SMA Reach-back

Question (S#1): What are the correlations between the US/coalition operational and tactical actions in theater effecting terrorist activity throughout the world (i.e., external events). For example, does the loss of ISIL controlled territory or kill/capture of an ISIL high value target lead to an increase/decrease in terrorist attacks in other areas of the world? Can location, intensity, duration or timing of attacks be predicted from a model?

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Executive Summary

Dr. Jen Ziemke, John Carroll University

The contributors weigh in on this question, doing their best to read the tea leaves. If Mosul should fall, what's next? Where, when, and why?

Getting to the Where: Location

Jen Ziemke (John Carroll University) suspects that, in Iraq, as the primary focus otherwise shifts westward as the main front retreats toward Syria, it would be very prudent to continue to **protect the rear from attacks on cities like Kirkuk**. Regionally, continuing signs of instability in **Saudi Arabia** might place sites there at greater risk vis-a-viz some others. Due to their relative proximity to the battlefield, **Beirut, Istanbul, or Amman** continue to be at risk**. Cafes, nightclubs, & bars** in these locations are more imaginable choices than many other alternatives **because such targets would serve to both maximize casualties and send a culturally-relevant message**. Further afield, given the state of aggrieved populations in certain European suburbs, we suspect locations in Italy, France, and symbolic targets like the London Eye to continue to be at risk.

What about American targets? Victor Asal & Karl Rethemeyer (University of Albany SUNY) find that, despite the fact that "anti-Americanism is probably the most universal and widespread of attitudes," **the relative risk to American targets is low**. However, the authors find that **VEO's are more likely to attack countries with American military bases**, and that the **risk of targeting is particularly acute when a significant number of American troops are stationed inside non-democratic countries,** suggesting that their presence "may be generating a great deal of resentment. In addition to creating a motivation, **the stationing of US troops abroad provides convenient military and civilian targets that can be killed without travelling to America**."

Timing is Everything: Battlefield Rhythms & Op-Tempo

Drawing from the literature on Complex Systems, Neil Johnson (University of Miami) argues that the ***timing*** of attacks follows reasonably well the "progress curve" (known from organizational development and learning literature)**.** Similarly informed by a complex systems perspective, Ziemke asserts that converting conflict data into sonic landscapes for pattern analysis allows us to *hear* the battlefield rhythm and op-tempo of the conflict.

When micro-level event data (battles, massacres, ceasefires, etc) on the 41 year long Angolan war are played over time, we learn just how *slowly* these campaigns tend to begin. Like drops of water slowly coming out of a faucet, each individual event stands out because of the silence between events. From such analysis and observation, Ziemke asserts that losing groups do not go down quietly, nor without a fight, and what begins as individual events eventually turns into a firestorm of violence. But then, and even more rapidly, the fire dies, the losing side scatters, and the storm subsides. A few chirps amidst the silence mark the end, *and the war dies in much the same way it starts, as an inverse refrain on how it began, little by little, punctuated by silences: an event here, an event there*. Adagio crescendos to an absurdist cacophony, but just as quickly, it reverts to the same Adagio in the end**. Thus, the start of the war helps to inform how it ends; it is actually the same melody, played again,** but this time in reverse.

Severity

Neil Johnson (University of Miami) notes that the ***severity*** of any given attack "always seems to follow a so-called power-law distribution", an occurrence repeatedly noted in the literature on conflicts and a feature of complex systems. This means that in every war, there are many events with relatively few casualties, but only very few events that are utterly catastrophic. Since extreme events and black

swans are of heightened interest, *when* would we expect the risk of experiencing a catastrophe to be the highest?

Ziemke finds from her analysis of the Angolan war that when UNITA began to *lose*, they lashed out against civilians, and both the pace and severity of each event vastly increased. *Losing* is what accelerated the war into a new period, and a veritable cacophony of incredibly destructive events followed. It was as if an aggregation of losses on the battlefield ushered in a kind of phase transition in the war where extreme, rare events became more likely.

While in some ways ISIL strategy markedly differs from other violent groups, its tendency to lash out against civilians nevertheless may end up mirroring other quite different rebellions and insurgent organizations in history in terms of *pattern, tempo, and timing*. Consider, for example, the behavior of the RUF in Sierra Leone during their reign of terror under *Operation No Living Thing*, or UNITA's appalling treatment of civilians during the latter half of the second Angolan war (1991-2002), or the surge in civilian deaths in Sri Lanka just before the LTTE was defeated in Sri Lanka in early 2009. Despite how different these organizations may be from one another, they share a common battlefield rhythm: when they began to *lose* the war, lose territory, and lose fighters, each group escalated their campaign to deliberately target civilians, and in increasingly grotesque ways, and even more than before.

Taken together, one might expect that if ISIL finds itself facing an imminent, existential threat to its survival, **they might commit an unimaginable mass atrocity in whatever city they are entrenched, even if this behavior risks destroying a large number of their own fighters along with everyone else. As coalition forces continue to advance, one could imagine a David Koresh-style cult-like suicidal response**, as many in their ranks might actually prefer this horrific outcome to defeat by another hand.

In the short term, as coalition forces render ever more devastating blows to ISIL, we fear that civilians in the area of operation may face even worse fortunes. However, **when we begin to see ISIL commit massive atrocities on a previously unseen scale, the horrific events themselves likely are signals of their imminent defeat**. The war (at least in the kinetic space, and in the near-term) will be nearing an end.

So what can be done to hasten ISIL's demise?

Is targeted killing effective?

Rich Davis applies these questions to the Israeli-Palestinian conflict. He asks whether Israel's targeted killing and apprehension program reduced the ability for ***Palestinian*** militants to project violence back into Israel. He finds that **targeting Hamas' militant network was effective and indeed led to a significant decline in both the number and lethality of suicide attacks by Palestinians inside Israel**. The "further up the production line" the Israeli's were able to penetrate, the better. As **new militants who lacked experience replaced** their deceased and/or imprisoned predecessors, less attacks occurred in general, and **the attacks that did occur were less lethal**. Additionally, as more and more of the network began to disintegrate, Hamas tended to allocate more resources "toward self-preservation, and less towards suicide attacks."

Implications of Davis' work applied to the Counter-ISIL campaign seem to suggest that missions targeting ISIL leadership might in the long-run lead to a decline in the ability of ISIS to project power and terrorize elsewhere, and that "the further up the production line" one was able to target, the better.

Somewhat in line with what Davis suggests, Johnston and Sarbahi also find that "**drone strikes *decrease* the number and lethality of terrorist attacks**," at least in the short run. Taken together, the moral seems to be: "targeting works". However, As Victor Asal and Karl Rethemeyer point out, research on the effectiveness of leadership decapitation, in particular, is mixed. Bryan Price suggests that **leadership decapitation is only effective when applied to young groups**. As groups mature, the effectiveness of leadership decapitation diminishes altogether. So if decapitation stands a chance of influencing outcomes with respect to the VEO under consideration here, the sooner, the better, and focus on the violence production line.

However, Victor Asal and Karl Rethemeyer suggest the reduction in violence might **actually be due to the reconciliation efforts instead**, and not the targeted killings. To conclude, one should ask: Historically, how effective has the use of violence been in terms of counteracting violence? Is using violence to counteract violence better than any of the alternatives?

SME Inputs

US/coalition operational and tactical actions in theater effecting terrorist activity throughout the world

Victor Asal, & R. Karl Rethemeyer, University at Albany SUNY

Introduction

An analysis of the impact of specific actions by US/coalition operational and tactical actions in theater and how they might impact terrorist activity throughout the world is something that has not been quantitatively analyzed with recent data and has not been analyzed broadly within the context of ISIL's behavior currently. I should note though that this kind of analysis is eminently possible and the answers that could be derived are potentially very useful for policy makers. If we look specifically at the question of the impact of leadership decapitation there is clear evidence in previous research that (a) such analysis can be done and (b) decapitation can both positively and negatively affect the behavior of violent non-state actors (VEOs). While there has not been a lot of work looking at current efforts (there is a need to increase both the scope and speed of data collection to close both coverage gaps and time lags) in the sections below we will review some of the work that has been done using existing datasets to assess the impact of (a) factors that make organizations more likely to target the United States and American citizens, (b) counter-terrorism policies in the Middle East and North Africa region on VEO behavior, and (c) the impact of targeting leaders and drone strikes on VEO behavior.

Targeting Americans[1] - The impact of US troops in foreign countries

Hating America – and killing Americans – at times seems like a mandatory activity for terrorist organizations. One researcher of terrorism went so far as to argue that "it is worth stating at the beginning that despite various goals and motivations of modern terrorists, anti-Americanism is probably the most universal and widespread of attitudes. Terrorists of the extreme Right and Left, religious fundamentalists, members of radical ecological movements, and anti-globalists treat the

[1] Note material in this section has been taken from the unpublished manuscript by Asal and Rethemeyer "Targeting America and Americans"

United States as the main obstacle to realizing their ideals and dreams (Stankiewicz, 2005, 784)." When one looks at the record of domestic and international terrorists, though, only a small minority of identified organizations actually select American targets for international or transnational terrorism (MIPT, 2006). Nonetheless organizations that target the United States have had an enormous effect, resulting in two wars, the first major reorganization of the United States government since World War II, and an enormous shift in the allocation of federal and state resources (Betts, 2002, 27).

Despite this enormous redeployment of public resources, as far as we know no one has actually studied the factors that make a terrorist organization likely to attack US citizens or interests. While there has been some qualitative research on why groups might want to target the West or the United States (Cronin, 2003) and on particular groups that seek to target the US (Laqueur, 2004), no study has focused quantitatively on features that make it more or less likely that an organization will choose to target the United States. Indeed, we have been able to find only one quantitative analysis that examines *any* factors that might increase the chances a group or individual will target the United States, its citizens, military, or economic interests (Sobek & Braithwaite, 2005). The extant qualitative literature identifies American corporate, cultural, and military presence and influence on countries as a motive factors for attacking the United States (Hoffmann, 2002; Jervis, 2003, 379). Islam and anti-globalization movements have also been suggested as key motivators for such attacks (Ajami, 2001, 4; Cronin, 2003, 34).

While not based on recent data (the analysis looks at terrorist organizational behavior from 1998-2005) work by Asal and Rethemeyer (unpublished manuscript) does examine the factors that lead organizations to targets the United States or American targets abroad. While the analysis shows that organizations based in countries that have a higher level of US bilateral trade and number of McDonalds in the country (which capture cultural and economic ties to the United States) has a negative or no effect on organizational behavior, the same is not true for the stationing of US troops. Stationing US troops abroad is directly related to the behavior of terrorist organizations when it comes to targeting Americans.

Specifically when it comes to the placement of US troops in a country, the United States is often "…shoring up the stability of regimes around the world (Juergensmeyer, 2003, 183)" in the service of said status quo. Yet US efforts are often made in circumstances where the ruling regime is actively opposed by violent internal forces that are seeking to upset the status quo. One specific policy that has been identified as a goad to terrorist activity is the presence of US military forces overseas: "The mere presence of U.S. contingents overseas is an ingredient in terrorist resentment against the United States (Pillar, 2001, 61)." With more than "800 Department of Defense installations (Johnson, 2002, 25)" overseas, US military presence may be generating a great deal of resentment. In addition to creating a motivation, the stationing of US troops abroad provides convenient military and civilian targets that can be killed without traveling to America (Pillar, 2001, 69). On the other hand much of the literature on the effect of United States troops focuses on the places where America is supporting authoritarian regimes (Pape, 2005). We thus it may not be military presence by itself but presence in countries that are not democracies.

Quantitative analysis of a dataset containing information on 395 terrorist organizations active between 1998 and 2005 found a strong relationship between US troop presence in a non-democratic country and violence against US interests. When 1,000 or more US troops are stationed in a country – regardless of regime type – terrorist organizations in that country are 11.13% more likely to target US interest at home or abroad. However, 1,000 or more US troops are located in an

authoritarian country the likelihood that terrorist organizations in that country will target US interests increases to 48.6%. While this finding was derived from data from 1998-2005, these results indicate that there are clear costs to stationing US troops in authoritarian regimes – though there are clearly also important needs for this given different security challenges.

The impact of counter terrorism policies in MENA: Carrot versus stick[2]

Using new yearly data that spans the period 1998 to 2012 Asal, Rethemeyer and Young modeled the behavior of violent nonstate actors (VNSAs) in the Middle East. They focused on organizations in the Middle East and North Africa that had either (a) been involved in an insurgency where 25 people died in battle during at least one year over this period or (b) killed at least 10 individuals through terrorist attacks during this period. Using several statistical techniques, including network modeling, logit analysis, and hazard modeling, the analysis shows **that governments can use strategies that influence a group's level of lethality, their relationships with other groups, and how long and if these groups become especially lethal**. When modeling why some groups become highly lethal (which we define as having killed more than 100 civilians in terrorist attacks in any year or causing more than 100 battle deaths in any year), we find that:

- VNSAs are more likely to kill many civilians in one year when they control territory and when governments use violence, or what we call a *stick* strategy, against them;
- VNSAs are most likely to kill many civilians in one year when governments use a *mixed* strategy – that is, a combination of violence (*stick*) and negotiation (what we term a *carrot* strategy) as opposed to either stick or carrot alone;
- VNSAs are most likely to inflict more than 100 battle deaths in one year when they control territory, are highly connected to other VNSAs, and are large (though there is a strong relationship between size and controlling territory);
- VNSAs are less likely to inflict more than 100 battle deaths in one year when they have a formal political party.

Again, I should note that the analysis presented here focuses on a specific kind of organization in MENA and not the world. If we broaden the type of organizations examined or the geographic scope the results could change. Nonetheless, these findings suggest that empirical analysis can give us insights into the impact of government policies and that strategic choices by governments can have important impacts on VEOs behaviors.

Dugan and Chenoweth (2012) look at more disaggregated data on counterterrorism and policies specifically within the Israeli and Palestinian context from 1987-2004 and find that repressive actions are either related to subsequent increases in terrorism and conciliation is related to decreases – depending on the time frames that are examined. This again underlines the importance that the same strategies may have different impacts depending on the actors being examined (Dugan and Chenoweth are not looking only at organizations), the geographic scope and the temporal period.

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[2] Material in this section was taken from Asal, Victor, R. Karl Rethemeyer, and Joseph Young: *An Analysis of Violent Nonstate Actor Organizational Lethality and Network Co-Evolution in the Middle East and North Africa* College Park, MD: START, 2016. And modified slightly

The impact of leadership decapitation and the use of drones

An analysis of the impact of leadership decapitation of terrorist organizations by Bryan Price provides empirical support for the proposition that decapitation can alter VEO behavior, depending on the nature of the organization. Price finds that:

> Contrary to this conventional wisdom, leadership decapitation significantly increases the mortality rate of terrorist groups, although the results indicate that the effect of decapitation decreases with the age of the group, even to a point where it may have no effect at all. This finding helps to explain the previously perplexing mixed record of decapitation effectiveness (Price 2012).

Note that Price draws an important distinction between overall results and the impact that such efforts will or will not have depending on the age and experience of the group: older groups are less susceptible to disruption from decapitation. This suggests that targeting decisions must take into account age and experience, among other organizational factors, when considering decapitating strikes. Price's work – like much of the work cited here should be caveated by his temporal constraints analyzing data from 1970 to 2008. In terms of organizational mortality, Jenna Jordan has found that organizational decapitation is not the most effective strategy – again especially if the organization is older and has more developed bureaucratization and communal support (Jordan 2014). We should also note that using different data **Patrick B. Johnston has found that decapitation within the context of campaigns is likely to be more effective (2012).**

More recent work by Patrick B. Johnston and Anoop K. Sarbahi examines the impact of drone strikes on terrorism in Pakistan from 2007 to 2011. While Johnston and Sarbahi cannot test the impact of drone strikes on recruitment, they do find that in the short run drone strikes decrease the number and lethality of terrorist attacks (Johnston and Sarbahi 2016).

Conclusion

In the paragraphs above we have identified at the strategic and operational level quantitative empirical analysis that indicates that certain kinds of policies can have both negative and positive impacts on the behavior of terrorist and insurgent organizations. Clearly not all policies have the results that are desired while some polices are having the impact that is desired. It is important that we underline the need for further research both in terms of more current data[3] as well as examining the impacts of such efforts both in the short term and the long term.

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[3] for example the Big Allied and Dangerous dataset is currently being updated and examples of the group data can be found at: http://www.start.umd.edu/baad/database

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Rich Davis, ARTIS

In my book published earlier this year (Hamas, Popular Support and War in the Middle East), I wrote about the only empirical evidence that shows a relationship between a Targeted Killing/Apprehension Program and an armed group's capability to project violence. Here is the pertinent section, which is in Chapter 7 of the book published by Routledge:

Israeli Targeted Killing and Apprehension Program

There are two different legal standards, which define the Israeli operations to kill Palestinians engaged in militant activities against Israel. First, there are those operations, which fall into the Targeted Killing and Apprehension Program. In a series of decisions by the Israeli High Court of Justice, the legality of performing Targeted Killings has three fundamental parts: [i] < #_edn1 >

1. A person who can be arrested is not an appropriate target for Targeted Killing;
2. A Targeted Killing cannot be a death sentence for previous acts. There must be evidence that the enemy combatant is part of the planning or execution of a future violent attack against the state; and
3. There must be sufficient care taken to minimize the risk to civilians to not be harmed in the process of the Targeted Killing.

IDF Commanders use terms like this person is part of the 'ticking infrastructure' [ii] < #_edn2 > when making a case for who meets the threshold for planning future attacks against the state.

The second legal standard is part of a program entitled, 'Canopy of Fire'. This program allows a special unit led by a major with an intelligence officer to determine if a target in Gaza can be eliminated. The difference between the Targeted Killing Program and the Canopy of Fire, lies mainly in the level of the Palestinian operative. High-level operatives fall into the Targeted Killing

protocol while the lower level operatives can be killed through the Canopy of Fire apparatus. No further definitions for what constitutes 'high' or 'low' level could be found.

Though the Targeted Killing and Apprehension Program used in the Second Intifada predates the Israeli High Court definitions described above, the operational aspects were applied similarly. According to multiple sources, it took many months for the IDF and Israeli Security Services to understand the tactical operations of the various Palestinian factions striking Israeli soldiers and civilians. With growing pressure coming from Israeli political leadership and public in mid to late 2001 the IDF and Security Services identified 500 Palestinian operatives, senior and junior, that were part of the violence campaign of the various Palestinian militant operatives. The idea was to kill or capture these operatives in order to degrade and destroy the Palestinian capacity to project violence into Israel. According to military strategists, the program essentially weakened Hamas's capacity to conduct violent acts against Israel.

A great deal of effort was spent trying to access Targeted Killing and Apprehension data from Israeli leaders. On multiple occasions, Israeli Security officials indicated that the data was classified and was therefore not available. With good fortune, two sources amenable to analysis were identified and used for this research. First, an article written by Ben Israel for a book entitled, A Ticking Bomb: Contending with Suicide Attacks was used. General Ben Israel was given the classified data for use in the article. To get around the classification, Ben Israel combined killings and apprehensions into monthly numbers. It is this material that provides much deeper Israeli understanding on the impact the arrests and killings had on the resistance operations of Hamas in the Second Intifada. Second, data from Zussman [iii] < #_edn3 > and Sharvit [iv] < #_edn4 > provides 37 Targeted Killings during the Second Intifada identified by specific date. All 37 Targeted Killings were independently verified by the author and the dataset was utilized in the time series analysis, the findings of which will be discussed after the discussion of the Ben Israel data.

In the article written on the Targeted Prevention Program, Ben Israel argues that defeating Palestinian terrorism is about destroying the network that is part of the production line leading to attacks. Figure 7.2 demonstrates what he calls a 'Terrorism Production Line'. He argues that the further up the production line the Israelis disrupt, 'the more effective its neutralization'. He further argues, 'neutralizing, whether through arrest or Targeted Killing,20%-30% of the participants of the production line, brings about a clear slowing of the production line and in the wake of this a clear decrease in the amount of attacks'.[v] < #_edn5

Figure 7.1

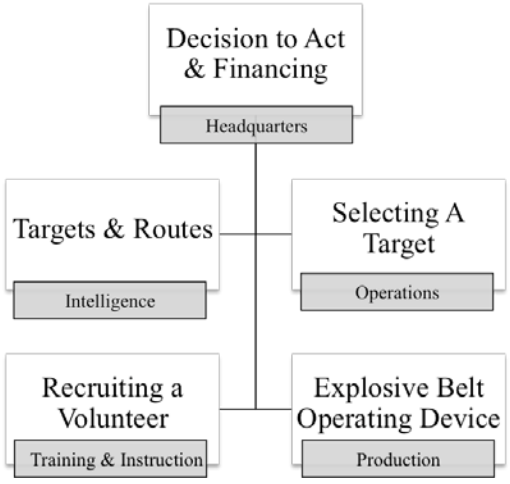
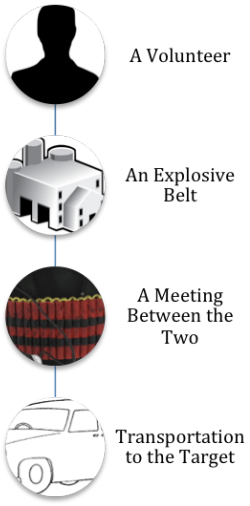


Figure 7.2



Ben Israel also argues that the fence around Gaza had an 'indisputable' role in preventing attacks coming from Gaza, even though he admits that much of the planning for the attacks on Israel was directed from Gaza and executed from the West Bank. Subsequently, he writes that according to captured militants, the existence of the new barriers in the West Bank forced Hamas operations to find ways around the barriers resulting in added warning time resulting in the increase in the percentage of preventions.

By mid-to-late2001, the Israelis had established the list of 500 Palestinian 'operatives 'that were part of the 'Suicide Bombing Production Line'. As quickly as possible, the IDF and Security Services were either arresting or killing those responsible for planning and executing the attacks against Israelis. According to Ben Israel, most of the targeted arrests and killings occurred in the West Bank and Gaza, respectively. Figure 7.3 articulates by quarter, the number of suicide attacks attempted, carried out and those that were prevented. The zenith of the number of attacks, initiated by Fatah's Al-Aqsa Martyr's Brigade, PFLP, PIJ and Hamas's al-Qassam Martyr's Brigade, occurred in the second quarter of 2003. The number of attempted and successful attacks declined from this point. Ben Israel argues that this is because the production line was severely disrupted and that replacements in the production line caused young and inexperienced persons to be put into positions for which they were not prepared. The result, he says, was reduced effectiveness from the production line:

It is true that new militants were appointed in the place of the ones who were neutralized, but these were usually much younger and lacking in experience compared to their predecessors. In addition, as the percentage of activists that were hit (or arrested) rose, and as the thwarting/prevention approached the top of the pyramid (whose peak was the assassination of Hamas leaders Sheikh Ahmad Yassin and Abbed al-Azziz Rantisi who was appointed in his place), the organization began allocating more and more resources towards self-preservation, and less towards suicide attacks. This process, which actually began with the assassination of the head of the military arm of Hamas, Salah Shehada (in July2002), eventually brought to drastic drop in the curve of attacks as it is reflected in the graphs [Figures 7.3 & 7.4]. [vi] < #_edn6 > Figure 7.3

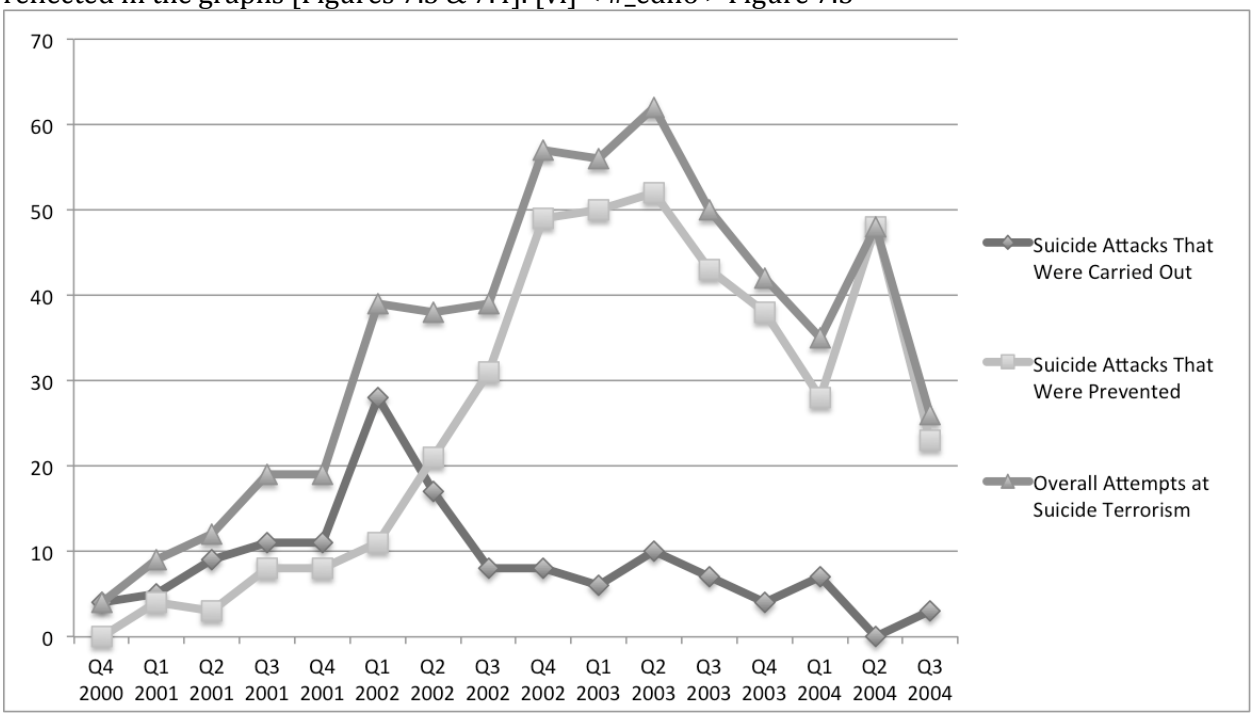


Figure 7.4

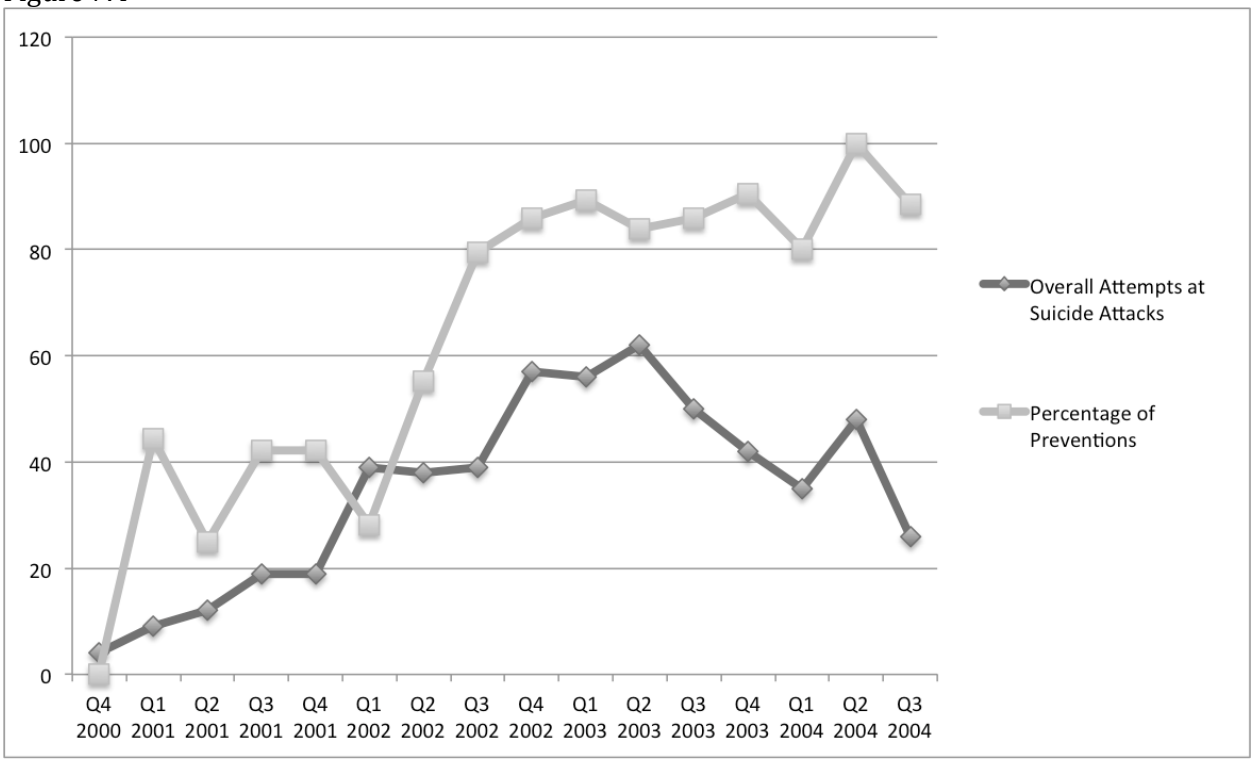
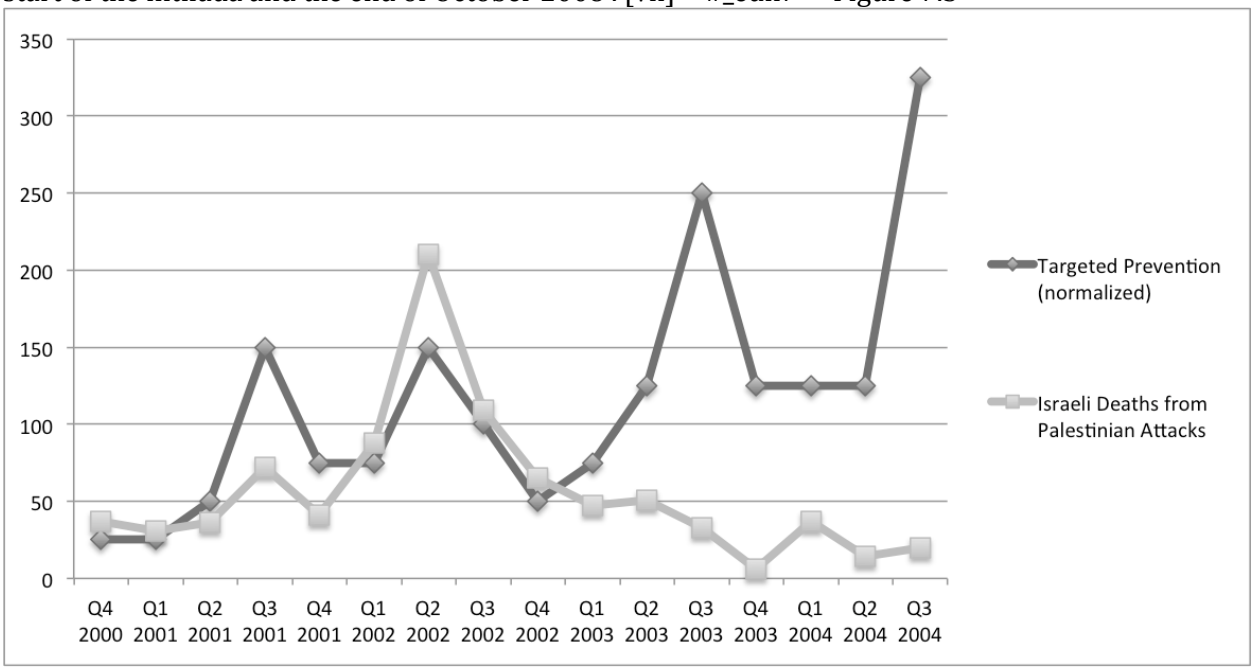


Figure 7.5 shows the targeted prevention activities by the Israelis and the total number of Israeli deaths by suicide bombings. The prevention activities combine the total number of killings and arrests into a single data point for each month of the intifada, which are reflected quarterly in the figure. The high-water mark for the number of Israeli deaths came in early 2002. Subsequently, the data shows that the frequency and lethality of the suicide bombings diminishes. It is not possible with this data to determine how many killings verses arrests were part of the program. According to the Human rights organization B'Tselem, 'the IDF assassinated 232 Palestinians between the start of the intifada and the end of October 2008'. [vii] < #_edn7 > Figure 7.5



On 26 January2004, a few months before his assassination, Abdel-Aziz al-Rantisi told Reuters that Hamas wanted a hudna (temporary truce) that could last, 'not more than 10 years'. [viii] < #_edn8 > It was clear some ten months before the death of Yasser Arafat that Hamas wanted to end the intifada with the Israelis, but desired a mechanism to do so without losing support from the group's militant operatives. It is unclear whether the Targeted Prevention Program of the Israelis led to this conclusion for the Hamas or if other factors were involved, but Rantisi made it clear that the Hamas wanted a hudna. On this point Ben Israel wrote:

…We can conclude that the suicide terrorism intifada was defeated through a strategy that included first and foremost identifying the key players in the terrorism production line and neutralizing them: either through arrest(and this was only possible in Judea and Samaria), or through assassination("targeted thwarting/prevention") in the case that their arrest was not possible (usually in the Gaza strip)….The attacks on people who planned, organized, recruited volunteers to commit suicide and coordinated the "production" of suicide terrorism is what brought about a dramatic drop in the number of attempts at suicide terrorism, and this was around a year and a half before Arafat's death.[ix] < #_edn9 >

So, what are we to think about data on the effectiveness of the Targeted Killing program written by a former Israeli General? In an attempt to verify the conclusions reached by General Ben Israel, the author conducted a review of the Hamas violence data and spoke directly to Hamas and Palestinian leaders about the program. As evidenced in the violence dataset, the fact is that the number of Hamas attacks against Israel lessened in the latter part of 2003, coinciding with the Targeted Killing and apprehension data described by Ben Israel. Though this could have been by choice of Hamas leaders, the data does show a significant decline in the lethality of attacks after August 2003. This reveals that the potency of the dozens of attacks that occurred between August 2003 and December 2004 were less harmful, which does suggest that lesser skilled operatives were planning and/or executing the attacks. In other words, the data demonstrates that the decline in the lethality of Hamas attacks predated the fall off in Hamas attacks, further suggesting that Hamas capability to launch attacks with lethality rates seen in late 2002 and early 2003 may have been impaired through the Israeli program. It, therefore inconceivable, that Hamas may have had reduced militant capabilities, due to fewer operatives and lesser skilled persons, as a result of the Israeli Targeted Killing and Arrest Program. According to Ariel Merari, the Israeli program became a deterrent for the remaining Hamas leadership, particularly after two of its senior leaders (Yassin and Rantisi) were killed in early 2004.

In Cairo in September 2012, Mousa Abu Marzouk responded to questions about the impact of Targeted Killings on Hamas decision-making, including the idea that the killings influenced the group to move from the Intifada toward elective national politics. He said, 'Hamas did not change its policy based upon this. The Israelis were killing our leaders, this we came to accept as part of our cause. We saw no difference in the program from the Israelis. From 2007, the Israelis have not killed leaders from Hamas and Fatah'. We know that the Targeted Killings continued just after this interview with Marzouk, when an Israeli helicopter gunship killed Al-Jabri, head of the al-Qassam Brigades in early November 2012; this event contributed to the escalation toward Gaza War II. Even though the Israelis specifically targeted the Suicide Bombing Production Line, Marzouk suggested that it made no difference to the future policy of Hamas in regards to its resistance operations.

After discussions with many Palestinians and Israelis on this question, there was general agreement that Hamas did shift, in part, away from the intifada because of the Israeli program. This, however, is not something that any Palestinian would say on the record. Further, it makes no sense for Hamas

to admit that such actions were influential in internal decision-making. In an interview after the cessation of the intifada in 2005, Osama Hamdan said on BBC Arabic, 'Hamas has halted the suicide attacks for the benefit of the Palestinian people'. In a different off the record exchange, a Senior Hamas leader said that al-Assam stopped the suicide bombings because, 'our people were exhausted'.

At one point during the Second Intifada, Hamas putout the following statement on their website in relation to the number of assassinations the group had absorbed:

The Zionist enemy succeeded in killing many of the fighter brothers, and this is at a time when we are in dire need of every pure fighter. There is no doubt that enemy's frivolousness is one of the central factors to the enemy's success, that indeed its electronic spying helicopters do not leave Gaza's skies, the numerous eyes appointed to the mission do not know sleep and the Apache helicopters are prepared and ready with their missiles and waiting for the opportunity.

Here you are under constant surveillance twenty-four hours a day. Here you are a target for assassination every day, and even every hour.

All the fighters must consider themselves to be a target for assassination. No one should delude himself that he is not a target.

None of the brothers should arrange the times for their travels or their placement using phones, since all the telephone frequencies are captured. You are wanted and being followed.

The brothers should not use cars in order to move from place to place, since you do not know who has been appointed to follow you, and this could be a convenience store owner, your friend whose house looks onto your house, a merchant or a car that watches over your house twenty-four hours a day. If the brothers do use a car, none of the brothers should drive with more militants so that there won't be more than one brother in the car.

All the brothers should displace themselves only in emergency situations, and it is better if the movement is in narrow streets.

All of the brothers should conceal themselves during their displacement in order to obscure things, whether by wearing specific clothes, whether by changing the direction of travel, etc.[x] < #_edn10 >

After extensive statistical review, the Israeli Targeted Killing and Apprehension Program data sourced from Ben Israel, who sourced classified Israeli Security Services documents, provided no predictive power on the use of Hamas violence or any other Palestinian popular support measure. As described in the analysis above and through the words posted on the al-Qassam website, we can see that the program had tactical efficacy in reducing the frequency and lethality of Hamas attacks against Israel. The striking thing about this finding is that one might expect that Targeted Killings of Palestinians would predict a higher level of Support for Violence against Israelis. This, however, is not the case.

In a different analysis, the Zussman and Sharvit data was analyzed using time series tools. That data included the dates of37 targeted killings of senior Palestinian operatives, including 21 Hamas members, by Israeli Security Forces from June 2000 to October 2008. Neither the 37 targeted killings nor the subset of Hamas targeted killings predicted Hamas use of violence or any other Palestinian popular support measure. Yet, in a 2013 article, Karen Sharvit and company asserted

that the Targeted Killings of Senior Palestinians leaders, led to reprisals by Palestinian Factions, typically within two weeks. The difference in these findings is likely due to the specificity of the Sharvit analysis. They used only a fraction of the nearly 250 Targeted Killings over the same period and looked for corresponding data about reprisals for specific acts.[xi] < #_edn11 > The fact that Sharvit found evidence of reprisals could be attributed to the fact that their data represents the killing of only high-level operatives while the Israeli data represents all killings and arrests. Further, it is possible that Palestinian factions launched reprisals for all Targeted Killings, but it could not be seen in the time series analysis because of the length of time it took to conduct the operation. It could also be that the reprisals Sharvit discusses were merely a function of Palestinian Factions saying that a previously planned bombing was revenge for a particular Targeted Killing. This is the most likely explanation given the challenges Palestinians had in conducting operations in the face of high Israeli pressure, particularly in the West Bank.

Qualitatively, we can see that the death of individuals like Ayyash and Jabri have resulted in a form of cult-hero status within the population. In interviews with families of suicide bombers in Hebron, the iconic value of the Palestinian leaders killed by Israelis was evident. Families described how their children wanted to follow in the footsteps of those 'martyrs' before them, describing even lower level persons as heroes. Hamas clearly uses the Targeted Killing of their leaders and militants as a recruitment tool for future generations of fighters. Yet, analysis of the quantitative measures does not demonstrate a cause and effect or predictive capacity between Targeted Killings and any violence or popular support data.

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[i] < #_ednref1 > Israel High Court of Justice, 2005, HCJ 769/02, December 11.
[ii] < #_ednref2 > Blau, Uri, 2008, 'License to Kill', Haaretz, November 27.
[iii] < #_ednref3 > Zussman, Asaf and Noam Zussman, 2006, 'Assassinations: Evaluating the Effectiveness of an Israeli Counterterrorism Policy Using Stock Market Data', Journal of Economic Perspectives, 20:2:2006:193-206.
[iv] < #_ednref4 > Sharvit, Keren, et al., 2013, 'The effects of Israeli Use of coercive and conciliatory tactics on Palestinians 'use of terrorist tactics: 2000-2006', Dynamics of Asymmetric Conflict, 6:1-3, 12-24.
[v] < #_ednref5 > Ben Israel, Contending with Suicide Terrorism.
[vi] < #_ednref6 > Ibid. 35-36.
[vii] < #_ednref7 > Blau, 'License to Kill'.
[viii] < #_ednref8 > Tostevin 2004.
[ix] < #_ednref9 > Ben Israel, Contending with Suicide Terrorism, 37.
[x] < #_ednref10 > Ibid. 36.
[xi] < #_ednref11 > According to various NGO reports and inconsistent interview data, there were approximately 120 to 200 Targeted Killings by the Israelis during the Second Intifada. The Zussman and Sharvit dataset only represents between one-fifth and one-third of those acts.

Neil Johnson, University of Miami

We have found that an escalation in the creation of these online VKontakte groups seems to precede an outburst of on-the-ground attacks — an important example being the attack on Kobane in 2014. So this could act as a 'left of boom' tool in that it requires no on-the-ground attacks to have yet happened in a region in order to work.

For scenarios where there have already been on-the-ground attacks and you are interested in predicting the severity or timing of future ones, there actually are two patterns that we have shown to be robust in published papers. The first paper "Simple Mathematical Law…" attached from 2013, discusses this, and the second was just presented at a Conference on Conflict Studies. The 2 key features are:

1. the severity of individual attacks always seems to follow a so-called power-law distribution, which is unlike the distribution of heights in a room, say, in that the 7ft, 7-ft, and 700ft person become quite likely. So an equally broad range of severities is to be expected. Moreover, all 'David vs Goliath' (i.e. asymmetric) conflicts seem to have the same value characterizing this power-law distribution of severities, around 2.5. In our 2013 study attached, ISIS did not exist and so is not included in the data -- but when we add it using the available data, it fits as shown in the attached diagram which also includes AQI (Al Qaeda in Iraq) etc. Here the 'ISIS' events are broken down according to the database, into ISI (Islamic State in Iraq) and ISIL (Islamic State of Iraq and the Levant).

We show that this common pattern can be explained and reproduced precisely, in the paper. It comes from the common way in which a 'David' (i.e. nomially weaker but agile and adaptive) collection of fighters behaves when attacking a 'Goliath' state which is more powerful but typically less agile and adaptive. Knowing this, and haveing a precise mathematical tool that repoduces it, then allows us to run 'what if' scenarios for testing out the likely results of interventions etc.

2. the timing of attacks follows reasonably well the 'progress curve' known from organizational development and learning literature. This reflects, we believe, the agile, adaptive learning of 'David' versus the arguably more sluggish 'Goliath. (Excuse the analogy. Another one is the 'Red Queen-Blue King' analogy that we use in the paper attached, in which a nominally weak but agile 'Red Queen' is adapting and counter-adapting against a far stronger but more sluggish 'Blue King').

These results are the result of many years of analysis using all available datasets on such conflicts — so we are confident that any future such asymmetric conflicts will also follow these same patterns — irrespective of cause or location. I don't want to over-promote our work, but I think it is fair to say based on the attention that all our work has received over recent years, that it is regarded as cutting-edge internationally in terms of analysis of event-level data across conflicts and terrorism.

Adagio…crescendo… catastrophe….adagio.

Jen Ziemke, Ph.D.
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While in some ways ISIL strategy markedly differs from other violent groups, its behavior nevertheless mirrors other quite different rebellions and insurgent organizations in history in important ways. Several quite different groups seem to time their most savage attacks against civilian populations according to their fate on the battlefield. Consider, for example, the behavior of the RUF in Sierra Leone during their reign of terror under *Operation No Living Thing*, or UNITA's appalling treatment of civilians during the latter half of the second Angolan war (1991-2002), or the surge in civilian deaths in Sri Lanka just before the LTTE was defeated in Sri Lanka in early 2009. Despite how different these organizations may be from one another, they share a kind of tactical timing or battlefield rhythm: when they began to *lose* the war, lose territory, and lose fighters, each group escalates their campaign to deliberately target civilians, and in increasingly grotesque ways, and even more than before.

When a violent organization begins to **lose the war, warning signs** anticipating imminent and severe threats to civilian populations **should be flashing red** around the world, and especially for populations inside the battlespace itself**.**

My research on the Angolan war found the rebel group UNITA was far more likely to commit massacres and deliberately terrorize civilians *when they were losing* than at any other time period during the war. I found a strong relationship between the presence of battlefield and territorial losses in one period with deliberate civilian targeting and massacres in the next. Others have agreed that there seems to be something about *losing* a conflict that increases the likelihood that violent organizations will adopt a deliberate strategy of savagely laying waste to civilian populations. [4]

So if ISIL is facing a kind of imminent, existential threat to their survival, what might one anticipate would be their next move, particularly after they lose Mosul and retreat west, toward Raqqa?

When viewed as a complex system, from above, **one might imagine the group doing something utterly catastrophic to the entire city, even as this behavior risks destroying a large number of their own fighters along with everyone else.** Such atrocities might be viewed as a "gamble for resurrection" as the cornered fight harder, and nastier, than before. We expect they will lash out, possibly destroying themselves in the process, burning the whole city, gassing, or destroying everything, seemingly preferring that outcome to one that would mean defeat by another hand. Like a David Koresh-style cult, they all may go down together. If a localized heavy climax of violence occurred, of course this would itself be a signal of their imminent demise, at least as it concerns the kinetic space and in the near-term.

Also likely, however, is the scenario in which, despite ISIL's retreat from Mosul, messages fly and global networks activate, and an attack elsewhere is put into motion. But where? Of course, anywhere

[4] See Lisa Hultman, "Battle Losses & Rebel Violence: Raising the Costs for Fighting," Terrorism & Political Violence, 19:205-222: 2007. Mark McDonald. "Civilian Deaths Surge in Sri Lankan War," *The New York Times*. February 21, 2009; Jen Ziemke. "Turn and Burn: Loss Dynamics & Civilian Targeting in the Angolan War," *Journal of Economics & Politics* 20(1). December 2012.

is always possible, and perhaps it is our lack of imagination, but we distinctly imagine certain spots to be far more likely targets than others. **We suspect heightened risk in those regional cities relatively closer to the battlefield. Nightclubs in Beirut, Istanbul, or Amman face heightened risk, particularly because such targets would serve to both maximize casualties and send a culturally-relevant message. Thus, cafes, nightclubs, & bars** in these locations are more imaginable as a choice of target to us than many other alternatives. Continuing signs of instability in Saudi Arabia might place sites there at greater risk vis-a-viz some others. And given the state of aggrieved populations in certain European suburbs, we suspect sites in Italy, France, and symbolic targets like the London Eye to round out a set of best guesses. Additionally, one should also expect that in the Iraq, coalition forces would be smart to protect the rear from attacks on cities like Kirkuk, that otherwise might catch a force off-guard who would clearly be otherwise shifting its gaze westward as the main front retreats toward Syria.

In addition, global events also will affect the CENTCOM AOR, particularly if the situation in N. Korea continues to escalate. **Should an event on the Korean Peninsula occur**, one should expect ISIL to attempt to take advantage of our seeming shift in attention and time their attacks accordingly, albeit on the other side of the world.

Timing is Everything: Battlefield Rhythms & Op-Tempo

Converting conflict data into sonic landscapes for pattern analysis allows us to actually *hear* the battlefield rhythm and op-tempo of the conflict.

Drip, Drip, Drip. When micro-level event data (battles, massacres, ceasefires, etc) on the 41-year long Angolan war are played over time, we learn just how *slowly* these campaigns tend to begin. Like drops of water slowly coming out of a faucet, each individual event is marked by a duration of silence between events. Very violent campaigns of all kinds tend to start very slowly. An event here. Pause. An event there. And it is silence that animates the space between events.

However, when groups begin to lose, losers lash out against civilians, and the pace accelerates. After you have listened to a conflict dataset for some time, you comes to recognize patterns you have heard before, from other wars. And what began as a slowly dripping water faucet predictably accelerates into a cacophony of violent events, where the individual drips can no longer be heard. What is remarkable is that you can anticipate the trajectory: the familiar, accelerating pace. You can actually feel it and tap your toe to it, and when you look at someone across the room listening to the same dataset, you know they feel it too. Sonic layers of peace talks and ceasefire attempts chime like bells on the background of even more death and destruction: now a civilian train is terrorized, next another village. You learn that peace talks and ceasefires tend to make it worse in the near-term, and rainy season and dry season offensives each share their own temporal peculiarities.

From my analysis and observation, I've learned losing groups do not go down quietly, nor without a fight, and the individual drops or events turn into a firestorm of violence, but then, and even more rapidly, the fire dies, the losing side scatters, and the storm subsides. A few chirps amidst the silence mark the end, *and the war dies in much the same way it starts, as an inverse refrain on how it began, little by little, punctuated by silences: an event here, an event there*. Adagio crescendos to an absurdist cacophony, but just as quickly, it reverts back to the same Adagio in the end**. And thus the start of the war helps to inform just how it ends, it is actually the same melody, played again,** the last few chirps are the dying memory of a war that once was, but is already, in many ways, almost over.

Coda

On January 5, during the Armed Services Committee Hearing on Cyber Threats, ADM Mike Rogers emphasized the need to improve the IC's ability to understand real-time data streams on cyber activity, stating: "The biggest frustration to me is speed, speed, speed. We have got to get faster, we've got to be more agile. And, so for me at least within my span of control, I'm constantly asking the team, what can we do to be faster and more agile?"

One answer might be to take advantage of a basic fact about human perceptualization: numerous studies on data sonification and audification have shown that ***our ears hear faster than our eyes see*.**

Imagine a persistent yet pleasant audio landscape representing a real-time data stream forming the background of an analysts' working environment. Data of all kinds, including cyber traffic, are compressed and converted into a pleasant sonic landscape. The daily presence of this background "music" would passively teach any listener all kinds of different things about its patterns and structure. Analysts would come to learn what sounds normal, and what does not, and maybe even use this technique to help anticipate what comes next.

In short, the analyst would *come to know what an average day at the office sounds like,* as the familiar refrain becomes a baseline representation of average data, such that any significant changes in tone, velocity or pace would *serve as an early warning* detection system.

It would seem that in an environment where timing is nearly everything, such a low-cost and low-risk experiment would at least be worth a try.

Biographies

Victor Asal

Victor Asal (Phd University of Maryland, 2003) is Chair of the Department of Public Administration and Policy and an Associate Professor of Political Science at the University at Albany. He is also, along with R. Karl Rethemeyer, the co-director of the Project on Violent Conflict < Caution-http://www.albany.edu/pvc/ > . Dr. Asal is affiliated with the National Consortium for the Study of Terrorism and Responses to Terrorism (START < Caution-http://www.start.umd.edu/start/ >), a Department of Homeland Security Center of Excellence. Dr. Asal's research focuses on the choice of violence by nonstate organizational actors as well as the causes of political discrimination by states against different types of groups including, ethnic minorities, sexual minorities and women. In addition, Prof. Asal has done research on the impact of nuclear proliferation on crisis behavior and on the pedagogy of simulations. Asal has been involved in research projects funded by the Defense Advanced Research Projects Agency, Defense Threat Reduction Agency, The Department of Homeland Security, The National Science Foundation, and The Office of Naval Research.

Richard Davis

Richard Davis is the Chief Executive Officer and Co-Founder of Artis International. Artis is an interdisciplinary field-based scientific research and development institution working with various governments, NGOs, universities and private sector entities in risk management and conflict resolution and mitigation efforts across the globe through four divisions: 1) Field Based Conflict Research, 2) Energy & Natural Resources, 3) Cyber Defense and 4) Health & Medicine.

Richard holds several active appointments, which include: Founding Fellow at the Centre for the Resolution of Intractable Conflict at the University of Oxford; Senior Research Fellow, Harris Manchester College, University of Oxford; Senior Research Associate, Centre for International Studies, Department of Politics and International Relations, University of Oxford; Professor of Practice, Arizona State University; and Member, Permanent Monitoring Panel on Terrorism, World Federation of Scientists.

Richard served at The White House as the Director of Prevention (terrorism) Policy. Prior, he was the Director of the Task Force to Prevent the Entry of Weapons of Mass Effect (framework for the prevention of the smuggling of nuclear materials) and the Director of the Academe, Policy and Research Senior Advisory Committee for two different Secretaries at the United States Department of Homeland Security.

Richard has been a Senior Policy Fellow at RTI international, a Senior Associate at the Center for the Study of the Presidency and Congress, led a non-profit international development organization dedicated to the education and development of youth, including crime prevention, prevention of radicalization and conflict mitigation, and a school administrator and teacher.

Richard has authored or co-authored articles and publications on energy, international security, political violence and terrorism. He is the author of a book entitled: *Hamas, Popular Support & War in the Middle East* that was published by Routledge in February 2016.

Richard has a PhD from the London School of Economics; an MPA from Harvard University; an MA from the Naval War College; and an MA from Azusa Pacific University. He holds Baccalaureate Degrees in Finance and Social Science from Hope International University.

Neil Johnson

Neil Johnson heads up a new inter-disciplinary research group in Complexity at University of Miami (Physics Dept.) looking at collective behavior and emergent properties in a wide range of real-world Complex Systems: from physical, biological and medical domains through to social and financial domains. The common feature which makes Complex Systems so hard to understand, and yet so fascinating to study, is that they all contain many interacting objects, with strong feedback from both inside and outside the system, and are typically far from equilibrium and exhibit extreme behaviors. Neil's research group is involved with interdisciplinary projects across multiple other departments and schools within the University of Miami, and other institutions both within U.S. and globally, e.g. Universidad de Los Andes in Bogota, Colombia.

Prior to coming to UM in 2007, Neil was Professor of Physics at Oxford University, having joined the faculty in 1992. He did his BA/MA at Cambridge University and his PhD at Harvard University as a Kennedy Scholar. He has published more than 200 research articles in international journals, and has published two books: "Financial Market Complexity" (Oxford University Press, 2003) and "Simply Complexity: A Clear Guide to Complexity Theory" (Oneworld Publishing, 2009). He also wrote and presented the Royal Institution Lectures in 1999 on BBC television, comprising five 1-hour lectures on “Arrows of Time”.

He is joint Series Editor for the book series "Complex Systems and Inter- disciplinary Science" by World Scientific Press, and is the Physics Section Editor for the journal "Advances in Complex Systems". He is Associate Editor for "Journal of Economic Interaction and Coordination", and is an Editorial Board member of "Journal of Computational Science". He previously served as an editor of "International Journal of Theoretical and Applied Finance". He co-founded and co-directed CABDyN (Complex Agent-Based Dynamical Systems) which is Oxford University's interdisciplinary research center in Complexity Science, until leaving for Miami. He also co-directed Oxford University's interdisciplinary research center in financial complexity (OCCF).

R. Karl Rethemeyer

R. Karl Rethemeyer, a graduate of Harvard University's John F. Kennedy School of Government is currently serving as Interim Dean of Rockefeller College of Public Affairs and Policy, University at Albany - SUNY. Rethemeyer's primary research interest is in social networks, their impact on social, political, and policy processes, and the methods used to study such networks. Through the Project on Violent Conflict < Caution-http://www.albany.edu/pvc/ > , Dr. Rethemeyer is currently co-investigator for two projects. The first focuses on organizational terrorist networks and is funded by the National Consortium for the Study of Terrorism and Responses to Terrorism (START), a Department of Homeland Security Center of Excellence. His work has focused on how networks affect the use of various forms of terrorism (including suicide terrorism and CBRN attacks), the lethality of terrorist organizations, the propensity of such organizations to attack soft targets, and the propensity to choose or eschew lethal violence.

Dr. Jen Ziemke

Jen Ziemke, (Ph.D., Political Science, University of Wisconsin-Madison), engages national and international institutions on ideation for a diverse set of hard problems, such as how citizen reporting from live conflict events shapes the nature of the battle space in real time. She is currently exploring how multimodal data perceptualization (visual & audio) can be leveraged to help understand and peripherally monitor temporal data streams.

Jen served as Co-Founder & Co-Director of the International Network of Crisis Mappers, an international community of experts, practitioners, policymakers, technologists, researchers, journalists, scholars, hackers and skilled volunteers engaged at the intersection between humanitarian crises, technology and rapid mapping**. Reuters AlertNet** named Crisis Mapping one of its **Top 20 Big Ideas** in 2011. She also managed an international conference event, the ICCM, held in Manila (2016), New York (2014), Nairobi (2013), the World Bank (2012), Geneva (2011), Harvard (2010), and Cleveland (2009).

Jen has consulted with, briefed, or engaged programs within the DoD, ONR, DARPA, DIA/MINERVA, National Intelligence Council, NDU, the United Nations Office of the Secretary General, UN-OCHA, UN-SPIDER, the World Bank, US Department of State, Rockefeller Foundation, Woodrow Wilson Center, Yale, Carnegie Mellon, Rochester Institute of Technology, Notre Dame, TED & her projects have been covered in several national and international outlets, including the Voice of America, Reuters, NPR, CNN, Huffington Post, Wired, The Chronicle of Higher Education, among others.

In her role as Associate Professor of International Relations at John Carroll University she teaches courses at the intersection of research methodology, international security, international relations, and conflict processes. She serves on the Board of Directors for the Open Geospatial Consortium (OGC) & the MapStory Foundation, & is principal consultant at Endogeneity, LLC.

Jen received her Ph.D. from the University of Wisconsin-Madison (Political Science) and undergraduate degree from the University of Michigan-Ann Arbor. She also served as a Crisis Mapping and Early Warning Fellow at the Harvard Humanitarian Initiative (HHI) and was named a 2013 recipient of the University of Michigan's LSA Humanitarian Service Award, presented annually by the Dean to 3 living alumni in recognition of their work.

Jen was a Peace Corps volunteer on the Namibian side of the Angolan border from 1997-1999. She has hitchhiked 20,000 miles in over a dozen African countries and has a set of very cursory experiences drawn from short stints in several different warzones around the world.