran's blessing (Kramer 1993).

These dynamics can also be seen within terrorist groups. The leader of a respective group ultimately constrains the violence the group undertakes operationally. In exerting operational control over their operatives, the leader must use tools which render the group vulnerable to organizational security breaches and increase the likelihood of the group being compromised (Shapiro 2013). Survival is the ultimate goal of any terrorism group, making organizational security that increases the probability of survival essential (Crenshaw 1987). An important ingredient to realizing this security is strong operational control. Thus, a tradeoff emerges signaling whether organizational security or operational control is dominant. Leadership decapitation severs operational control exerted by the leader and forces a focus on organizational security. This creates a vacuum in which operatives' more violent preferences can be realized (Ibid.).

Yet, leadership decapitation ultimately has two countervailing effects. Using a principal agent model, it can be predicted that groups will overall have a higher number of attacks post-decapitation. But, the other dimension of efficiency of these attacks has yet to be examined. Whether the attacks post-decapitation are of the same nature as attacks pre-decapitation is unclear. Decapitation may have a profound impact on a group's abilities to carry out well-organized, larger-scale attacks. Furthermore, principal-agent frameworks have, as of yet, only utilized case studies and qualitative work. No empirical, cross-national quantitative studies have been undertaken.

Overall, the research designs of previous studies have not allowed us to examine leadership decapitation fully. Using a sample that only includes active, impactful groups and a dependent variable that measures group's relative levels of violence and efficiency allows us to understand and test the deeper dynamics of leadership decapitation. I build a comprehensive, cross-national, large-n study that will test the implications of operational control (and its loss), and help build insight into how the interaction between organizational security and control plays out post-decapitation. Specifically, while previous work suggests that groups may become more violent after decapitation, further work is needed to determine if they are also less efficient i.e., produce relatively less fatalities per attack thus weakening their strategic impact. The following section lays out the theoretical path taken that both rationalizes this insight and sets the platform for additional theoretical inquiry.

3. Theory

Principal-agent theory has long offered insights into preference divergence and information asymmetry in relationships. The principal, or actor who holds the authority, forms one side of the relationship while the agents, or the side who have the informational advantage, form the other. The principal must align the interests of the agent with their own. A failure to do so will result in agency costs, or the losses the principal incurs by having the agents follow their own self-interests (Miller 2005).

In the case of terrorist groups, within each group, there are two sets of actors: the principal, or terrorist leader who sets the operational boundaries for the group, and his agents, or ground operatives who carry out attacks. Each can be considered a "rational actor," trying to optimize their own position. However, they can have divergent preferences that are rooted in a set of internal dynamics focused around information processing. The agents, who are on the ground, receive different information. The principal, conversely, is tasked with utilizing the information he has received to ensure the group's survival. More specifically, the principal and agent both scan for and interpret information they get in different ways and for different motivations. Or rather, how they make sense of incoming information differs. Agency costs occur when the leader's preferences for more constraint on group violence are overtaken by operative's more violent preferences.

Agents receive tactical information because they are interacting on the ground. They may see the potential for a greater amount of attacks in order to achieve shorter term goals (Shapiro 2013). Agents are more likely to have had friends lost on the front lines, incentivizing them and creating a motivating lens to conduct more attacks (Moghadam 2006). Furthermore, many were recruited because they have a particular, violent skillset or desire which they want to put to use (Shapiro 2013). This both shapes the nature of the information scanned for and the understanding that is created around that information. Overall, agents have a higher propensity for violence, look for information that promotes that preference, and engage in information processing that both reinforces and drives that desired outcome, resulting in more attacks if their preferences are realized.

Conversely, the principal is motivated to map any attack to a set of political outcomes. They receive an aggregation of information from operatives and vantage point that allows them to see the whole picture. Because of their role and perspective, they are better at understanding these political impacts of attacks and is interested in longer-run outcomes. They think in a more strategic manner, focused on group survival, are more attentive to information that supports that desired result, and ascribe more “strategic” sense to the information to which he is exposed. Principals engage the group around the need for constraint of violence, both in order to remain unknown to government forces and to mitigate the risk of alienating potential recruits or sympathizers (Ibid.). Thus, the principal’s road to survival is paved by both a need to control and an urgency for lower levels of violence. Though the principal and the agents differ in their strategy, it is the principal who has primary influence over this strategic agenda—resulting in more constraint on violence and a lower number of attacks.

Leadership decapitation forcefully removes the principal from this equation. With the principal's removal, operational control is subsequently greatly reduced, thus allowing the agents' preferences to become dominant. Accordingly, we can expect to see an increase in violence as the agents' more radical preferences for a greater number of attacks are realized.

HYPOTHESIS 1A: Leadership decapitation results in a relatively higher attack frequency among a groups compared to their activities before decapitation

Some groups experience multiple decapitations through their lifecycle. This further exasperates the control any leader (or replacement) can exert on the group's actions, thus rendering more extreme realizations of the agent's preferences.

HYPOTHESIS 1B: Multiple leadership decapitations results in a relatively higher attack frequency among groups when compared to groups that experience only one decapitation

However, some may argue that a group with a second-in-command who can fill the void, rendering the group with a continued strong leader who can impose punishment to member's who deviate or with strong charisma which results in member's following his path, will result in leadership decapitation being ineffective. This is not the case in this principal-agent overview and the efficient realization of strategic outcomes that it suggests. Leadership decapitation signals a government crackdown, forcing a shift from a focus on operational control to organizational security regardless of the group's current leadership. In this time of crisis, the second-in-command will not be able to exert the same control as the previous leader.

Offering new insight, while the relative number of attacks may increase post-decapitation, the group is rendered less efficient. Without the strategic thinking of the principal, the group is constrained with respect to well-planned, multi-dimensional, outcome-driven attacks that kill great numbers of people and garner international attention, such as 9/11 or 7/7. Thus, the amount of fatalities per attack will be lower post-decapitation.

Pre-decapitation, the group can be defined as a "mechanistic organization." They have a leader who undertakes operational control and sets the strategic agenda. A mechanistic organization is defined by its structure, formalization and centralization. The structure is complex, with each cell undertaking a specialized task. These tasks are formalized by a set of organizational rules. The relative stability and security of a mechanistic group facilitates a governance model in which a centralized leader exerts authority and operational control. Efficiency is promoted because the group runs like a machine, with each part of the organization doing their formalized job to promote a strategic outcome (Burns & Stalker, 1961).

When the leader is lost, this mechanistic efficiency is greatly reduced. While the number of attacks may increase, the total fatalities per attack will be less as each attack is intended to promote the motivations of the agents, not the principal. The operatives now set the agenda, but their dearth of organizational resources and strategic guidance means the cells within the organization are no longer working together to produce efficient, planned, and grand attacks. The operatives prefer a larger number of attacks, but they are ultimately prone to smaller-scale attacks.

HYPOTHESIS 2A: Leadership decapitation results in a relatively lower total fatalities attributed to a group per year compared to their activities before decapitation

Again, multiple decapitations within one group should exasperate the limits on their efficiency, such that:

HYPOTHESIS 2B: Multiple leadership decapitations results in a relatively lower total fatalities attributed to a group per year compared to groups that experience only one decapitation

So far, the agents have been treated as a unitary actor. However, there most likely exists a heterogeneous pool of actors that make up the lower-rank members of any group. While on average, they prefer more attacks compared to the leader yet are less competent, there certainly may exist differences in preferences and ability within any group's ranks. Some align with the leader, while some differ.

Group size is one proxy for heterogeneity of the agents. A larger group should be more heterogeneous. The leader should also, theoretically, be able to exert more control over a larger group because the costs of building a new group of agents is so high (Hawkins et al 2006). Because of the clandestine nature of terrorist groups, members are not easily replaceable. In smaller groups, the agents know few options for replacement are available and thus already have more autonomy over their actions. However, in larger groups, the threat of screening and selection can still work as a control mechanism (Ibid.).

Thus, when a leader is eliminated in larger groups, we should see a greater ability for the agents' preferences to take over. Even with diverse interests, on average, largest groups should be the most likely to increase their attacks.

HYPOTHESIS 3A: Leadership decapitation results in a relatively higher attack frequency among a the largest groups compared to the activities of smaller groups experiencing a decapitation

Larger, heterogeneous groups should also have the most variety of skills and vision among their agents. Thus, on average, they are the least competent post-decapitation, such that:

HYPOTHESIS 3B: Leadership decapitation among the largest groups results in a relatively lower total fatalities attributed to a group per year compared to the activities of smaller groups

4. Research Design

Sample

The study sample includes the 133 active terrorist groups during the period of 1970-2015 which committed 4 or more attacks during their lifecycle and have had at least one attack which resulted in a fatality. This threshold of attack frequency and fatalities, as used in previous studies, ensures that these groups are legitimate threats. They have committed more than only a few minor attacks, and thus will be able to affect a state's counterterrorism policies. This sample is appropriate for addressing the research question that engages both the effectiveness and possible ramifications of the leadership decapitation policy. Including groups that are essentially inactive, and thus do not impact counterterrorism policies, does not accurately allow for the research question to be answered.

The dataset further excludes groups in which the decapitation occurred before 1970, as the inability to capture their attacks prior to decapitation would affect accurate measurement of the dependent variable. Of these 133 groups, 60 never experienced a decapitation. This provides a baseline to establish if groups that experience a decapitation are systematically different than those who do not.

To gather information on attack frequency and the number of fatalities per attack, data from the GTD database was used. With previous literature focusing on duration, the effectiveness of leadership decapitation can only be measured in the negative: The group can only be assessed as either declined or collapsed. Attack frequency allows for assessment of the group based on both whether the group declined in activity after decapitation, as well as if they increased in activity and fatalities. Thus, we can assess if decapitation can be assesses as to whether it is counterproductive, rather than just ineffective. With over 42,000 attacks across the 133 groups, the number of attacks per group per year (1970-2015) was calculated. At the group-year unit of analysis, the number of observations is 2,510.

DEPENDENT VARIABLES

Attacks is a count variable of the total attacks attributed to a given group in any year. The number of attacks per year was first determined using the GTD database. The starting date for each group-year observation is the year in which they first have an attack. The ending year is the last year of attacks after they have gone 3 years without an attack. Efficiency is measured using the proxy of a count of fatalities per attack, labeled *Fatalities*.

Because both *Attacks* and *Fatalities* are count variables, I use an event count model. Poisson models assume observations are independent, which is not tenable here, as groups may be more likely to utilize terrorism when they have successfully utilized it in the past. Since the event count variables of attacks and fatalities are dependent and also over dispersed, with a great variance in the number of attacks by a group, I utilize a negative binomial model. I also include robust standard errors clustered by year to address any potential problems with heteroskedasticity and serial correlation (Greene, 2002). I present both Random and Fixed effects models. Fixed effects are included to account for the time invariant factors in the groups and for the general upward trend of groups pledging. Fixed effects generates a "within" estimator, such that results can be interpreted as a unit increase in the explanatory variable yielding a change in the dependent variable, within each given group. It is not the overall change in violence, but the change within each group.

Key Independent Variable

Several key independent variables are used. First, *Decap* is a dichotomous variable used to compare groups that experienced a decapitation against ones that did. It represents the change from the years prior to decapitation to the years post-decapitation, among groups that at some point in their lifecycle experienced a decapitation.

Second, to assess the sample as a whole, groups that never experienced a decapitation are compared to groups that did experience a decapitation. *No Decap* and *Post Decap* are compared to the reference group *Pre Decap. No Decap* represents the expected attacks or fatalities by groups that never experienced a decapitation. *Post Decap* represents the years after a group experiences a decapitation. Both are compared to *Pre Decap,* which measures the years prior to a group's first decapitation. The comparison to groups that never experienced a decapitation is important, in order to examine if these two types of groups (never decapitated and decapitated) are systematically different.

Lastly, the number of decapitations experienced by a group is utilized as a factor variable. Groups that experienced multiple decapitations (*2 Decap, 3 Decap, 4 Decap)* are compared to the reference category of groups that experienced 1 decapitation.

CONTROLS – GROUP LEVEL

Religious.

Jordan found that religious groups are highly resilient to decapitation, while ideological (such as left-wing) groups were especially prone to collapse (Jordan, 2009). Ideology is measured with a dichotomous variable, with religious groups measured as (1) and ideological (such as left-wing) or nationalist/separatist groups serving as comparisons (0) (Ibid.).

Killed.

Scholars have debated whether capturing or killing the leader has an impact on a group's decline. It is argued that arrests are more effective, as they demoralize the group and demonstrate the state's powerful rule of law (Cronin, 2008). Others argue killing is more effective, as it acts as a deterrent, signally future leaders will find the same fate (Ganor, 2005). This variable, which serves as a measurement of the specific means of decapitation, is measured with (0) as captured and (1) as killed (Price 2012).

Group size.

It has been posited that larger groups are better able to withstand decapitation, because they have more resources to overcome state's counterterrorism strategies (Jordan, 2009). Size is measured according to Price's data, which can only be estimated in four buckets: fewer than 10, 10–99, 100–1,000, and more than 1,000 members (Ibid.). These are the most accurate ranges available, due to the inherently clandestine nature of terrorist groups.

Total Decapitations.

Groups can experience more than one decapitation in their lifespan. A count variable of the total number of decapitations a respective group experienced is therefore included to account for the fact that some groups are inherently more resistant to decapitations than others (Ibid.).

Coleader.

Coleader is a dichotomous variable that demarcates whether a group has a clear second in command (1) or not (0). A second in command would theoretically mitigate effects, as they could step in and re-establish control quickly (Ibid.).

Reputation.

Reputation is also a dichotomous variable in which (1) represents groups who have actively tried to build a reputation. It is all derived from the Reputation of Terror Groups Database, which codes actions groups can take in order to build a reputation (Tokdemir and Akcinaroglu 2016).

Lagged Attacks and Fatalities.

I control for attacks by a given group in the previous year to account for time trends and dependence on past actions.

CONTROLS – STATE LEVEL

ln(Area); ln(GDP); ln(Population); ln(military); Polity2.

These state level controls represent the characteristics of the state from which each group primarily operates. They represent the economic and governmental capacity present in each state that may influence levels of terrorism, as well as if a group can successfully be decapitated.

5. Findings and Discussion

BASELINE RESULTS

To examine hypotheses 1a and 2a, which predict that groups will increase their attacks after decapitation while decreasing their fatalities per attack, I first estimate a series of models using only the sample of groups that experience decapitation. The base models, 1 and 3, use all controls. The fixed effects models (2 and 4) utilize only the time-varying state level controls, but account for all other time invariant group-level factors in any given year. Overall, I find strong support for the respective hypotheses.[1]

All models in Table 1 use *Decap* as the dependent variable, representing the change in attacks or fatalities when moving from the years before a group experiences a decapitation to the years post-decapitation. In models 1 and 2, the coefficient for *Decap* is positive and significant, indicating that post-decapitations, groups do indeed increase the number of attacks. Models 3 and 4 have a negative and significant coefficient for fatalities per attack. This is in line with hypothesis 2a. After experiencing a decapitation, groups are less efficient, causing less fatalities per attack.

To aid in substantive understanding, the Incident Rate Ratios (IRR) for the Decap variable indicates the percent change in the dependent variable for every unit increase in the independent variable. For example, the IRR for Model 1 is 1.16, indicating a change from pre to post-decapitation results in a 16% increase in the number of attacks. The IRR for Model 3 is 0.92, indicating a change in *Decap* results in an 8% decrease in the number of fatalities per attack post-decapitation.

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[1] For the full tables including control variables, see Appendix

VARIABLES	(1) Attacks	(2) Attacks FE	(3) Fatalities	(4) Fatalities FE
Decap	0.09*	0.02***	-0.16*	-0.16**
	(0.05)	(0.00)	(0.10)	(0.08)
Constant	-2.70***	1.47***	-2.61***	-1.92***
	(0.62)	(0.50)	(0.61)	(0.54)
Observations	1,512	1,512	1,512	1,512
Groups	77	77	77	77

Negative Binomial with Group-Year RE/FE
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1: Post-Decapitation Effects

In Table 2, the analysis breaks down *Decap* into how many total decapitations a group experienced. When compared to groups that only experience 1 decapitation, groups that experience 2 decapitations have significantly more attacks and significantly less fatalities per attack. This is in line with hypothesis 1b and 2b, as additional decapitations should further exasperate the principal-agent problem. The coefficients for groups experiencing 3 or 4 total decapitations, though not always reaching statistical significance, also fall in line with the directional expectations.

VARIABLES	(5) Attacks	(6) Attacks FE	(7) Fatality	(8) Fatality FE
2 Decap	0.21**	0.24***	-0.60*	0.00*
	(0.09)	(0.09)	(0.25)	(0.00)
3 Decap	0.09	0.09	-1.06*	-0.13*
	(0.14)	(0.14)	(0.64)	(0.04)
4 Decap	0.30*	0.02	-0.31	-0.23
	(0.17)	(0.14)	(0.35)	(0.14)
Constant	0.36	1.21**	-0.91	1.42***
	(0.63)	(0.49)	(2.19)	(0.50)
Observations	2,510	2,510	2,510	2,510
Groups	133	133	133	133

Reference Category: 1 Decapitation
Negative Binomial with Group-Year RE/FE
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2: Total Number of Decapitations

Overall, these results are in line with expectations for hypotheses 1 and 2. The increase in attacks post-decapitation suggests that in the aftermath of losing a leader, operatives are dramatically increasing their activity. The influence and strategic vision of the leader is indeed important in controlling the number of attacks undertaken by the group. In terms of fatalities, groups post-decapitation, without attacks planned by a politically informed leader, are interested in conducting smaller yet more frequent attacks. For example, under bin Laden, al-Qaeda Central was known for large scale, visually spectacular attacks such as 9/11. While fewer in numbers, these attacks generated large amounts of fatalities. Post bin Laden, they are only capable of conducting smaller-level attacks with fewer fatalities.

Hypothesis 3 predicts that the effects of decapitation may be mediated by the size of the group, with the effects exasperated among the largest groups. Figure 1 represents the marginal effects of decapitation on both attacks and fatalities when the size of the group varies. Size 4 represents the largest groups, with over 1,000 members, that should theoretically be most affected by the loss of a principal. Indeed, these largest groups are significantly different pre and post-decapitation. On the left, the largest groups are most constrained by the leader pre-decapitation and are predicted to have lower attack numbers (in blue). Post-decapitation, these groups have significantly more attacks once they have the autonomy to realize the agent's preferences. On the right side of Figure 1, the largest groups also inflict significantly less casualties post-decapitation when compared to their pre-decapitation rates.

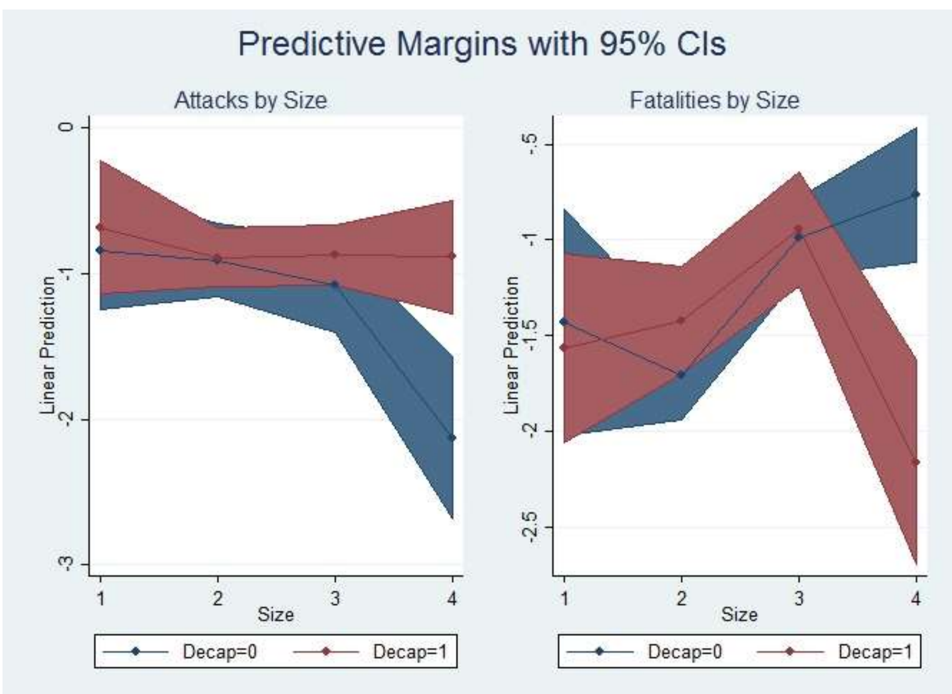

Figure 1: Interaction of Size and Decapitation

SELECTION EFFECTS

There remains a worry that the groups that get decapitated are systematically different than those that are never targeted. Groups targeted may just be more violent or less efficient in nature. In Table 3, the whole sample of 133 groups is analyzed. Groups that never experience a decapitation in their lifespan are not significantly different when compared to the activity in the years prior to decapitation for the groups that are ultimately decapitated. In Models 9 through 12, the coefficients for *No Decap* groups are not significant, indicating that groups that never experience a decapitation are not merely less violent or less efficient, and thus not targeted. Consistent with models 1 through 4, groups do undertake significantly more attacks with less fatalities per attack post-decapitation, however.

VARIABLES	(9) Attacks RE	(10) Attacks FE	(11) Fatality RE	(12) Fatality FE
No Decap	-0.31	-0.44	-0.11	0.16
	(0.24)	(0.47)	(0.19)	(0.19)
Post-Decap	0.22*	0.25*	-0.35**	-0.78**
	(0.12)	(0.14)	(0.17)	(0.35)
Constant	1.01*	-1.53***	-2.57***	-4.84*
	(0.61)	(0.57)	(0.62)	(2.52)
Observations	2,510	2,510	2,510	2,510
Groups	133	133	133	133

Reference Category: Pre-Decapitation
Negative Binomial with Group-Year RE/FE
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Pre-Decapitation compared to No Decapitation and Post-Decapitation

Table 4 additionally uses all pre-treatment variables on the right hand side of the equation in addition to *Attacks* and *Fatalities* to determine if group or state-level characteristics can successfully predict decapitation among groups (*Exp. Decap*). If these variables could, it would suggest that groups that are never decapitated may be systematically different than those who do. Yet, the only *ln(Military)* is significant. Overall, it appears that decapitation is as-if random. This is in line with previous findings that found the same to be true among all insurgent groups (Johnston 2012).

VARIABLES	(13) Exp. Decap
ln(Area)	0.36
	(0.32)
ln(GDP)	-0.01
	(0.03)
ln(Population)	-0.26
	(0.21)
Polity	-0.12
	(0.22)
ln(Military)	0.19*
	(0.07)
Group Age	-0.00
	(0.00)
Reputation	-0.67
	(0.45)
Size	-0.81
	(0.59)
Religious	-0.28
	(0.31)
Attacks	-0.15
	(0.22)
Fatalities	0.19
	(0.17)
Observations	2,510

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Predicting Decapitation

Robustness Checks

I check the robustness of the empirical results in several ways. First, I take out the outliers (the top 10%) of both dependent variables. This ensures that an event like 9/11, which produced over 3000 casualties (the average is just 2.2 fatalities per attack), is not driving the results. Next, I remove groups that have experience multiple decapitations from the sample and re-estimate the model. Groups that persist after multiple decapitations may be better equipped to adapt or may be severely degraded and not representative of the average group.

Next, I estimate the effect of decapitation on attacks with two separate mediators: captured versus killed and the presence of a second in command. Groups with a killed leader have been hypothesized to be more deadly (Jordan 2012). A second in command may mitigate the effects, as a replacement leader can step in and regain control.

Next, I estimate the short versus long term effects of the model using an intervention analysis that allows for both the short and long term possible effects of decapitation, such that:

$$Y_t = \varphi Y_{t-1} + \omega_o I_t + \omega_1 \Delta I_t + e_t.$$

Lastly, I measure efficiency with different dependent variables, the number of perpetrators per attack and wounded per attack. Overall, the results found in the appendix are in line with the baseline results found above.

6. Conclusion

Terrorist leaders hold an important strategic position among their respective groups. They are responsible for constraining their levels of violence in order to avoid backlash. Groups commit a lower number off attacks so as to not alienate supporters and induce a government crackdown. This often goes against the preferences of their operatives, who have joined in order to carry out violence as a means for achieving their personal political goals. Yet, while the number of attacks is lower in groups that have not experienced a decapitation, their efficiency is higher. They are able to carry out attacks that produce a relatively higher number of fatalities and thus more directly garner media attention to help the group survive and advance their cause. This study yielded two primary findings that support this theory and help resolve the gap in the leadership decapitation research agenda.

First, groups post-decapitation perform a significantly higher level of attacks per year relative to groups pre-decapitation and groups that never experience a decapitation. Their leaders are no longer able to constrain the number of attacks the group performs in order to avoid backlash and the more violent preferences of the operatives take over. The goal of a decapitation policy is to render the group so incapacitated that they decline and cease to exist. Decapitation, in reality though, is having the opposite effect. These groups are becoming more active in comparison to their previous level of attacks.

The measurement of this variable allowed us to explore the research question of the effect of decapitation on the violence levels of terrorist groups more completely.

Instead of just being able to measure if groups end or not post-decapitation, this aspect of the counterproductive effect of decapitation is evidenced. By including only groups that have at least 4 attacks and therefore truly impact government policy, the full effects of this target policy can be flushed out and further explored.

Second, groups post-decapitation have a significantly lower level of fatalities per attack per year relative to groups pre-decapitation and groups that never experience a decapitation. Their efficiency, or ability to undertake attacks which produce a relatively large number of fatalities and thus have a greater impact, is lower post-decapitation. Leaders are able gather and organize resources. When the leader is removed, the resulting dearth of organization and resources renders groups less efficient. Both of these effects are further mediated by the size of the group, with the effects exasperated among the largest groups.

Ultimately, the effects of leadership decapitation are countervailing. From a policy perspective, this yields conflicting suggestions. While groups may be producing a relatively lower number of fatalities compared to pre-decapitation, they still are undertaking more attacks. Their impact on society is still felt, even though the psychological effect may be less. The net effect of a decapitation policy may still be counterproductive. Even though fatalities per attack are down, this is negated by an increase in overall attacks. While a leader decapitation may have fundamentally changed the profile of attacks undertaken by groups post-decapitation, with lower fatalities per attack, the impact of these groups remains. Policy makers must find a place where these countervailing effects converge, with both lower attacks frequencies and lower fatalities per these attacks.

Appendix

Tables 1A-3A are the fully-specified models which align with Tables 1-3 in the text, respectively.

VARIABLES	(1) Attacks	(2) Attacks FE	(3) Fatalities	(4) Fatalities FE
Decap	0.09*	0.02***	-0.16*	-0.16**
	(0.05)	(0.00)	(0.10)	(0.08)
ln(Area)	-0.05	-0.16***	-0.06	-0.07*
	(0.04)	(0.04)	(0.04)	(0.04)
ln(GDP)	0.08	-0.18***	0.07	0.10**
	(0.05)	(0.04)	(0.05)	(0.05)
ln(Population)	-0.01	0.06	-0.01	0.02
	(0.05)	(0.05)	(0.05)	(0.05)
Polity	0.01	0.02***	0.01*	0.02***
	(0.01)	(0.01)	(0.01)	(0.01)
ln(Military)	0.15***	0.15***	0.15***	0.11**
	(0.05)	(0.05)	(0.05)	(0.05)
Group Age	-0.02***	0.01***	-0.02***	-0.02***
	(0.00)	(0.00)	(0.00)	(0.00)
Reputation	0.21***		0.20**	
	(0.08)		(0.08)	
Size	0.28***		0.28***	
	(0.05)		(0.05)	
Kill	0.06		0.05	
	(0.06)		(0.06)	
Religious	0.03		0.03	
	(0.09)		(0.09)	
Coleader	-0.37***		-0.36***	
	(0.08)		(0.08)	
Total Decapitations	0.17***		0.06	
	(0.06)		(0.06)	
Lag Attacks	0.01***	0.09**		
	(0.00)	(0.04)		
Lag Fatalities			0.06*	-0.00
			(0.03)	(0.12)
Constant	-2.70***	1.47***	-2.61***	-1.92***
	(0.62)	(0.50)	(0.61)	(0.54)
Observations	1,512	1,512	1,512	1,512
Groups	77	77	77	77

Negative Binomial with Group-Year RE/FE
*** p<0.01, ** p<0.05, * p<0.1

Table 1A: Full Results – Post-Decapitation Effects

VARIABLES	(5) Attacks	(6) Attacks FE	(7) Fatality	(8) Fatality FE
2 Decap	0.21**	0.24***	-0.60*	0.00*
	(0.09)	(0.09)	(0.25)	(0.00)
3 Decap	-0.09	0.09	-1.06*	-0.13*
	(0.14)	(0.14)	(0.64)	(0.04)
4 Decap	0.30*	0.02	-0.31	-0.23
	(0.17)	(0.14)	(0.35)	(0.14)
ln(Area)	-0.10***	-0.13***	0.12	-0.15***
	(0.04)	(0.03)	(0.14)	(0.04)
ln(GDP)	-0.12**	-0.18***	-0.08	-0.18***
	(0.05)	(0.04)	(0.18)	(0.05)
ln(Population)	0.03	0.02	-0.41*	0.03
	(0.05)	(0.05)	(0.22)	(0.05)
Polity	0.01*	0.02***	0.03	0.02***
	(0.01)	(0.01)	(0.03)	(0.01)
ln(Military)	0.11**	0.15***	-0.24	0.17***
	(0.05)	(0.05)	(0.20)	(0.05)
Group Age	0.01***	0.01***	-0.02	0.01***
	(0.00)	(0.00)	(0.02)	(0.00)
Reputation	0.13		-1.09***	
	(0.08)		(0.39)	
Size	-0.04		-0.02	
	(0.05)		(0.22)	
Kill	0.13*		-0.21	
	(0.07)		(0.28)	
Religious	0.28***		0.15	
	(0.09)		(0.43)	
Coleader	-0.37***		-0.53	
	(0.08)		(0.43)	
Lag Attacks	0.33***	0.12***		
	(0.01)	(0.04)		
Lag Fatalities			0.09*	0.10
			(0.04)	(0.08)
Constant	0.36	1.21**	-0.91	1.42***
	(0.63)	(0.49)	(2.19)	(0.50)
Observations	2,510	2,510	2,510	2,510
Groups	133	133	133	133

Reference Category: 1 Decapitation
Negative Binomial with Group-Year RE/FE

Table 2A: Full Results – Total Number of Decapitations

VARIABLES	(9) Attacks R	(10) Attacks FE	(11) Fatality R	(12) Fatality FE
No Decap	-0.31**	-0.84*	0.11	0.16*
	(0.14)	(0.47)	(0.39)	(0.09)
Post-Decap	0.22*	0.25*	-0.35**	-0.78**
	(0.12)	(0.14)	(0.17)	(0.35)
ln(Area)	-0.11***	-0.07*	-0.06	0.17
	(0.04)	(0.04)	(0.04)	(0.16)
ln(GDP)	-0.13***	0.07	0.06	0.33
	(0.05)	(0.06)	(0.05)	(0.23)
ln(Population)	0.04	-0.08	-0.01	0.07
	(0.05)	(0.07)	(0.05)	(0.27)
Polity	0.02**	0.01	0.01	0.08***
	(0.01)	(0.01)	(0.01)	(0.03)
ln(Military)	0.09*	0.16***	0.15***	-0.54**
	(0.05)	(0.06)	(0.05)	(0.22)
Group Age	0.01***	-0.02***	-0.02***	-0.03*
	(0.00)	(0.00)	(0.00)	(0.02)
Reputation	0.13		0.19**	
	(0.08)		(0.08)	
Size	-0.04		0.29***	
	(0.05)		(0.05)	
Kill	0.14**		0.06	
	(0.07)		(0.06)	
Religious	0.29***		0.03	
	(0.09)		(0.09)	
Coleader	-0.35***		-0.37***	
	(0.08)		(0.08)	
Total Decapitations	-0.01		0.16***	
	(0.06)		(0.06)	
Lag Attacks	0.18*	0.22**		
	(0.11)	(0.11)		
Lag Fatalities			-0.03	0.06
			(0.04)	(0.05)
Constant	1.01*	-1.53***	-2.57***	-4.84*
Observations	2,510	2,510	2,510	2,510
Groups	133	133	133	133

Reference Category: Pre-Decapitation
Negative Binomial with Group-Year RE/FE

Table 3: Full Results - Pre-Decap compared to No Decap and Post-Decap

Table 4A removes all outliers in the 90 percentile. Results are statistically similar.

VARIABLES	(13) Attacks - Outliers	(14) Fatal - Outliers
Decap	0.08*	-0.09*
	(0.04)	(0.05)
ln(Area)	-0.10***	-0.01
	(0.03)	(0.03)
ln(GDP)	-0.13***	0.10**
	(0.04)	(0.05)
ln(Population)	0.00	-0.03
	(0.05)	(0.05)
Polity	0.01**	0.01
	(0.01)	(0.01)
ln(Military)	0.16***	0.16***
	(0.05)	(0.05)
Group Age	0.01***	-0.02***
	(0.00)	(0.00)
Reputation	0.14*	0.16**
	(0.08)	(0.08)
Size	-0.03	0.32***
	(0.05)	(0.05)
Kill	0.16**	0.06
	(0.06)	(0.06)
Religious	0.19**	-0.05
	(0.09)	(0.09)
Coleader	-0.39***	-0.43***
	(0.08)	(0.08)
Total Decapitations	0.03	0.16***
	(0.06)	(0.06)
Lag Attacks	0.03	
	(0.10)	
Lag Fatalities		0.01
		(0.03)
Constant	0.52	-3.38***
	(0.60)	(0.61)
Observations	2,618	2,585
Number of Groups	138	138

Table 4A: Outliers Removed

Figure 1A represents the interaction between decapitation and whether a leader was captured or killed on the left. No significant difference is found. On the right, groups with an established coleader have significantly less attacks post-decapitation than those without a second-in-command. Theoretically, this is intuitive as the coleader can quickly re-assert the preferences of the principle post-decapitation.

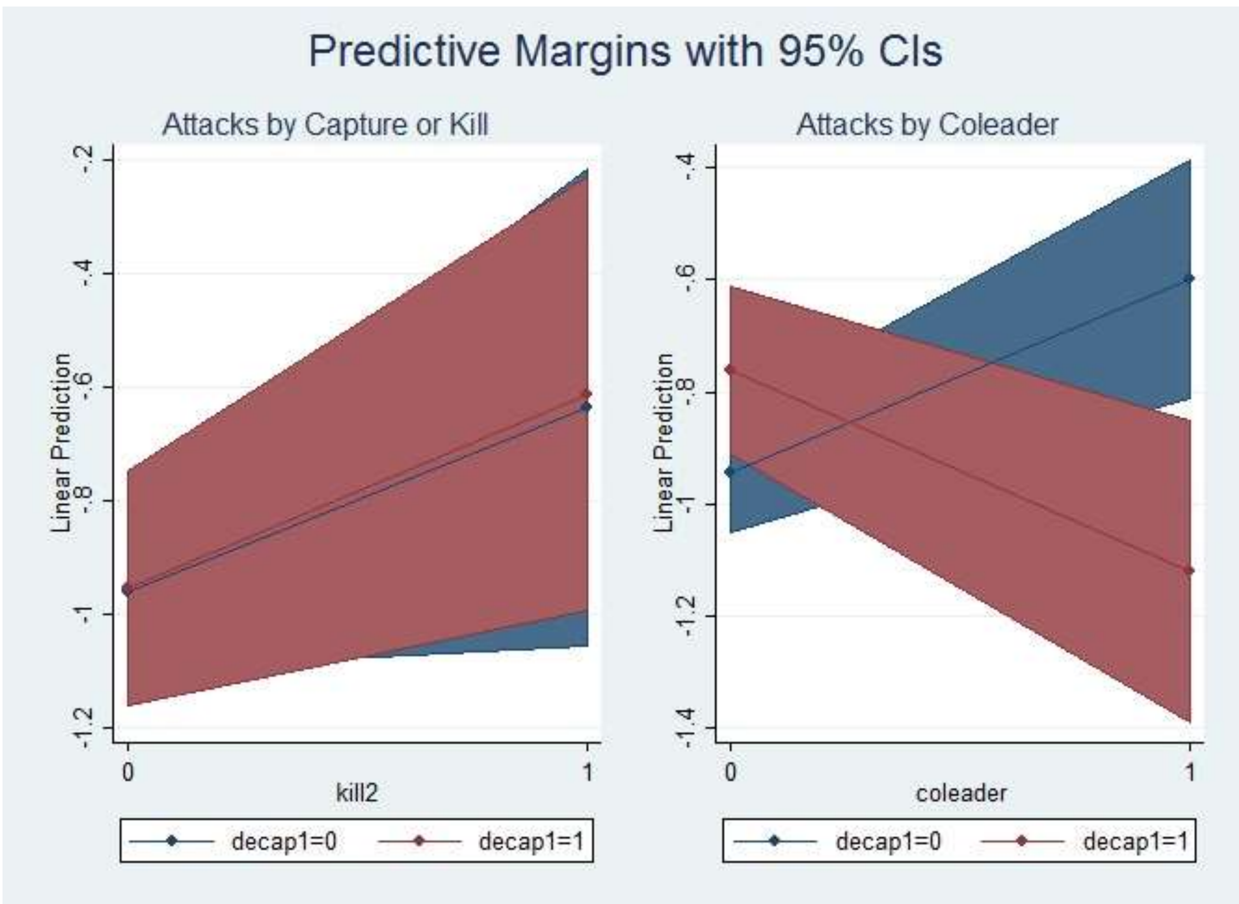

Figure 1A: Interactions of Attacks with Capture/Kill and Coleader

Figure 1B represents the interaction between decapitation and whether a leader was captured or killed on the left and with a coleader on the right. Neither represent significantly differences.

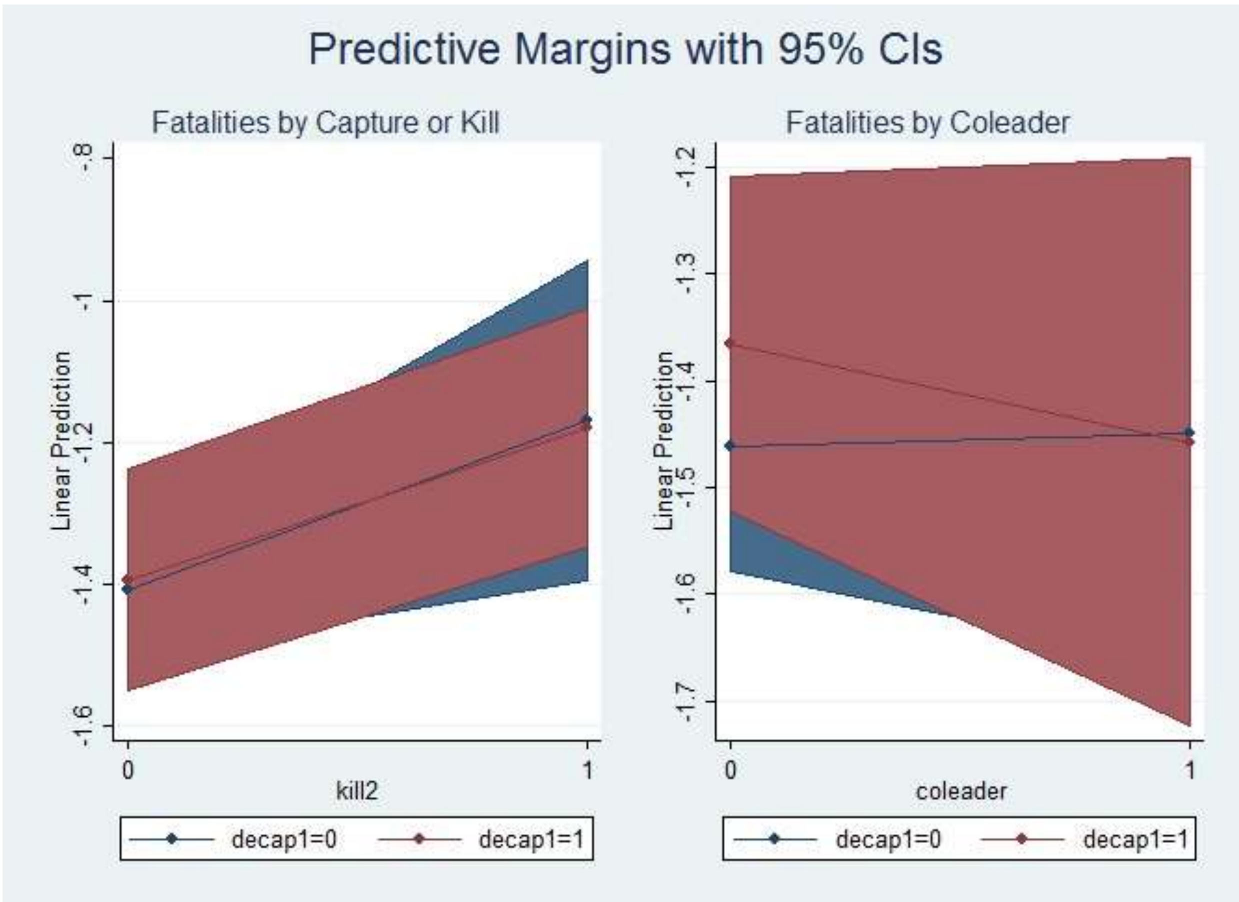

Figure 2A: Interactions of Fatalities with Capture/Kill and Coleader

Table 5A is an intervention analysis in which the intervention is a decapitation. This model allows for compound effects, both long term and short term. While the past-year's level of attacks and fatalities effect current levels, the result is substantively small. Attacks increase in the long term, while the fatalities decrease in the short term post-decapitation. This suggests that groups may be able to more quickly gain their efficiency back and be more lethal, but it takes longer for a new principal to re-establish their less-violent preferences.

VARIABLES	(15) Attacks	(16) Fatalities
L.attacks	0.00***	
	(0.00)	
L.nkill		0.00***
		(0.00)
Long Term	0.05*	0.01
	(0.03)	(0.03)
Short Term	0.10	-0.26*
	(0.12)	(0.14)
Constant	-0.97***	-1.42***
	(0.04)	(0.04)
Observations	2,735	2,682
Groups	170	170

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5A: Short v Long Term Effects

Table 6A presents alternative independent variables to proxy for efficiency. Both the number of perpetrators and the number of wounded per attack decrease post-decapitation.

VARIABLES	(17) Perps	(18) Wounded
Decap	-0.16***	-0.20***
	(0.06)	(0.05)
ln(Area)	0.01	0.07**
	(0.04)	(0.03)
ln(GDP)	0.08	0.02
	(0.05)	(0.05)
ln(Population)	-0.09	-0.14***
	(0.06)	(0.05)
Polity	0.00	0.00
	(0.01)	(0.01)
ln(Military)	0.10*	0.16***
	(0.06)	(0.05)
Group Age	-0.01**	0.00
	(0.00)	(0.00)
Reputation	0.05	0.20**
	(0.09)	(0.08)
Size	0.06	0.34***
	(0.05)	(0.05)
Kill	0.13*	0.04
	(0.07)	(0.06)
Religious	0.24**	-0.03
	(0.10)	(0.08)
Coleader	-0.30***	-0.55***
	(0.09)	(0.08)
Total Decapitations	0.14**	0.28***
	(0.06)	(0.06)
Constant	-2.52***	-4.11***
	(0.65)	(0.58)
Observations	1,812	2,620
Groups	138	138

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6A: Alternate Dependent Variables – Perpetrators and Wounded

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