Shapes and Noise: Does Border Geometry and Capital Location Affect the Prevalence of Insurgency in a State?

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SHAPES AND NOISE

DOES BORDER GEOMETRY AND CAPITAL LOCATION AFFECT THE PREVALENCE OF INSURGENCY IN A STATE?

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WITH GUIDANCE FROM
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ABSTRACT

The destruction brought by World War II fashioned an intense fear of any instability in the international system. The primary result of this fear is the institution of the United Nations, which, in turn, has been compelled to undertake a number of state building and peace keeping operations. While the international community has seen success in these operations, many states continue to fail – for these states all variables should be on the table. Among the most underexplored variables in state failure is state geometry; for years, a select few political scientists have attempted to explore the relationship between the two, but with little success, primarily due to a lack of tools and proper datasets. This has changed rapidly with the rise of the information age; new data and new methods now allows us to build precipitously on the work of these scholars.

In my paper, using the compactness equation developed by Lewis Fry Richardson for his influential book “The Statistics of Deadly Quarrels,” I seek to analyze how compactness, or the “circularity” of a state, and capital location have affected the number of days of insurgency in a state between the year of 1970 and 2013, which I treat as a proxy for instability. My research suggests that both state shape and capital location have little correlation with the amount of insurgency, while other geospatial variables like physical distance and size have much greater effects. Nevertheless, my research is only a preliminary inquiry; much more research is required to determine how state geometry not only effects the stability of a state, but to also ascertain how it may affect other variables like economics and political representation, in the hope can we build stronger, more prosperous, and more representative states.
INTRODUCTION

Relentless politicians and news outlets desperate to fill a constant, competitive news cycle have sold the Western publics the idea that the insurgencies of the late 20th and 21st centuries are unprecedented. While it is true that the global reach of insurgent organizations is novel, the concept of insurgency has plagued the state since its infancy. Akkad, located in the modern day Middle East during the late third millennium BC and widely considered the first empire, was fraught with uprisings until mountain peoples overran the beleaguered state. (Boot, Invisible Armies: An Epic History of Guerrilla Warfare from Ancient Times to the Present, 2012) The Western Roman Empire fought scores of peasant insurgents called “bagaudae” from the third century until it’s fall. (Minor, 1975) Insurgencies defined the French Revolutionary period and its successor, the Napoleonic era, which saw insurgencies succeed and redefine the European mainland. (Andress, 2015; Jones, 2015) Even today, insurgent groups like the loosely affiliated Patriot movement dot the landscape of the world’s only superpower, the United States. (Southern Poverty Law Center, 2010)

Regardless, the purveyors of fear and the horrors of the First and Second World Wars has created help foster an intense fear of instability throughout the world. This fear of instability is so deeply imbedded in the collective psyche of the political elite in the post-World War era that the Charter of the United Nations begins with the following:

“The Purposes of the United Nations are….to maintain international peace and security, and to that end: to take effective collective measures for the prevention and removal of threats to the peace, and for the suppression of acts of aggression or other breaches of the peace, and to bring about by peaceful means, and in conformity with the principles of justice and international law, adjustment or settlement of international disputes or situations which might lead to a breach of the peace” (United Nations, 1945)
In this spirit, the United Nations has undertaken an unprecedented number of state-building cases (often referred to as nation-building) campaigns; most of which have occurred in young, post-colonial nation-states. (Dobbins, Jones, Crane, & Rathmell, 2005)

The UN has seen much success in its state-building efforts, with “seven out of eight societies left peaceful” and three out of four left democratic. (Ibid) Yet, for the many states that have fallen through the cracks and the other failing states, many of which are African states facing brutal insurgencies, all solutions should be on the table. (Ibid) Among these solutions set forward, specifically for Africa, is to redraw the borders set by their colonial heritage. Several scholars have argued that there is little hope for long-lasting legitimacy for many African states who continue to use the colonial borders as political borders.

For example, one scholar, Mutua, (1995) who, in “Why Redraw the Map of Africa: A Moral and Legal Inquiry,” argues that the “crude and thoughtless” borders constructed by Europeans during the colonial era are a strong source of the significant conflict experienced on the continent. The Institute for Security Studies (2012), a think tank for African security, similarly, attacks Africa’s colonial heritage and its defense of the status quo as reason for its lack of state control. In a review on African borders and their effects on conflict in the region, among other things, they ascribe the inability to institutionalize government efficiency, consolidate as a nation, and various state terror and insurgencies to the border situation in the area. Further, Englebert (2015), in his analysis of the African economy, places significant blame in the pre-colonial state structures that the continent inherited and maintained. These academics and their works all hint at a similar thread - they all maintain that the political structure of post-colonial Africa is malformed and needs to be thoroughly redefined for Africa to become relatively functional continent.
This serves as the backdrop for my discussion on the role of border geometry and state stability. Political scientists have written extensively on the role of other physical attributes of states, such as geography, and its role in insurgencies, but comparatively little has been written on the role of border geometry and its effects on insurgency. If we are going to have a conversation about producing more stable states and a populace that feels that it is better represented at home and aboard, all variables should be on the table. My contribution to this research is simple, I wish to examine the effects of state geometry on the incidence of intrastate strife.

Specifically, I will be examining if and how a state’s compactness and capital location affect the frequency of days of insurgency between the years of 1970-2013. For this paper, I define compactness as the degree to which a geographic figure’s boundaries are uniformly distributed from the geographic centroid. Simply put, a perfect circle, whose perimeter is always equidistant from the centroid, is perfectly compact, whereas a line that stretches infinitely is the most incompact figure; furthermore, we will explore the role of capital placement in non-compact states and discuss if more central capital placement can mitigate any effects that noncompactness may have on a state.

**REVIEW**

**DEFINITIONS**

The core of this paper revolves around two concepts, the state and the violent challenges to the state known as insurgency. Thus, to lay the foundation for this paper, we must define the two. The fierce discussion around how to define these concepts is both a testament to Political
Scientists and somewhat unfortunate in the fact that the diverse definitions have made analysis both complicated and difficult to compare. Thus, it is imperative that we have a thoughtful yet brief discussion regarding the literature on the definitions to properly reinforce the foundations of this paper.

The two most prominent definitions among Political Scientists are furnished by the influential sociologist Max Weber and the 1933 Montevideo Convention. Weber (1919) termed the state as a “a human community that (successfully) claims the monopoly of the legitimate use of physical force within a given territory.” Legitimacy of the state, for Weber, is derived from one of three sources: a charisma of a leader who demonstrates that he can lead with some extraordinary quality, the tradition of the people, or a system of laws. (Ibid) Beyond Weber, our second prominent definition was constructed at the Montevideo Convention (1933), which established that “The state as a person of international law should possess the following qualifications: a permanent population; a defined territory; government; and capacity to enter into relations with the other states.”

These two definitions are appreciable in tandem; with Weber’s definition, we have an idea of how a state should act and, with the Montevideo criteria, we have an idea of how a state should appear. Ultimately, this paper will carefully adhere to these guidelines but, again, neither of these are universally accepted and, thus, the political map of the world varies dramatically by region. For example, the United States is among the, approximately, 100 of the 193 United Nations member states have recognized that Kosovo is sovereign state; however, the UN itself does not recognize Kosovo, largely due to the Russian and Chinese presence on the United Nations Security Council. (United States Department of State, 2016;
Examples of divergences in policy are numerous, the among the most notable examples being the aforementioned Kosovo situation, the dispute between Palestine and Israel over Palestine, India and Pakistan over Jammu and Kashmir, and the People’s Republic of China and the Republic of China over China. (National Geographic, 2014; Blumenthal, 2016) Therefore any research, including my own, will be biased by the political world the data is living in.

Similarly, insurgency has a variety of competing definitions, although none are particularly well-established; this is rather unsurprising given the relative novelty of insurgent studies. To begin, the latest version of the United State Department of Defense’s (2016) “Dictionary of Military and Associated Terms” defines insurgency as 

“the organized use of subversion and violence to seize, nullify, or challenge political control of a region.”

I disagree with this definition on one key point; the definition does not emphasize that insurgents are non-state actors challenging state actors for political control of regions where the state actor is the legitimate possessor. To illustrate the problems this creates, we can examine the situation in Iraq; the insurgency the Islamic State (IS) is not seen as the legitimate government of the region it controls in the Middle East, yet it does control it. Therefore, by the Department of Defense definition, the Iraqi government, which is retaking control of the Iraqi regions currently controlled by IS, could be considered an insurgency itself.

On the other hand, it does correctly assert that insurgent are trying to “seize, nullify, or challenge political control of a region.” Many other definitions are often too precise in their definitions when considering what insurgencies are trying to accomplish. Among these is Hayden who writes
“Insurgency is best defined as an organized movement aimed at the overthrow or destruction of a constituted government through the use of subversion, espionage, terrorism and armed conflict.” (ProCon.org, 2008)

Hayden’s definition would exclude separatist insurgencies, like those of the Kurds in Iraq, Iran, Turkey and Syria, who do not seek to overthrow or destroy a government, but rather carve out a legitimate state from an existing state. Additionally, his addition of “and” indicates that insurgency needs to include all those ingredients - this is not true. During the American Revolution, while some American terrorist groups did exist, neither the Continental Congress nor the Continental Army ever used terrorism as a tactic.

In *Invisible Armies*, which is the source of the insurgency data for this paper, scholar Max Boot (2012) defines insurgents as an irregular militia that uses guerilla warfare and/or terrorism as tactics to fight a state actor. Boot never names a goal for the insurgents and his definition is better for that; the goals of insurgents are innumerable, ranging from seeking no state control whatsoever (Anarchists) to gaining total state control (Communists). His definition, in contrast to the others, also excludes subversion, best defined as “all illegal measures short of the use of armed force taken by one section of the people of a country to overthrow those governing the country at the time, or to force them to do things they do not want to do”; of course, subversion is not irrelevant to insurgents, but it also, alone, does not make an insurgency. To illustrate, would we consider the numerous underground Baltic newspapers and subversive political groups as insurgencies during the Soviet Era? Conversely, would a theoretical insurgency that focused purely on armed confrontations without subversion, not be considered an insurgency? In both cases, I would argue no and, as a result, I would argue that adding subversion to the definition of insurgency is worthless.
More concisely, the definition of insurgency for this paper is:

“a violent resistance organized by a non-state actor against the legitimate government of a state”

**THE ELEMENTS: PEOPLE**

As I have noted, these organized groups are not new, but their entrance into the collective psyche of the Political Science sphere is; largely scaling with increasing frequency, operational capability, visibility of insurgencies. Recently, this has been enhanced by the availability of large, comprehensive dataset, the rise of novel methods, and the desperation of the American situations in the Middle East and Southwest Asia. However, before we begin discussing insurgencies as an organism, we must look at the individuals that compose insurgencies with a careful eye, designed to try to avoid the biases that often plague even high level discussions of insurgencies. As Steven Metz (2012) writes “Americans face a mental barrier of our own creation…we are a quintessentially political people, but it is politics of a peculiar type, born of the European Enlightenment.”

In his article “Psychology of Participation in Insurgency,” Metz (Ibid) categorizes insurgents into six “ideal types”: survivors, who join insurgencies because the life of insurgent offers them a safer life; the lost, who join for a more structured and meaningful life; the thugs and the ambitious; who are looking for personal gain; the aggrieved; who seek revenge on an unjust system; and the idealists, who, like the aggrieved, seek justice, but also seek to build a new political system in the ashes of the old. Of these, the two key cogs are the aggrieved and the idealists. Metz pens that “Most insurgents do not seek a better political system but rather one that empowers them or, at least, leaves them alone.” Simply put, most insurgents are unsatisfied with
the status quo, but not in a grandiose way; they are not politicians; therefore, they are not looking to fulfill unmet political needs, rather unmet psychological needs.

To better understand how insurgencies grow, it is best to cluster these ideal types into three groups, which we will call the needy (the survivors and the lost), who are attempting to meet unmet psychological and physical needs, the warriors (the ambitious and the thugs), who seek fight for personal gains, and the soldiers (the aggrieved and the idealists), who are fighting to avenge and right perceived wrongs. In states where violence is a norm, the barriers to joining an insurgent group is relatively low and a majority of an insurgent group will be the needy and the warriors, groups that are desperate to achieve their personal goals, but are, in large part, not desperate enough to break norms in the process. On the other hand, in cultures where normative behavior shuns violence and injustice, the majority of an insurgent group will be the soldiers, who have a normative reason for their fight – grievance. (Ibid)

However, it is important to note that these are ideal types and that there is much fluidly between the Metz’s groups; an insurgent can exist in multiple groups at simultaneously. For example, one insurgent, Zaydan al-Jibouri, justified his tribe’s decision to join the Islamic State by claiming that “the Sunni community has two options, fight against ISIS and allow Iran and its militias to rule us, or do the opposite. We chose ISIS for only one reason. ISIS only kills you. The Iraqi government kills you and rapes your women.” (Ignatius, 2014) In his words, you can find both the mentality of person who is a survivor and a person who has legitimate grievances with the government of Iraq. Interestingly, based on this quote alone, we can deduce that both ideal types are crucial for his participation; if al-Jibouri felt that ISIS only granted him access to one of these concepts, it is likely that al-Jibouri would not a participant at all.
With similarity, Arie W. Kruglanski (2014) writes that “violent extremism” comes two basic human needs – the need for cognitive closure and personal significance. Cognitive closure is the “feeling of certainty;” a student would feel the need for cognitive closure when waiting for the results of an exam, a professor when offering a paper for peer review, or an author when submitting a book to a publisher. (Lange, Kruglanski, & Higgins, 2011) The political and social uncertainties that are ever present in the Sunni Northwestern Iraq have created an atmosphere where a stunning lack of cognitive closure is the norm. (Kruglanski, 2014) Further, the rampant unemployment and lack of opportunity in the wider Middle East, Southeast Asia, and Sub-Saharan Africa have created recruiting hotbeds for various insurgent groups; the feeling that, through the work of insurgent groups like the Islamic State, a poor disaffected Sunni can become a hero is enticing and adds an element of intrigue to a seemingly meaningless existence. (Ahmed, Guillaume, & Furceri, 2012; Kruglanski, 2014)

The threads of Metz and Kruglanski complement each other well. If you look over the history of insurgency, from the Akkadians to the Cubans, you can find these base elements have similar bonds. Importantly, we must understand that the chemical insurgency is not a monolith and is largely formed by the disaffected, whom fight both because they feel they must and, for some, because it’s the only thing they have. Although these are led and legitimized by the “Idealists,” the Mao Tse-tungs, Che Guevaras, and Osama Bin Ladens, the impressionable leaders who grant insurgencies the ideologies that “unify, inspire, explain why the existing system is unjust or illegitimate, and rationalize the use of violence to alter or overthrow the existing system,” insurgencies are rarely largely composed of these types. (Metz & Millen, 2004)
**THE CHEMICAL: INSURGENCY**

Most insurgencies typically arise out of three situations: grievances and political instability, ethnic/religious tensions, and, finally, greed and poverty; the two former are typically dominated by our “soldiers” and the latter is dominated by the “warriors,” with the “needy” interspersed between the three. In their opening phases, organizations, to be viable, typically need to achieve two goals – first and foremost, maintaining operational security and, after, carrying out attacks. (Lewis, 2012; Frisch, 2011) In a case study of insurgent groups in Uganda, it was found that operational security was the determining factor for failure and success of insurgencies; states that had difficulty policing regions beyond their capital and situations where citizens were more likely to cooperate with the government often led to catastrophic outcomes for these young insurgencies or “proto-insurgencies.” (Lewis, 2012)

Naturally, initial conditions among a region’s populace are important for operational security. Certain demographic climates can naturally enhance operational security; in Uganda, it was found that ethnically homogeneous societies were conducive to maintaining insurgencies than those that were more homogeneous. (Ibid) For the insurgencies in homogenous populations, the battle to prevent government penetration into these in-groups becomes the war; once the government achieves even cursory infiltration, even the most accomplished groups are suspect. For instance, the Irgun, a Jewish insurgency who was on the front lines of the Jewish quest for Israel in the British mandate, was reduced to a shell of its former self when the Hagenah, a moderate Jewish group, decided that it would cooperate with the British. (Byman, 2007) In a case study of proto-insurgencies, it was found that in-group was “perhaps the best and most efficient way to prevent proto-insurgents from gaining ground.” (Ibid)
Yet these are still proto-insurgencies, for these small groups to gain the size and capability of an insurgency that can truly challenge the government, they need to achieve four goals beyond operational security; they must carve out a political identity that is relevant, have an identity that is popular beyond the “proto-insurgents,” they must become the dominant challenger to their government by superseding other rival groups, and finally, they must obtain a physical sanctuary from the opposing state. (Ibid) In “Understanding Proto-Insurgencies” Daniel Byman (2007) argues that violence is the primary mode by which an emerging insurgency can accomplish every task besides the last. Among other things, violence encourages media attention, support in the citizenry, and all reduces confidence in the government and moderates; thus, the calculations behind the use of violence and, most importantly, the government reactions to the use of violence are the most important factors beyond operational security. (Ibid)

Once a proto-insurgency becomes an insurgency, an entire host of new bureaucratic issues arise. To be successful insurgencies must, typically, be organizationally sound, act quickly, obtain some measure of state sponsorship, and use terrain effectively. Paul Staniland (2013), in “Insurgent Organization and State-Armed Group Relations,” identifies four types of insurgent organizational structures: “Integrated groups” are the most effective – they have exceptional central command and deep control over their local units, “vanguard groups” have an exceptional central command but weak local control, “parochial groups” are composed of powerful local factions, “fragmented groups” are the least effective - they lack both exceptional central command and local control. These organizational structures are not intentionally implemented, rather, they are, according to Staniland (Ibid), “determined by the structure of prewar political networks.”
Like Metz’s ideal types, these structures are not explicitly chosen, they are determined by the structures of political networks prior to the start of the insurgency, and they can be fluid throughout the length of a conflict. On the first point, Staniland argues that “political parties, religious associations, student networks, and tribal ties, for instance, are often the underpinning of new insurgencies. These social bases are usually nonviolent and not built for war. Insurgents go to war with the networks they have, creating new organizational structures by mobilizing the ties of information, obligation, and trust they have access to it.” To slightly expand on Staniland’s assertion, the Tamil Tigers, the Taliban, and Boko Haram are all effective insurgencies that grew out of non-violent organizations and continued to nurture that structure, rather than risk their movement rebuilding their organization. (Richards, 2014; Stanford University, 2016; BBC News, 2016)

However, these groups had the advantage of having exceptional horizontal and vertical links prior to insurgency, which is important for forming an integrated insurgent organization. I contend that any insurgent organizations that are not integrated are so because the structure and weaknesses of vanguard and parochial organizations are not readily apparent; these groups are often one or two dramatically events from fragmentation (a surgical strike on leadership or a political in-fight for instance). For those who do understand the weaknesses of their organization, reform is often dismissed because it could jeopardize the entire movement, as Che’s reform of the Congolese Simba insurgency did, and because vanguard and parochial organizations can still win, albeit with fewer roads to victory, as the parochial Afghan mujahedeen did in Soviet-era Afghanistan and the Nicaraguan Democratic Force did in Nicaragua during the Nicaraguan resistance. (Guevara, 2001; Malici, 2008; Long, 1986)
Beyond organizational structure, insurgencies, if they wish to best a state, must act quick. In the RAND monograph “How Insurgencies End,” Ben Connable and Martin Libicki (2010), in an analysis of 89 cases, discovered that insurgencies cannot win by simply surviving and, by extension an insurgency’s chance of winning may decrease over time. Thus, insurgencies must be prepared to strike at the cores of state power quickly and effectively; the Free Syrian Army, currently embroiled in the Syrian Civil War, is a prime example of this. In the early stages of the war, FSA threatened Damascus and held significant parts of Aleppo, however, by November 2016, it was questionable that the FSA was still active at all, let alone an effective fighting force, thoroughly decimated by years of political infighting and desertions. (Associated Press, 2016; Banco, 2015; Fisk, 2015)

Moreover, Connable and Libicki (2010) found that obtaining and maintaining state sponsorship, meaning the “direct or indirect support provided to an insurgency by a nation-state,” is absolutely crucial for maintaining an insurgency and achieving victory. When insurgencies benefitted from state sponsorship they won at 2 to 1 ratio, whereas when insurgencies lost sponsorship, they lost at a 1 to 4 ratio. Further, the loss of state sponsorship often coincides with the loss of an insurgency’s sanctuary, which most often takes the form of “a secure base area within which an insurgent group is able to organize the politico-military infrastructure needed to support its activities.” These sanctuaries are often located within a state sponsor’s territory and, as Connable and Libicki discovered, insurgencies “rarely survive or succeed without some kind of sanctuary.” (Ibid)

Regardless of whether the sanctuary is located within the borders of a state sponsor, most insurgencies, if not all, require one; if not within the borders of the opposing state, it is within a “liberated zone” in the territory of the opposing state; naturally secluded from the enemy by
protective terrain – mountains, swamps, harsh vegetation, and so on. (Connable & Libicki, 2010) Moreover, sanctuaries need to be within a manageable distance of major political influence, which alleviates costs and allows insurgents to strike quickly. Because of this, and for insurgent morale, it is preferable that sanctuaries be located within a liberated zone. (ibid)

Finally, insurgents must be an effective fighting force. Typically, insurgents are inferior in terms of skill, materiel, and numbers, thus, effective use of terrain is paramount. Stephen Biddle (2005), in his well-known book “Military Power,” claims that success in the modern era of combat is highly dependent on the use of geography in modern war. Biddle writes that when cover and concealment, among other factors, are used effectively, the technological advantages of the state is dampened; he offers a multitude of example to prove his thesis, most notably the tactics and failures of the Taliban in Afghanistan against Coalition forces during the early stage of the War in Afghanistan vis-à-vis its more recent success using the aforementioned principles. In addition, in the aforementioned “Understanding Proto-Insurgencies,” RAND scholar Daniel Byman (2007) writes that “governments have trouble implementing control when the terrain makes movement difficult and aids concealment,” Further analysis from the RAND Corporation found that “terrain allowed insurgents to avoid/overcome [counterinsurgent] force firepower or vehicle advantages.” (Paul, Clarke, Grill, & Dunigan, 2013)

**State Geometry: An Underexplored Factor**

However, while much has been penned on the relationship of state geography and insurgency, comparative little has been written on state geometry and insurgency. Nevertheless, one scholar, Lewis Fry Richardson, could be considered a pioneer in the field. For his book, the ground-breaking *Statistics of Deadly Quarrels*, Richardson (1961) wrote an appendix “The
Problem of Contiguity,” which first appeared, posthumously, in the fourth volume of the “Yearbook of the Society for General Systems Research.” In “Problems,” Richardson divides the world into groups of equal populations located within boundaries have “homoplaty” or are as “compact” as possible.

The appendix was most noted for containing Richardson’s compactness equation, which has found a variety of uses within the academic community; Richardson himself used it in an attempt to theorize that states looked to obtain geographical compactness; so that their territory might be easier to defend. (ibid) Unfortunately, Richardson’s work was seriously hamstrung by the poor cartographic equipment available and the lack of a standard for measuring often incredibly complex borders at the time, a phenomenon we will discuss more in-depth later. (Richardson, 1961; Diehl, 1999) Nonetheless, even after better standards and tools became available, relatively few Social Scientists explored Richardson’s work on compactness; even fewer, if any, explored it in an international context or in regards to the stability of state systems. This is the gap we are looking to bridge – we are seeking to explore the effects, if any, of the variable of compactness in the internal stability of state systems, specifically in the context of insurgency.

Why compactness? Let’s theorize two states with the social and political situations. One of our states has the same border geometry and capital location as Malawi while the other has the same as Nicaragua. Malawi and Nicaragua have, roughly, similar areas, with Malawi clocking in at about 118,000 km² and the slightly larger Nicaragua hosting approximately 128,000 km². However, assuming our states maintain the same capital, due to state geometry, the farthest border from the Nicaraguan capital of Managua, despite being less centrally located, is only, approximately 460km, while the farthest border of Malawi exists 520km from Lilongwe, the
Malawian capital. Why does this matter? First, the work of scholars Ades and Glaeser (1995), among others, reveal that “spatial proximity to power increases political influence;” thus, as states become less compact and more elongated, who live in the borderlands of that state become less effective politically, assuming a one to one ratio vis-à-vis a compact state with similar area.

Among the select few Political Scientists that applied Richardson’s work on compactness to states is Vanzo (1999), who uses case studies of both World War 2-era Germany and post-independence Israel to effectively argue that compactness is often a goal of many states: though few other scholars, if any, have looked to build on this work. Beyond Vanzo, academics have often circled Richardson’s compactness wagon, so to speak. Among these academics is Halvard Buhaug, who, with Rød (2006), divided Africa into a grid of 100x100km cells (a technique pioneered by Richardson) because “the intensity” of “popular explanations of why and where civil wars occur…varies geographically with states.” In this analysis, Buhaug and Rød find that, in African conflicts, distance from the capital is positively associated with risk of separatist war and that distance to border, expectedly, shows a negative, but not strong correlation. In other research, Buhaug, with Gates and Lujala (2009), finds that duration of conflict is positively associated with distance from the capital; even more so than “conflicts located in rough terrain,” which his research leads him to believe is not actually supported by empirical evidence. Finally, in separate research, Buhaug and Gates (2002) find that “conflict zones that abut an international border will tend to be larger than conflict zones that do not.”

Somewhat similar to Buhaug, David Galula (1964) argues that larger countries and border regions are more difficult to control and adds that countries that are easy to compartmentalize are easier to control. Given this, on the surface, one might believe that Galala believes that compact nations are the least friendly to the counterinsurgents, but Galala notes that
the barriers of compartmentalization must be hard barriers, not forests, swamps, or, most importantly, borders, since these obstacles, in fact, help most insurgents. To him, the French counterinsurgency against the National Liberation Front (FLN) in Algeria is a prime example of how difficult it is to guard long borders against insurgent forces. It took a massive French military advantage plus a force of over 150,000 Muslims to secure the Algerian border, but comparatively little to cut off the coast from pro-FLN smugglers,

To Buhaug and Galala, Richard A. Griggs (2000) adds that countries with elongated borders are more difficult and expensive to defend against illegal border activity and, by extension, insurgency. He offers up Malawi (see Figure 1) as an example, a state whose “porous borders and location have made it a site of continuous refugee flows.” Simply put, states with high ratios of border areas to regular area will have a much more difficult time defending said border areas. Ultimately, Griggs writes that there is “a deeper need for… more scientific attention to boundaries” and that states, especially in south Africa, are avoiding this due to their own want of “power and sovereignty.” To compensate for this, he asks for the discussion on borders to be moved from politicians to geospatial political scientists.

Jordan Branch (2016) agrees, writing that “territorial shape has been an underexamined aspect of territorial disputes, claims, and rights.” He argues that the international community often divides territory consistently, not only because it’s politically efficient but because it feels right. Decision makers are therefore directing empirical studies and actions on territory towards

Figure 1: Malawi
solutions are not only practical, but towards solutions that just feel right. Furthermore, Branch does directly mention Vanzo and cautions academics on over-focusing on state shape because “defense, for example, has as much to do with other aspects of the ‘shape’ of a state, such as geography or terrain, as it does with geometric compactness.” I, cautiously, agree with Branch on this point, the more likely scenario is that terrain and geographic features mean more than geometric shape. History is littered with inferior forces who use terrain to overcome superior forces. In fact, as evidenced by word of Biddle and Byman above, many scholars contend that the use of terrain and geography is often the decisive factor in warfare.

Nevertheless, it’s best to take time to explore the discussion that Branch is putting forth; once again, I (and, I assume, Vanzo) do not dispute that, given the body of literature surrounding the geography issue, geography is important, but it should be apparent that the issue of geography should not be the only political calculus a state should make. For example, a state should carefully consider annexing many foreign nationals and their lands to gain a favorable, geographically advantageous border. In 1975, Indonesia invaded annexed the eastern half of Timor Island; the move put the entire island under Indonesian control and, as a result, geographically strengthened Indonesian defenses against invasion by pushing Indonesian borders to the ocean; thus, denying an expanding, Timor-allied China a more favorable border area to attack. However, the move was met with widespread condemnation and an unmanageable insurgency that lasted until East Timor and Indonesia split in 1999. (Freedom House, 1999)

Another example is the Israeli occupation of the Sinai after the Six Days’ War in 1967. The Israelis, looking to gain strategic depth against the Egyptians, occupied the entire Sinai Peninsula, constructing a massive, expensive defense barrier, named the Bar-Lev Line, along the Suez, a seemingly natural defense barrier against Egyptian tanks. Yet, by taking this territory,
authors Ambrose and Brinkley (1997) note, the “Israeli Army....had overextended itself...by occupying all of the Sinai up to the east bank of the Suez.” This hints that, despite the favorable geographic position, Israel could not effectively administer the territory, negating much of the strategic depth they perceived as important.

When the Egyptians launched a surprise attack in 1973, the Bar-Lev virtually melted and the Israelis were dealt a moral defeat that redefined Egyptian-Israeli relations. (Tucker & Roberts, 2008) In this case, it’s clear that Israel had simply overestimated the worth of geography in its political calculations and underestimated the ability of other factors to undermine the usefulness of natural barriers. It should also be noted that, per Vanzo (1999), the Sinai occupation made Israel much more compact, but this is besides my ultimate point; my goal using these examples is to demonstrate that other factors, including, perhaps, state geometry, can mitigate any gains that geographic advantages may bring and states should be cautious about over relying on “geography or terrain.”

The Israel example also produces a second point: can the location of the capital city affect the efficiency of the less compact states? A capital in more central location of the state, perhaps just north of the then-former border, may have given Israel a better opportunity to repel the Egyptians. Why? Perhaps it may have given Israeli politicians and tacticians greater knowledge of the terrain and local Bedouins. For instance, Jean Gottman (1961) writes that since World War I, several states have relocated their capitals and several these relocations have been to an inland, central location. He also writes that capitals have often served as a “pluralistic hinge, articulating the various sections, cross sections, networks and groups of interests within a territory.” World-class capital cities like Washington, Tokyo, Stockholm, Ottawa, and Brussels
all fall into this category; primary as sociocultural hinges, intended to link sections of a state that has “different cultures and social structures.”

Thus, it should be no surprise that autocratic regimes looking to dominate states and insulate themselves from dissention move their capitals to relatively remote areas. A World Bank report found “robust evidence that isolated capitals are indeed associated with misgovernance, controlling for a number of variables that are reckoned to correlate with quality of governance and isolation of the capital, and using different ways of measuring these concepts.” (Campante, Do, & Guimaraes, 2014) In their report they define an isolated capital, in their definition, is a capital that exists relatively far from the spatial center of a state’s population; this, of course, concurs with the work of Ades and Glaeser (1995), who write that “spatial proximity to power increases political influence;” and Buhaug’s discovery that insurgencies are more robust near the border. (Buhaug & Rød, Local determinants of African civil wars, 1970-2001, 2006)

Ades and Glaeser’s assertion provides us with a link to insurgents; as we have discussed, a running thread among insurgents is their feeling of powerless in the government. In Chechnya, a federal subject of Russia, insurgents don’t sympathize with radical ideologies, but rather “because they feel powerless to do anything else in to violations committed against them and their loved ones.” (Schaefer, 2010) Unsurprisingly, the Chechnya is located almost two thousand kilometers from the Russian capital of Moscow. Similarly, during his time in Doda, a town in Jammu and Kashmir, Harjeet Singh (1999) discovers that a rural population supports insurgents when are neglected by the government and feel powerless to control their lives. This is so prevalent a theme that many counterinsurgency (COIN) handbooks see empowering citizen as an exceedingly crucial step in COIN strategy.
THEORY

To uncover the relationships between insurgencies and state morphology, we will begin with the first of two hypotheses:

H1: States that are less compact will experience more days of insurgency than states that are more compact.

Producing states that can effectively administer force within their borders is key to producing viable states. Non-compactness creates challenges that can severely impede states, especially in the third world, where resources are often scarce. Let’s return to Malawi as an example of a noncompact state; again, Malawi is approximately 120,000 km$^2$, but nearly 900km from its northernmost end to its southernmost end. For comparison, Nicaragua is over 10,000km$^2$ larger than Malawi (approximately 130,000 km$^2$) but no two places are more than 500km apart due to its compact design. This means that Nicaragua can move material and materiel within its borders with greater efficiency and much lower cost, despite its larger size.

Even when controlling for the shorter distances of Malawi’s East-West border, transportation of material is still inefficient. To illustrate this in a simple manner, let’s take a circle, a perfectly compact shape and compare it to an uncompact ellipse. For this example, both shapes have an area of $\pi$, thus our circle has axes of 2 our ellipse has a major axis of 4 and a minor axis of 1. Considering this, our ellipsis would have an average distance to the “border” that is twice as large as a circle’s average distance to the border. Of course, examples within our state system are infinitely more complicated, but this translates the added cost of a noncompact state rather well. This seems trivial to a degree, but recalling the work of Buhaug (2006) tells us that insurgencies are commonly found in the borderlands of states, far from the eyes of the
polity; thus, nations like Malawi may be more likely to be facing insurgent forces at the far edges of its territory.

In our literature review, we noted that Buhaug and Rod (2006) found that separatist war is positively correlated with distance from the capital of a state. This, according Buhaug, not only makes insurgency more likely in non-compact states, it also means, between states of equal resources and size, that non-compact have equal resources to deal with higher rates of insurgency. This is a crucial piece of political calculus in state-building exercise; states that are undergoing state-building are fragile and particularly sensitive to insurgency. Additionally, the organization or state overseeing the state-building operation would want to complete the operation with the utmost efficiency.

If I find this hypothesis has merit, then compactness could be an exceptional variable in the state-building equation. State-building operations, to this point, have been overwhelmingly focused on maintaining the status quo in relation to border fixity. Still, if non-compact states are prone to high amounts of insurgency and, by extension, an increased rate of failure, then the international community would be required to place a greater emphasis on borders and their permutations, both for domestic and international security. Indeed, nation-states are hesitant to fracture states due out of fear that it may undermine their sovereignty, however, if noncompactness significantly increase state failure, they may have no choice. On the other hand, if this hypothesis doesn’t have merit, then states need to understand that their quests for compactness, as noted by Vanzo, is unlikely to produce the outcomes they are seeking.

My second hypothesis is:
H2: If the source of power in a state, the political capital, is far from the centroid of the state, then it negates the strengths of a compact state.

As research from the World Bank noted, capitals that are geographically isolated are less sensitive to the will of the people. (Campante, Do, & Guimaraes, 2014) There is an argument to be made that a capital should be placed at the center of population in the state, providing somewhat equal access to all citizens, however, moving the capital as the center of population moves is untenable for many states. Also, it makes the symbols of the state less opaque and, by extension, reduces the visibility and traditions of the state. Moreover, if we take the capital to be a source of a power gradient that emanates from the capital, as the World Bank report suggests, then those who reside at the edge of the gradient would be even more disenfranchised if they were part of a government that followed the center of population rather than the geographic centroid. (Ibid)

A counter to this reasoning would be that large populations could exist at the state border and keeping those populations “in check” would be much more crucial for a government than those in relatively remote areas. However, the Army’s Strategic Studies Institute notes that economic grievances are key in many insurgencies and, further, a lack of proper transportation, which is the norm for many rural border regions, is a crucial factor in addressing the lack of economic opportunity. Additionally, insurgencies can thrive in areas in areas with little population provided they are sufficiently remote. Regardless of distance, large population centers are much more likely to be connected via high speed transit to the capital region of any state, therefore the effects of the “gradient” are felt much less in these areas. Finally, the economic cost of building roads and other transportation infrastructure to the remote borderlands is much less with a capital in the geographic centroid of the state.
RESEARCH METHOD

Richardson’s compactness equation is as follows:

\[ 2\sqrt{\pi A/P} \]

In this equation, \( A \) translates to area, and \( P \) substitutes for perimeter. In the breakdown of this equation, scholar Paul Francis Diehl provides two of the chief advantages of Richardson’s method. First, according to Diehl (1999), “Richardson’s formula has the advantage of mathematically controlling for size,” second, Richardson’s equation provides us with an incredibly straightforward value between 0 and 1; 0 gives us my an imperfectly compact line and 1 would signify a perfectly round circle. Given this simply and the extreme malleability of the equation, along with its long history with in the academic community, we be using Richardson’s equation to determine the compactness of each state.

However, measuring the length of boundaries is notoriously difficult and, when it comes to coastlines, impossible to obtain an exact number; Lewis Fry Richardson himself noted this while attempting to survey the Britain coast during the 1950s. In 1967, Richardson’s research would lead B.B. Mandelbrot to write about the “self-similarity and fractional dimensions” of coastlines, research that would later lead to creation of the field of fractal geometry. In his work, he writes that “geographical curves…can be considered superpositions of features of widely scattered characteristic sizes; as even finer features are taken into account, the total measured length increases, and there is usually no clear-cut gap or crossover, between the realm of geography and details with which geography need not be concerned.” (Mandelbrot, 1967)

Thus, many states have wildly different measurements of their coastline, which is often assumed to be accurate and aggregated by others, most notably the CIA World Factbook.
Therefore, the base of my research, the boundary line calculations of states, needed to be compiled with similar standards and scrutiny. Thus, I chose the March 2013 version of the Department of State’s Large Scale International Boundary Lines and World Vector Shorelines (LSIB-WVS) dataset. The Department of State’s Humanitarian Information Unit considers this dataset to be “to be the most accurate worldwide international boundary vector line file available.” (Department of State, 2016) Of course, the recognition of states themselves is largely subjective and the LSIB-WVS reflects the foreign policy of the United States, which revolves around both the “facts on the ground” and US opportunism. Unfortunately, due to the lack of a more objective dataset that is as exceptional as the LSIB-WVS, our research will have a natural US bias.

To transform and construct the LSIB-WVS for my dataset, I used ArcGIS Pro, developed by Esri. Within ArcGIS, each state boundary was transformed into its convex hull, which is defined as “a set of points $S$ in $n$ dimensions is the intersection of all convex sets containing $S$. ” (He & Petoukhov, 2011) In more simple terms, the convex hull is the shape that you receive when you stretch a rubber band around collection of points. The primary reason for this transformation is fragmented states; with fragmented states, Richardson’s compactness would not control for the distance between the landmasses of fragmented states – states like Kiribati, an island state in the heart of the Pacific, which is spread over thousands of kilometers. When analyzing Kiribati, Richardson’s compactness would essentially describe it as if all the

![Figure 2: The convex hull of a figure](image-url)
islands composing the states were separated by an infinitesimally distance and as if they had an infinitesimal land bridge connects each island. This would be a poor way to codify states when we are attempting to understand, essentially, how distance from a capital effects insurgency.

To prevent insignificant landmass from dramatically misrepresenting a state’s convex hull, I removed any landmasses that failed to account for less than one percent of state’s landmass – for instance, Guam, the Aleutians, and the various Polynesian islands under the tutelage of the United States are not included. Further, any territory that was deemed by the U.S. Department of State, in the LSIB-WVS, to be autonomous was also disregarded, regardless of claim. Despite the fact that these territories are not considered to be states by the international system, they are administered locally and, thus, distort the conceptual gradient of political power that is at the center of this paper; Greenland, the British Overseas Territories, and Taiwan would all fall under this umbrella.

To calculate the locations of each state’s capital, I chose Natural Earth’s Populated Places dataset. Primary among the reasons for choosing the work of Natural Earth is its pedigree; it’s maintained by a host of cartographers hailing from world renown entities like Apple, the Washington Post, the United States National Park Service, the University of Wisconsin, and more; additionally, Natural Earth’s work has been featured in the aforementioned Washington Post, in addition to well-known publications like the Atlantic and WIRED. (Natural Earth, 2016) Finally, the dataset has an acceptable resolution at 1:10m and naturally compatible with the ArcGIS software that I used to produce the final dataset; this dataset was further verified for accuracy against the ESRI’s topographical layer. Finally, when any state had more than one capital, the capital that hosted the state executive was chosen – for instance, I chose Pretoria to represent South Africa.
Using the convex hull of each state’s borders and the location of their capital, I was able to produce a *capital centrality score*. This simple measure is represented by the following equation:

\[
capital\text{ centrality score} = 1 - \left( \frac{c}{b} \right)
\]

In this equation, \(c\) is equal to the distance of the capital from the centroid and \(b\) is equal to the distance of the farthest land border or coastline to the centroid – the least central possible location for a capital. This equation allows us to, first, score the centrality of the capital on a scale of 0 to 1, with 0 being the least central and 1 being the most central and, second, allows us to “normalize” the location of each capital; it would be unfair, given our hypothesis to consider the Russian capital of Moscow to be more isolated than the Swedish capital of Stockholm, despite the fact that Moscow is approximately 3,000 miles farther from Russia’s centroid than Stockholm is from Sweden’s centroid – this is, of course, due to the fact that Russia is much larger than Sweden. Simply put, we are not measure physical distance nor the size of the size, but rather it’s geometric features.

For my insurgency dataset, I have selected Max Boot’s “Invisible Armies Insurgency Tracker.” (2013) A myriad of exceptional datasets exists for insurgency, but I contend that they have significant problems for analysis. Boot writes “Many databases include only conflicts that pass a certain threshold, such as inflicting over one thousand battle deaths. This excludes groups such as the Ku Klux Klan and the Baader-Meinhof Gang, and produces bias in favor of insurgents—just as a study of start-up companies would be biased in favor of entrepreneurs if it were limited to only those firms that achieved a certain revenue threshold or stock price. Most start-ups, like most insurgent groups, never get very far, and this fact needs to be recorded.”
(ibid) It is for this reason that I avoid the two most noteworthy datasets, the Uppsala Conflict Data Program (UCDP) and the Correlates of War (CoW) project.

For the Uppsala Conflict Data Program, this is somewhat ironic, since it was created to mitigate the author’s criticisms of the CoW project; the creators, Gleditsch et al (2001), explain in their introduction of the UCDP that the CoW’s minimum of 1,000 annual battle related death, is simply too substantial for a worthwhile analysis of insurgency. For example, the well-known separatist insurgencies in the Basque region of Spain do not make the CoW dataset, nor does the Northern Ireland insurgency conducted by the Irish Revolutionary Army, despite the fact these insurgencies have resulted in the deaths of thousands. (Government of Spain, 2013; The Guardian, 2010) More reasonably, the UCDP datasets that are relevant to insurgency (the UCDP One-sided Violence Dataset and UCDP/PRIO Armed Conflict Dataset) lists 25 deaths in one calendar year as the minimum criteria to be considered an armed conflict.

While both are excellent datasets, even the UCDP is too high for our analysis. To illustrate this, let’s examine the Khalistan Sikh insurgency in India, which is included in the Invisible Armies dataset from 1984 through the last data at the end of 2012 but is largely absent from the UCDP dataset (it is included in 89-93 of both UCDP dataset, excluding 1991, of the One-sided Violence Dataset). (Melander, Pettersson, & Themnér, 2016) In “The Sikh Separatist Insurgency in India: Political Leadership and Ethnonationalist Movements,” Jugdep Chima (2010) illustrates that the Sikh insurgency was underway by 1984 and continued until a unified India effectively “destroyed” the insurgency in 1997. However, many of the Sikh separatist groups, including the infamous Babbar Khalsa, continued to be well funded through at least 2012 and still showcase the ability to carry out intricate attacks. (South Asia Terrorism Portal, 2012) This meets Boot’s argument for inclusion in his Invisible Armies dataset, the criteria for which is,
in conjunction with the definition of insurgency that we established for Boot, “they caused some deaths and drew some attention from contemporaries and historians.” (Boot, Invisible Armies Insurgency Tracker, 2013)

Many scholars would argue that this is too loose, but I disagree. Boot’s criteria matched all the definitions discussed above. More importantly, I argue that a more inclusive dataset means that we can more accurately measure the intense feelings of dissatisfaction that produces the conditions necessary for insurgency and the true trajectory of an insurgency. Indeed, an air of subjectivity plagues this criterion, but that air remains in other datasets; for example, the authors of the CoW subjectively consider anything under 25 deaths per year to be an unimportant to the story of an insurgency. However, the Babbar Khalsa clearly demonstrates that this is not the case.

Within Boot’s dataset, I will examine a section beginning in the year 1970 and ending in 2012, three months before LSIB-WVS was published. 1970 was chosen primarily to keep issues from shifting borders at a minimum, although Boot does account for some changes in the international system. For instance, the insurgencies in former Soviet Republics during Soviet Era are counted under the states that grew out of them, not under the Soviet Union or Russia. However, Boot’s dataset is both more simplistic and probably not as well maintained as CoW and UCDP; even if it was, it would be difficult for Boot to ascertain all the boundary changes in an extended time period.
RESEARCH

VISUALIZING THE INTERNATIONAL SYSTEM

To enhance our discussion on state geometry, it is important that we discuss that how the state system looks. First and foremost, the mean compactness was a relatively high .8583, indicating that Vanzo’s assertion that states seek compactness has some merit. Further, on a regional level, the Europe had, by far the highest compactness, followed by Sub-Saharan Africa. The state with the lowest compactness was Mali, an island state in the Indian Ocean, at .35, followed by another archipelago state, Mauritius at .39; no other state fell below .5. The least compact non-island state was, unsurprisingly, Chile, which maintains a compactness of approximately .57. The most compact states were dominated by island states, Nauru and

<table>
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</table>
Suriname, with .971 and .97 respectively, followed Sierra Leone at .97. The mean compactness is best represented by European state Albania, as seen in Figure 3.

For our capital centrality score, we found the mean to be .555; on a regional level, North America had the least centralized set of capitals at .38 and Southern Asia had the most centralized capitals at .63. The least centralized capitals were South Tarawa (.28) of Kiribati, a large archipelago state, and Porto Novo (.0289) of Benin, a small West African state. The most central capital was Spain’s Madrid, which scored .982. The mean capital centrality score is almost exactly that of North Korea’s Pyongyang, which is represented in Figure 4.

Moving on to insurgency, the average state
Ryan Hall  Shapes and Noise  33

experienced approximately 3,754 days, just over 10 years, of insurgency in the 43 period that we
examined. By region, Southern Asia (7753 days) and Middle East/North Africa (6764 days)
regions, unsurprisingly, had by far the highest mean insurgency
while Latin America (1843 days) and Europe (2045 days) had the
lowest. 105 states felt no insurgency over the course of the 43-
year period while 11 experienced insurgencies from beginning to
end. The 3725 days of insurgency in Nepal is just 30 days below
the mean days of insurgency and best represents cases in real terms.

**RESULTS**

I begin by testing the relationship of Richardson’s compactness and the number of days
of insurgency as a universal principle by calculating the *Spearman’s r* between the two variable
for the entire dataset. *Spearman’s r* finds a small relationship between the two with a mid-level
significance, but the relationship is rather surprising, as states become *more* compact, they see
more days of
insurgency. Indeed,
scrutiny of the
quadratic scatterplot
also detects a similar
relationship between
the two variables and
potentially reveals
some more

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<tr>
<td>SSA</td>
<td>4905.266</td>
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interesting associations. A cursory examination shows that insurgency contends that many states with low compactness have had no insurgency. Indeed, a cross-tabulation of our variables (insurgency days grouped into 0 and then, roughly, thirds) confirms this; nearly three-fourths of the lowest quartile (least compact) had no insurgency while over half of the highest quartile experienced the most occurrences of insurgency. To better understand what variables may be at play, I dissected each quartile to their component parts – the states themselves; additionally, seeking some geopolitical clarity, I have sorted them by region as well.

For the lowest quartile, we notice an interesting set of circumstances; first, only one nation, Japan, has had insurgency the entire length of our dataset (15705 days) while 4 states of the most compact quartile reached the maximum. Further, the least compact states are dominated by Latin America, East Asia/Pacific, and Sub-Saharan Africa, while the most compact states are dominated by our Europe/Central Asia and Sub-Saharan African regions. In the former, only four of the fourteen East Asian and Pacific and two of the Latin American countries; in the latter, only six of the seventeen Europe/Central Asia felt insurgency. Perhaps the most interesting portion of these samples is the vast gulf between the Sub-Saharan African states – of the least compact, only two, Eritrea and Somalia had insurgency while the vast majority of the most compact states saw insurgency.
<table>
<thead>
<tr>
<th>Least Compact States</th>
<th>Most Compact States</th>
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<tr>
<td><strong>NAME</strong></td>
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<td>TRINIDAD/TOB</td>
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Why are these more compact states seeing so much more insurgency? I posit that it’s more so related to size than compactness. Examining the Sub-Saharan African states specifically, the mean area of the most compact states is dramatically larger than those of least compact states. Indeed, when testing our entire dataset for a correlation between days of insurgency and physical size, Spearman’s r found a .28 correlation with a p value of less than .01 when testing the real area of the state against insurgency days. To add another wrinkle to this relationship, I also found a .33 correlation with a p-value of less than 0.0001 when testing the relationship between compactness and the area of a state.

What does this mean when it’s all put together? We have marginal, if any, that compactness prevents insurgency, however, we do have significant correlations between the area of a state and its compactness, lending credence to Vanzo, who suggested that states seek to become more compact, and Branch, who suggests that states are compact because compactness feels right. Further, as states grow, my data suggests that, as states get larger, they experience more insurgency. Thus, it may be that states are trying to become more compact and, in the process, risking their government and the rights of their citizens; still, more research is needed.

Regarding my second hypothesis, although we have found no correlation that suggests that compactness has an effect on the number of days of insurgency, we can still examine how the centrality of borders can affect the number of days of insurgency. An examination of each group of insurgency days reveals that it does seem to have some relationship with capital centrality score; however, it is not a negative relationship – there’s a

<table>
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<tr>
<td>5000 to 10k</td>
<td>.57937087</td>
</tr>
<tr>
<td>10k+</td>
<td>.61474955</td>
</tr>
</tbody>
</table>
distinct positive trend. Although, this does seem counterintuitive, I find there’s a very simple explanation.

First, analysis using Spearman’s r finds a low significance between the two variables, demonstrating that this trend is the result of another variable. Further, as with our relationship between insurgency and compactness, Spearman’s r does find high significance (with a p value of .0001) in a positive relationship (.28) between distance and days of insurgency. Further, adding area and physical distance to the examination of each group of insurgency days, sans Russia – a massive outlier in the third group, supports the suggestion that physical space has a much greater effect on insurgency. Therefore, when we put this all together, my data indicates that, as states grow, repositioning political power has little ability to mitigate the potential negative effects of that growth.

<table>
<thead>
<tr>
<th>Insurg Leng (in days)</th>
<th>Mean CapCentScore</th>
<th>Mean CapToCent (km)</th>
<th>Mean Area (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>.53341082</td>
<td>196.10836</td>
<td>255122.12</td>
</tr>
<tr>
<td>1 to 5000</td>
<td>.5399959</td>
<td>314.79438</td>
<td>978166.08</td>
</tr>
<tr>
<td>5000 to 10k</td>
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<td>334.10296</td>
<td>1066742.6</td>
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<tr>
<td>10k+</td>
<td>.61474955</td>
<td>395.15401</td>
<td>980002.38</td>
</tr>
</tbody>
</table>

**CONCLUSION**

My findings lend support to Vanzo’s assertion that states seek compactness as they grow and Branch’s assertions that other factors are much more important in the state building equation and producing compact states just because compact feel right is, obviously, a very poor strategy. More clearly, my interpretation of my data suggests the following story: when states look to grow, they choose territory that makes said state more compact, because, as Branch suggests, it feels correct. Yet, conversely, there seems to be little “correctness” in this choice and further,
that growth may put the government and people of that state at greater risk. When looking for solutions to this problem, a state may look to reposition their capital to a more central location, as Gottman suggests, but there is little support for this solution in my data.

However, beyond this, there is much more to be examined on this topic, even with in the field of asymmetric warfare. Future research should focus on expanding the number of years included in the data, despite the difficulty that the large amount of territorial reconfigurations in the international system grants the task. In doing this we may be able to discover a longer term trend and better understand if compactness or the emphasis on it is truly related to the failure of these states; if this is the case, there may be a need to “redraw the map of Africa,” as Matua suggests, albeit in a much different way than my hypotheses suggested. Moreover, other datasets and methods should be used to review this problem, as both those of mine have various weaknesses; for example, calculating the convex hull necessitated removing some politically relevant territory, such as the Hawaiian Islands.

Moreover, our results should not be taken to invalidate the work of the other authors included in this paper, our measures had key differences with much of the research reviewed. For example, the work of Buhaug and the World Bank focuses much more on the physical space where this work focuses much more on the geometric shapes and the normalized distance of political power. Indeed, my cursory examination of the days of insurgency with variables of physical area and distance from capital to centroid yield significant positive correlations.

Still, as other scholars have mentioned, state geometry is underexplored in many other areas of Political Science. As I demonstrated in the case of our ellipse, elongated states are inefficient in a vacuum and the costs of compactness may manifest their selves in other ways; for example, increased refugee flows, increased costs of government, decreased economic growth,
less favorable defense outcomes, among others. Thus, the potential application of this research would greatly override the highly complex methods necessitated by the endeavor; but it is complex, nonetheless - even Lewis Richardson, a ground-breaking mathematician, was frustrated by the complexity of the issue. (Richardson, 1961) Yet, with the continuous introduction of an incredible wealth of tools and datasets, we are moving ever closer to completing Richardson’s work.
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